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Terminology and Abbreviations

ADT Admission, Discharge, and Transfer
ARO Antibiotic Resistant Organism
BIDW Business Intelligence Data Warehouse
C.diff Clostridium difficile
CDI Clostridium difficile infection
DAD Discharge Abstract Data
Ehealth Healthcare practice supported by electronic processes and communication
ED Emergency Department
ESBL Extended Spectrum Beta Lactamase
FirstNet A comprehensive emergency department information management system that helps hospitals improve emergency department workflow from triage through discharge
IC Infection Control
ICP Infection Control Practitioner
ILI Influenza Like Illness
IM/IT Information Management/Information Technology
IPC Infection Prevention and Control
MRSA Methicillin Resistant Staphylococcus Aureus
NRGH Nanaimo Regional General Hospital
NSQIP National Surgical Quality Improvement Program
OMS Outbreak Management Structure
OR Operating Room
ORSOS Operation Room Scheduling Operating System
PharmaNet Province-wide network that links all BC pharmacies to a central set of data systems
SSI Surgical Site Infection
VIHA Vancouver Island Health Authority
VRE Vancomycin Resistant Enterococcus
### TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliate</td>
<td>Facility that has a contract with VIHA to provide specific services</td>
</tr>
<tr>
<td>Confidence Interval</td>
<td>The confidence interval (CI) is a range of values within which the “true” value of the rate is expected to occur (with 95% probability). Throughout this report, the CI has been determined at 95%. The CI is generally used when there are a small number of observations or cases, and indicates the range of values in which there is confidence that the identified rate will fall 95% of the time. In reading the charts where a CI has been applied, there is more confidence/reliability in the rate the shorter the “black” line.</td>
</tr>
<tr>
<td>Residential Care</td>
<td>Long Term Care Facilities</td>
</tr>
</tbody>
</table>
Executive Summary

This Annual Report of the Vancouver Island Health Authority (VIHA) Infection Prevention and Control (IPC) Program highlights the achievements and continued challenges facing infection prevention and control practices. The report outlines the infection prevention and control activities undertaken within VIHA during Fiscal Year 2012-13 (April 1, 2012 to March 31, 2013).

This fiscal year, the IPC Program has been involved in a number of major projects and initiatives as well as a significant number of development activities and accomplishments including the following:

PROVINCIAL:

- Contributed to the provincial policy on hand hygiene, through membership at the Provincial Hand Hygiene Working Group, and on four sub-groups: Communications, Reporting, Evaluation and Infrastructure;
- Contributed to the British Columbia *Clostridium difficile* infection toolkit and clinical management algorithm through participation in the *Clostridium difficile* Infection Toolkit Working Group; and

REGIONAL:

- Implemented the Cerner IPC Module in July 2012 for use by VIHA staff;
- Worked closely with the Heart Health program to reduce the incidence of surgical site infections and collaborated in audits to review environmental and process risk factors;
- Improved utilization and collection of data for prompt and effective case management and surveillance of infection processes and outcomes across VIHA by collaborating with a number of VIHA programs including Clinical Informatics, the National Surgical Quality Improvement Program, the Nanaimo Regional General Hospital Emergency Department, and Surgical Services;
- Developed and implemented a comprehensive, collaborative approach to the Outbreak Management Structure through a single step on-line process;
- Participated in reporting communicable diseases to the the Occupational Health and Safety call centre;
- Developed and implemented a Health Shared Services BC “NO GO” list posted on-line to enable purchases to be pre-screened for IPC approval for safety;
- Participated in the North Island Hospitals Project and Oceanside construction;
- Participated in Cowichan District Hospital operating room value stream mapping for improvement in patient flow, and suggested design suggestions for the future; and
- Developed a means to improve the efficiency of surgical site infection surveillance by utilizing data in VIHA’s business intelligence data warehouse and laboratory information system. Records in these data sources are scanned to efficiently identify patients with a possible surgical site infection for further investigation.

As the IPC Program moves forward into 2013-14 the focus will be on:
- Building capacity and capability of the IPC team by continuing recruiting and training a cadre of highly skilled IPC practitioners and consultants – “grow our own”;
- Enhancing the Cerner Infection Control module through Phase 2 with systematic realization of its benefits for case monitoring, outbreak detection and routine surveillance;
- Implementing an on-line physician Infection Control Training Module; and
- Applying informatics to utilize VIHA’s Business Intelligence Data Warehouse in the surveillance of selected healthcare-associated infections.
Introduction

The IPC Program is part of the Quality, Research and Safety Portfolio. In a shared accountability model with clinical programs, the IPC Program is responsible for:

- Providing expert IPC advice and support;
- Supporting the organization in the implementation of accreditation and other applicable standards;
- Collaborating with partners to develop and implement standardized approaches to IPC issues (including outbreak management and surveillance); and
- Building capability through education and issue-specific consultation to staff.

The IPC Program functions in accordance with international, national and provincial guidelines and best practices across the continuum of care. The program influences practice through the following actions:

- Manages infection surveillance and disseminates data to appropriate stakeholders;
- Develops and recommends policies, procedures, and best practices and construction consultation as it pertains to IPC;
- Provides education and training to healthcare providers, patients and nonmedical caregivers; and
- Provides consultation and outbreak management support to all acute care hospitals, health centres, residential care facilities and community programs owned/operated by VIHA.

During the 2012-13, the IPC Program has continued to support processes that promote shared accountability, strengthen the infrastructure for an integrated IPC program, as well as maintaining and strengthening the linkages with the programs that promote IPC practices (Public Health, Occupational Health & Safety, Laboratory [Microbiology], Pharmacy).

There have been technical and workflow challenges with the July 16, 2012 implementation of the Cerner Infection Control module:

- The module runs slowly, impacting efficient data collection and ICP’s workflow; and
- The continuum of information flow from the nursing units to the Infection Control module is not yet optimized as there is significant interdependence between nursing, laboratory information system users and IPC.

To effectively manage these technical and workflow challenges the IPC program has been working closely with IM/IT to commence Phase 2 of the project. In Phase 2, Cerner’s upgraded version of the Infection Control tool will be implemented, initiatives to increase communication between nursing units and the IPC team will be rolled out, and workflow for IPC will be streamlined. A status report for the IM/IT-IPC Project for the 2012-13 fiscal year can be found in Appendix 2-a.
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 person-to-person transmission in hospital. This continues to have a positive impact on duration of outbreaks and number of people affected. Work continues to create sustainable improvement, based on education, supporting accreditation and feedback to clinical areas.

Responsibility for IPC is an organizational wide responsibility where the ‘ownership’ of IPC practices and principles rests with functional departments and front line staff, supported by expert content input from IPC. Sustained IPC improvements within VIHA will be achieved through initiatives such as:

- introducing a Provincial Infection Prevention and Control Training Module in the Learning Management System for all employees, physicians, volunteers, and contract services; and
- updating and reformatting the IPC Manual to an interactive Reference Guide to expedite information searches.

These types of initiatives will empower healthcare providers to understand and incorporate the principles of IPC into their daily work.

Development Work

The IPC Program was involved in the following major projects and initiatives this fiscal year:

- Development of new non-contract consultant positions and associated organizational changes in reporting lines and accountability;
- Phase 2 of Cerner IM/IT Infection Prevention Control project;
- IPC access to First-Net and Ehealth Viewer to enable surgical site infections and catheter associated urinary tract infection surveillance of patients who have been discharged from hospital, and rapid identification of patients in the ER that may require precautions; and
- Construction projects: Oceanside, North Island Hospitals Project, Nanaimo Regional General Hospital ER, and Cowichan Lodge.

In addition, the IPC Program participated collaboratively with other program areas in:

- Heart Health to investigate and address increased incidences of cardiac surgical site infections;
- OR and Endoscopy patient mapping at Cowichan District Hospital;
- Capital Planning for equipment and programs with IPC requirements;
- Health Shared Services BC “NO-GO” list created to identify purchases of difficult to clean equipment;
- Occupational Health & Safety call centre inclusion in Outbreak Management Structure for staff protection;
- A review of reprocessing environments and procedures, by collaborating with the Reprocessing Coordinator to review processes, new programs, renovations and new
construction, to ensure standards and best practices in infection control are adhered to; and

- A review and recommendations for general support services including development of educational materials and review of existing policy and procedures.

**IM/IT Infection Prevention and Control Project Phase 2**
The purpose of Phase 2 is to address the system performance issues and improve usability of the Infection Control module. The expected benefits include:

- Faster user experience;
- Streamlined data viewing;
- Improved access to information needed for prompt and effective intervention and case management; and
- Improved surveillance of infection processes and outcomes across VIHA.

This will promote and support evidence based best practice. It will also contribute to reducing the present burden of manual data entry.

**Application of informatics and VIHA`s Business Intelligence Data Warehouse**
In January 2013, the IPC Program began to utilize VIHA’s Business Intelligence Data Warehouse, a repository of administrative data collected from the Cerner transaction system and the Operating Room Scheduling Operating System. A tool to scan surgery records in the data warehouse and laboratory reports was developed to remove manual processes involved in the surveillance of surgical site infections. A detailed description of the tool is found in Appendix 2-b.

## Outbreak Management

During fiscal year 2012-13 a total of 11 outbreaks were declared in VIHA’s acute care facilities (ten due to Norovirus or other enteric viruses, and one due to *Clostridium difficile* infection). Another 16 outbreaks were declared in VIHA’s owned/operated residential care facilities (seven due to enteric viruses and nine due to respiratory viruses). A total of 25 outbreaks were declared in VIHA affiliated residential care facilities during 2012-13 (16 due to enteric viruses – mainly Norovirus - and nine due to respiratory viruses). Comparative numbers for previous years are found in Table 1.

The IPC Program provides expert support to VIHA owned/operated sites that are experiencing outbreaks. For affiliated sites (usually privately owned, but publicly funded residential care sites), this responsibility rests with VIHA’s Public Health Communicable Disease Program. Active outbreaks are posted at:

[http://www.viha.ca/mho/public_health_alerts/active_outbreak_list.htm](http://www.viha.ca/mho/public_health_alerts/active_outbreak_list.htm)
OUTBREAK SUMMARY:
When comparing the number of outbreaks from year to year, it is important to keep in mind the changing prevalence of enteric and respiratory pathogens in the community. Norovirus is the most common cause of gastroenteritis, and influenza the most common cause of respiratory outbreaks in VIHA’s healthcare facilities.

Table 1 identifies the number of outbreaks in VIHA owned and affiliated acute and residential care facilities during fiscal years 2010-11 to 2012-13. The number of declared outbreaks in VIHA owned residential care facilities increased from ten during 2011-12 to 16 in 2012-13.

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>25</td>
<td>21</td>
<td>27</td>
<td>14</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Enteric</td>
<td>16</td>
<td>13</td>
<td>18</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>CDI</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Norovirus</td>
<td>13</td>
<td>7</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Noro-like/Other</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Influenza</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>ILI</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

While the endemic level of viruses may increase the risk of outbreaks, 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.

Table 2 shows that the average duration of outbreaks in VIHA facilities ranged from nine to 12 days between 2010-11 and 2012-13. The average number of patients/residents affected by outbreaks decreased by 50%: from 16 in 2010-11 to 8 in 2012-13.

The increase in average duration of viral gastrointestinal outbreaks at VIHA residential care facilities between 2011-12 and 2012-13 may in part be due to a policy not to declare an outbreak over until the unit has received a terminal clean. In residential care facilities, full resources to clean are available where there is the same contracted staff as the acute sites. Smaller independent sites may not have timely access to more staff for cleaning on an overtime basis. During 2012-13, 45% of gastrointestinal outbreaks in residential care facilities were declared over on Monday compared to 23% in 2011-12. Moreover, in 2012-13 the proportion of staff affected in these outbreaks increased because of a change in practice, where the Outbreak Management Structure includes the Occupational Health & Safety Call Centre, which may have contributed to an increase in the duration due to staff illness.
Table 2: Outbreaks by Select Characteristics in VIHA Acute & Residential Care Facilities

<table>
<thead>
<tr>
<th></th>
<th>All VIHA Facilities</th>
<th>Acute Care Facilities</th>
<th>Residential Care Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Outbreaks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average duration (days)</td>
<td>11.8</td>
<td>9.0</td>
<td>10.3</td>
</tr>
<tr>
<td>average number of patients</td>
<td>16</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Enteric</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average duration (days)</td>
<td>12.3</td>
<td>7.8</td>
<td>10.9</td>
</tr>
<tr>
<td>average number of patients</td>
<td>16</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Respiratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average duration (days)</td>
<td>11.1</td>
<td>11.0</td>
<td>9</td>
</tr>
<tr>
<td>average number of patients</td>
<td>17</td>
<td>14</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 3 provides the number of outbreaks along with the average duration and average number of residents affected by outbreaks for different types of viruses in VIHA affiliated residential care facilities. The number of declared outbreaks increased from 15 during 2010-11 to 25 during 2012-13. Meanwhile, the average duration and the average number of residents affected by the outbreaks did not change significantly over the three years.

Table 3: Outbreaks by Selected Characteristics in VIHA Affiliated Residential Care Facilities

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number of outbreaks</th>
<th>Average duration (days)</th>
<th>Average number of residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enteric</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norovirus</td>
<td>6</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Noro-like Illness</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Other Enteric</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory</td>
<td>9</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Influenza</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>ILI</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other Resp.</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

What is VIHA doing to decrease number and duration of outbreaks?
In healthcare settings where the risk of transmission is high, use of isolation precautions, adherence to hand hygiene and enhanced environmental cleaning are the most effective means of interrupting transmission. Operation of the risk-based model for IPC remains central to our approach to detect and control outbreaks, facilitating early detection of transmission and appropriate intervention. The IPC program utilizes a symptomatic approach rather than being
organism driven. For example, the need for additional precautions is determined by the symptoms of the patient(s) rather than just laboratory based result(s).

The Outbreak Management Structure (OMS) toolkit continues to be used for all outbreaks declared at VIHA acute and residential sites. In consultation with staff, significant improvements were made to the online OMS reference document. Hyperlinks were embedded in the document to help staff quickly find the information they need when managing an outbreak. The OMS facilitates immediate and concurrent involvement of all areas impacted by the outbreak thereby facilitating communication between departments. Consequently, issues are identified, actions are assigned, and interventions are implemented. Outbreak management is standardized and well understood by staff members, who feel engaged within the process. The toolkit also provides a venue to identify successful interventions and areas of improvement.

Other actions taken to prevent or contain outbreaks include:

- Providing staff education to reinforce the need to implement precautions based on symptoms rather than diagnosis, decreasing the time frame when exposure and transmission can occur;
- Building decision support tools into the Cerner Infection Control module to automatically trigger precautions for diarrhea, new and worsening cough, rash and fever and scabies and lice;
- Adhering to standard outbreak case definition;
- Involving IPC staff in outbreaks at a early stage;
- Conducting *Clostridium difficile* infection rounds at the bedside through an interprofessional approach to reinforce the nursing care plan, use of the stool chart, review medications, and review epidemiology links to other patients;
- Focusing on the Emergency Department as a high risk area -in the process of obtaining FirstNet for all ICPs as it provides real time information for patient census, patient location, number of patients on precautions, and enables the Infection Control Practitioners to be proactive in providing advice and information;
- Conducting laboratory testing “in-house”, thereby providing prompt laboratory identification of infecting agent;
- Developing a precaution order report for housekeeping staff to implement enhanced cleaning processes;
- Increasing frequency of cleaning in units impacted by over capacity;
- Dedicating equipment to the patient/resident on additional precautions, and placing the patient in a private room, where possible;
- Maintaining a clear separation of clean and soiled items, decreasing the amount of equipment in hallways and labeling clean equipment; and
- Promoting the importance of hand hygiene to prevent the spread of healthcare-associated infections.
**Education**

Education is a key component of the ICP’s role. Education regarding IPC principles and practices is provided to VIHA staff primarily through the following three venues: new employee orientation, new nursing hire orientation, and in-service education. Just-in-time education is also provided during rounds on units and in facilities.

The main topics presented this year were:

- Management of Antibiotic Resistant Organisms;
- Infectious and emergent Pathogens;
- IPC Principles and Practices;
- Initiating and maintaining precaution orders within the new Cerner Infection Control Module; and
- Hand Hygiene.

For International Infection Control Week (October 15-19, 2012) the IPC program collaborated with other VIHA programs to provide a workshop that was presented at various sites. The workshop was conducted by the ICPs. Education was given around correct technique for applying alcohol hand rub and the *Four Moments for Hand Hygiene*. The Ultra Violet Light box was also demonstrated and health care workers had the opportunity to be involved.

Prior to the opening of the new Emergency Department at Nanaimo Regional General Hospital, IPC collaborated with the ED program to develop education and printed materials for the pre ‘Go Live’ educational event. All health care staff rotated through five educational stations, two of which provided IPC information and interactive learning.

**Surveillance**

The IPC program carries out surveillance for a number of quality and patient safety indicators. This section of the report presents information on a number of these indicators. A summary of the measures can be found in Appendix 1. Descriptions of the surveillance case definitions can be found in Appendix 3.
1. Hand Hygiene Compliance

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012-13 Rate</th>
<th>2012-13 Target</th>
<th>Trend</th>
<th>Improvement Direction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Hygiene Compliance</td>
<td>Acute care facilities: 80% Residential care facilities: 90% Nursing staff: 85% Physicians: 53% Clinical/Diagnostic services: 78% Support services/other: 68%</td>
<td>90% or more</td>
<td>↑</td>
<td>Higher rates indicate improvement</td>
<td>▲</td>
</tr>
</tbody>
</table>

VIHA’s hand hygiene policy calls for all healthcare providers to perform hand hygiene before and after touching a patient and/or touching any object that comes into contact with the patient. Hand hygiene is audited in VIHA acute care and long term care facilities using an audit tool adapted from the Canadian Patient Safety Institute. Health care providers were observed by auditors to determine whether they used proper technique when they washed their hands or used an alcohol based hand rub product. Those who completed the activity correctly, without wearing barriers such as rings and long sleeves, were considered to be compliant with VIHA guidelines.

Overall hand hygiene compliance improved steadily between 2010-11 and 2012-13 at VIHA’s acute care facilities, from 71% in 2010-11 to 76% in 2011-12 and 80% in 2012-13.

Chart 1 shows hand hygiene compliance at VIHA’s larger acute care facilities. During 2012-13 almost all facilities reported compliance around 80%. The lower percentage reported for St. Joseph’s General hospital may in part be explained by a difference in how audits are conducted at this facility. The vast majority of audits at St. Joseph’s were conducted by the ICP while audits in the other facilities were conducted by unit staff.
Chart 1: Hand Hygiene Compliance Percentages by Acute Care Facility

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

Note: The error bars in the chart refers to 95% confidence intervals

Chart 2 provides hand hygiene compliance by health care providers working at VIHA’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. Compliance increased among all healthcare provider groups between fiscal years 2010-11 and 2012-13. Rates were highest among nursing staff and lowest among physicians.

Chart 2: Hand Hygiene Compliance Percentages by Healthcare Provider Group

Note: The error bars in the chart refers to 95% confidence intervals
Chart 3 shows that hand hygiene compliance at VIHA’s affiliated residential care facilities also improved between 2010-11 and 2012-13 from 76% to 90%:

*Chart 3: Hand Hygiene Compliance Percentage, VIHA Residential Care Facilities*

What is VIHA doing to improve hand hygiene rates?
VIHA continues to emphasize the importance of hand hygiene in preventing the spread of healthcare associated infections. The organization has played an active role in setting the provincial policy on hand hygiene, with membership at the Provincial Hand Hygiene Working Group and on the Communications, Reporting, Infrastructure, and the Evaluation sub working groups.

- Quality Governance is providing ongoing mentoring to program/unit auditors and unit leaders to support the hand hygiene audit process and change management activities to improve compliance rates;
- Quality Governance is planning how to implement the hand hygiene audit process within areas such as Home and Community Care, Community Clinics and healthcare settings with few staff; and
- The provincial hand hygiene module is complete and is available to all staff through the Learning Management System.

How does VIHA’s rate compare to other areas?
All health authorities in British Columbia conduct hand hygiene audits and report results to the Provincial Infection Control Network. Compliance percentages are not comparable directly between Health Authorities due to differences in methodologies and strategies for hand hygiene auditing. For example, audits at Vancouver Coastal Health are conducted by trained personnel who are designated auditors. In other authorities, including VIHA, audits are carried out by unit staff. VIHA is currently piloting a program using dedicated auditors. Moreover, the provincial definition of compliance does not take the presence of barriers such as rings and long sleeves into account. As a result, the VIHA compliance percentage reported provincially will always be higher than the percentage reported internally.
What is the Annual Target VIHA seeks to reach?
VIHA aspires to 100% compliance in non-emergency situations, and is striving to meet a 90% compliance rate over the next fiscal year (2013-2014).

2. Clostridium difficile Infections Incidence Rate

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012-13 Rate</th>
<th>2012-13 Target</th>
<th>Trend</th>
<th>Improvement Direction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital-acquired CDI rates</td>
<td>3.5 per 10,000 patient days</td>
<td>3.7 per 10,000 patient days, yellow if reached, and a stretch target of 2.4 per 10,000 patient days, green if achieved.</td>
<td>↓</td>
<td>Lower rates indicate improvement</td>
<td>green</td>
</tr>
</tbody>
</table>

Clostridium difficile is a bacterium that can cause infections of the gastrointestinal system. Clostridium difficile infection (CDI) is usually mild but can be severe and sometimes requires surgery, and in some cases cause death. CDI has an adverse effect on the health of patients, often leading to costly excess hospital stays. Tracking trends of CDI provides a way to assess the ability of the health care system to minimize the risk of spread of infection through

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1 CDI rates equal the number of inpatients newly diagnosed with hospital-acquired CDI, divided by the total number of days inpatients spent in a hospital multiplied by 10,000.
measures such as proper hand hygiene, environmental cleaning and the judicious use of antibiotics.

Chart 5 provides the annual rate of hospital acquired CDI for all VIHA acute care facilities between fiscal years 2009-10 and 2012-13.

During fiscal year 2012-13, a total of 176 cases of hospital-associated CDI were identified at all VIHA acute care facilities, a decrease from 196 cases during 2011-12, 225 cases during the 2010-11, and 259 cases in 2009-10. The CDI rate per 10,000 patient-days declined from 5.6 in 2009-10 to 3.5 in 2012-13.

![Chart 5: Hospital Associated CDI VIHA Acute Care Facilities](image)

Note: The error bars in the chart refers to 95% confidence intervals

Chart 6 provides CDI rates by acute care facility for the fiscal years 2009-10 to 2012-13. Rates tend to vary somewhat within most facilities between fiscal years. However, for the most part, the differences were not 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 CDI, including:

- the health conditions and medical history of the population served;
- the complexity of the services offered;
- antimicrobial use policy;
- the size and physical layout of the facilities; and
- the age of patient population.

The higher incidence of CDI at Nanaimo Regional General Hospital may be explained by a number of these factors. The average age of the patient population at this facility tends to be higher than some other VIHA acute care facilities. The facility often exceeds 100% occupancy, particularly on medicine units. Meanwhile, the facility design and configuration of the units presents challenges for the optimal placement of patients who are on contact precautions.
One outbreak in a facility can have a large impact on annual rates. Moreover, in smaller facilities slight changes in the number of cases can dramatically affect the rate, making it difficult to obtain an accurate representation of what is happening in such a facility from year to year. The jump in incidence rate among small rural hospitals in 2012-13 can be attributed to one outbreak of CDI at Lady Minto Hospital in August 2012 that affected four patients. As a result, rates for small rural hospitals, facilities with less than 50 beds, have been grouped together.

**Chart 6: Hospital Acquired CDI Rates by Acute Care Facility**

<table>
<thead>
<tr>
<th>Facility</th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
<th>2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell River</td>
<td>1.5</td>
<td>3.0</td>
<td>4.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Cowichan District</td>
<td>4.0</td>
<td>4.7</td>
<td>4.9</td>
<td>3.0</td>
</tr>
<tr>
<td>Nanaimo Regional</td>
<td>7.3</td>
<td>9.5</td>
<td>6.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Royal Jubilee</td>
<td>8.1</td>
<td>4.4</td>
<td>4.4</td>
<td>4.0</td>
</tr>
<tr>
<td>St. Joseph’s General</td>
<td>6.0</td>
<td>3.8</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Saanich Peninsula</td>
<td>11.2</td>
<td>1.3</td>
<td>2.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Victoria General</td>
<td>2.9</td>
<td>2.9</td>
<td>2.1</td>
<td>1.8</td>
</tr>
<tr>
<td>West Coast General</td>
<td>3.2</td>
<td>5.2</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Small Rural hospitals*</td>
<td>2.3</td>
<td>2.9</td>
<td>2.8</td>
<td>6.3</td>
</tr>
</tbody>
</table>

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

Note: The error bars in the chart refers to 95% confidence intervals

**What is VIHA doing to decrease CDI incidence rates?**

The Antimicrobial Stewardship program has begun to review utilization and appropriate use of antibiotics. VIHA is also continuing to work toward improving early recognition of symptoms indicative of CDI and early implementation of precautions (under the risk-based model). Moreover, the following interventions are instituted when a positive CDI result is received:

- Early implementation of additional precautions based on symptoms;
- Affected patients are placed in private rooms with dedicated equipment.

The IPC program reviews all new CDI cases to ensure adherence to the Bristol Stool Chart, care plan and medications. In addition, weekly CDI reports are sent to senior executive, Communications, IPC Team, and Access and Flow to facilitate communication about the incidence of CDI.
What is the annual target VIHA seeks to achieve?
VIHA set an annual target of 3.7 per 10,000 patient days, and a stretch target of 2.4 for the 2012-13 fiscal year. The target of 3.7 was achieved. As a result, the 2013-14 target is set to 3.3 with a stretch target of 2.4.

How does VIHA compare to other areas?
Chart 7 was obtained from data published in the latest annual CDI report from the Provincial Infection Control Network of British Columbia. Results for fiscal year 2011-12 are provided and show that the rates for VIHA were among the lowest in the province.²

Chart 7: Hospital Acquired CDI Rates by Health Authority, 2011-12 Fiscal Year

<table>
<thead>
<tr>
<th>B.C. Health Authorities</th>
<th>Rate per 10,000 patient days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraser Health</td>
<td>11.3</td>
</tr>
<tr>
<td>Vancouver Coastal Health</td>
<td>9.2</td>
</tr>
<tr>
<td>Provincial Health Services</td>
<td>7.1</td>
</tr>
<tr>
<td>Interior Health</td>
<td>5.8</td>
</tr>
<tr>
<td>Vancouver Island Health Authority</td>
<td>4.1</td>
</tr>
<tr>
<td>North Health</td>
<td>2.8</td>
</tr>
</tbody>
</table>

B.C. rate = 8.1

Source: Provincial Infection Control Network
http://www.picnetbc.ca
Note: The error bars in the chart refers to 95% confidence intervals

3. Methicillin-resistant *Staphylococcus aureus* Infection & Colonization Rate³

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012-13 Rate</th>
<th>2012-13 Target</th>
<th>Trend</th>
<th>Improvement Direction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital-acquired MRSA Infection &amp; Colonization Rates</td>
<td>2.4 per 10,000 patient days</td>
<td>2.3 per 10,000 patient days (yellow if reached) and a stretch target of 2.0 (green if reached)</td>
<td>Lower rates indicate improvement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a strain of *Staphylococcus aureus* resistant to various antimicrobial agents. Individuals who carry the organism on their skin or in

² The report can be obtained at: http://www.picnetbc.ca/

³ MRSA incidence rates equal the total number of newly identified MRSA cases acquired by patients as a result of their stay in a VIHA acute care facility, divided by the total number of days patients spent in hospital multiplied by 10,000.
their nose are said to be colonized. Sometimes MRSA can cause serious wound, respiratory or bloodstream infections. Patients who are older, have more chronic disease, and undergo invasive procedures are at higher risk of MRSA. The principal mode of transmission within healthcare facilities is considered to be from one colonized or infected patient to another via the hands of healthcare providers. The data presented below represents newly identified cases of MRSA among patients admitted to a VIHA acute care facility where the acquisition was considered to be due to their stay in the facility. In fiscal year 2012-13, these cases made up half of all newly identified MRSA cases among patients admitted to a VIHA acute care facility. Another 30% of all inpatients who tested positive for MRSA acquired the organism in the community and 20% acquired the organism in another healthcare facility.

During fiscal year 2012-13, 127 inpatients acquired MRSA within a VIHA acute care facility. This represents an incidence rate of 2.4 per 10,000 patient days – a slight decrease from 2.8 during 2011-12. Chart 8 provides incidence rates of hospital acquired MRSA for both infections and colonization. From a clinical perspective, patients who are infected with MRSA will have more adverse outcomes.

*Chart 8: Hospital Acquired MRSA Rates, all VIHA Acute Care Facilities*

![Chart 8: Hospital Acquired MRSA Rates, all VIHA Acute Care Facilities*](image)

* Excludes St. Joseph’s General Hospital
Note: The error bars in the chart refers to 95% confidence intervals

Chart 9 provides the rates of hospital acquired MRSA infection and colonization by acute care facilities. During fiscal year 2012-13, the lowest rates were recorded at Victoria General and Cowichan District Hospital (1.6 and 1.7 per 10,000 patient days respectively). The highest rate was recorded at West Coast General Hospital (5.2 per 10,000 patient days). The rate of hospital-acquired MRSA steadily increased at West Coast General over the four fiscal years under review, mainly due to a rise in MRSA infections acquired among patients at this facility – from one case in 2009-10 to seven cases in 2012-13. At all other acute care facilities, except Saanich Peninsula Hospital, the overall incidence of hospital acquired MRSA either declined slightly or remained the same between 2011-12 and 2012-13.
Patients with bloodstream infections can have severe adverse outcomes. Chart 10 shows the incidence of MRSA bloodstream infections is low and makes up less than 10% of all new hospital-acquired MRSA infections.

**Chart 10: Hospital Acquired MRSA Infection Rates, VIHA Acute Care Facilities***

*Excludes St. Joseph’s General Hospital

Note: The error bars in the chart refers to 95% confidence intervals
What is VIHA doing to decrease MRSA incidence rates?
The IPC team is submitting risk factor data for all sites and targeting high risk groups with more intervention. All patients admitted to a VIHA acute care facility are screened for MRSA risk factors and those considered to be at risk are tested for the organism as quickly as possible. Patients who are diagnosed with MRSA are placed on precautions to reduce the risk of transmission within a facility. Whenever possible, admitted patients found to be MRSA positive are followed up for de-colonization during their hospital stay.

The IPC Program plans to evaluate the efficacy of the antibiotic resistant organism (ARO) screening form, examine whether all patients are administered the form when they are admitted to a hospital, and examine whether testing takes place in a timely manner. Work as started on merging the ARO screening and Infection Prevention Assessment forms to improve efficiency and increase the likelihood that all patients are screened for an ARO. The use of photodynamic therapy to decolonization MRSA positive patients before they undergo surgery will also be investigated. This intervention can potentially reduce post-surgical MRSA incision and bloodstream infections.

How does VIHA compare to other areas?
Chart 11 was obtained from data published in the latest annual MRSA report published by the Provincial Infection Control Network of British Columbia. Results for fiscal year 2011-12 are provided and show that the rates for VIHA were among the lowest in the province.4

Chart 11: Hospital Acquired MRSA Infection & Colonization Rates by Health Authority

![Chart 11: Hospital Acquired MRSA Infection & Colonization Rates by Health Authority](chart.png)

Source: Provincial Infection Control Network
http://www.picnetbc.ca
Note: The error bars in the chart refers to 95% confidence intervals

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4 The report can be obtained at: http://www.picnetbc.ca/
4. Infection Rates from Other Antibiotic Resistant Organisms

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012-13 Rate</th>
<th>2012-13 Target</th>
<th>Trend</th>
<th>Improvement Direction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic Resistant Organisms Infections – Acute Care Facilities</td>
<td>ESBL: 1.0 per 10,000 patient days</td>
<td>1.0 per 10,000 patient days and a stretch target of 0.8 per 10,000 patient days</td>
<td>▼</td>
<td>Lower rates indicate improvement</td>
<td>△</td>
</tr>
<tr>
<td></td>
<td>VRE: 0.2 per 10,000 patient days</td>
<td>0.2 per 10,000 patient days and a stretch target of 0.15 per 10,000 patient days</td>
<td>▼</td>
<td></td>
<td>△</td>
</tr>
</tbody>
</table>

Chart 12 identifies the number of new cases of hospital acquired infections due to Extended Spectrum Beta-lactamase (ESBL) and Vancomycin Resistant Enterococcus (VRE). Patients identified here had a wound, respiratory, urinary tract or bloodstream infection due to one of these antimicrobial resistant bacteria. The overall hospital acquired infection rates for each of the three antimicrobial resistant organisms have remained steady over the three years under review.

Bacteremia - the presence of bacteria in the blood - can occur as a complication of infections such as meningitis, as a result of surgery, or due to catheters including urinary or intravenous catheters. It can have severe consequences such as sepsis, septic shock and death. VIHA’s rates for hospital acquired bloodstream infections remain low and generally make up less than 10% of all new hospital acquired ESBL and VRE infections.

Chart 12: Rate of Hospital Acquired ARO Infection by Organism Type, VIHA Acute Care Facilities*

* Excludes St. Joseph’s General Hospital

Note: The error bars in the chart refers to 95% confidence intervals
What is VIHA doing to decrease ARO incidence rates?
When a patient is diagnosed with an infection due to an ARO, the patient is placed on contact precautions. The IPC program will continue to work with partners in surgical programs to reduce the risk of device related infections along with surgical site infections.

What is the Annual Target VIHA seeks to reach?
VIHA is aiming to lower the rates of ARO infections in 2013-14 and has set a target of 10% reduction (yellow if reached); and a stretch target of 25% reduction (green if achieved).

**VIHA’s Target Rates**

<table>
<thead>
<tr>
<th></th>
<th>2012-13 Actual</th>
<th>2013-14 Target (10%)</th>
<th>2013-14 Stretch Target (25%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESBL</td>
<td>1.0</td>
<td>0.9</td>
<td>0.75</td>
</tr>
<tr>
<td>VRE</td>
<td>0.2</td>
<td>0.18</td>
<td>0.15</td>
</tr>
</tbody>
</table>

5. **Surgical Site Infection Rates**

Despite advances in operative techniques and use of prophylactic antibiotics, surgical site infections (SSIs) continue to be a major source of morbidity for patients who undergo operative procedures. SSIs are identified by the development of an infection 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 one year if the procedure included some type of implant (e.g. coronary artery bypass grafts, joint replacement or pacemakers).

VIHA’s surveillance of SSI is limited to selected cardiac and orthopaedic procedures with a one-year follow-up period. Moreover, ascertainment of an SSI is limited to patients who are readmitted to a hospital with an infection following a surgery. Since persons with serious infections are readmitted to hospital, the cases presented in this report represent a proportion of all patients with infections associated with a surgery performed in a VIHA facility. Patients with less serious SSI are treated in outpatient clinics and physician offices and are not captured in the surveillance system. Nor are patients who travel to a VIHA facility for surgery from a community outside of VIHA’s boundaries and subsequently treated for a SSI in their home community included.

Because surgeries under surveillance at VIHA are followed for one year to identify possible infections, fiscal year 2011-12 is the most recent data available for presentation in this report. Changing the post surgical follow-up period to three months would facilitate more timely reporting of the SSIs currently under surveillance to stakeholders and would put VIHA in line with recent changes made at Vancouver Coastal Health and at the National Healthcare Safety Network in the United States. A review of all SSIs reported during the three fiscal years under review revealed that 56% were identified within one month of surgery and 87% were identified within three months.

SSI surveillance at VIHA is based on standard case definitions used at the National Healthcare Safety Network. However, in 2012-13 the IPC program developed a more efficient method for case finding by linking surgery and microbiology laboratory datasets (see appendix 1-b). This change in approach may lead to more complete case ascertainment which may account, at least in part, for any increase in reported infection rates in the future.

Chart 13 provides the infection rates following joint replacement surgeries between fiscal years 2009-10 and 2011-12. The overall VIHA rate has remained steady at about 1.5 per 100 procedures:

- **2009-10:** 1.5%
- **2010-11:** 1.3%
- **2011-12:** 1.4%

While SSI rates did vary somewhat between facilities, the differences were not significant. In general, SSIs tended to be more common when the surgery was performed at Campbell River Hospital. Rates were stable at each facility between 2009-10 and 2011-12 except at Cowichan District Hospital where the rate increased from 0.4% in 2010-11 to 1.8% in 2011-12.

**Chart 13: Infection Rates Following Joint Replacement Surgery* by Acute Care Facility**

<table>
<thead>
<tr>
<th>Facility</th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell River</td>
<td>2.5</td>
<td>2.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Cowichan District</td>
<td>0.7</td>
<td>0.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Royal Jubilee</td>
<td>1.1</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Victoria General</td>
<td>2.0</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Nanaimo Regional</td>
<td>1.3</td>
<td>1.8</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* Total Hip, Knee and Shoulder Surgeries

Note: The error bars in the chart refer to 95% confidence intervals

Chart 14 shows that the infection rate following a coronary artery bypass graft and/or valve repair surgery performed at Royal Jubilee Hospital increased each year between 2009-10 and 2011-12, from 2.8 to 4.7 infections per 100 procedures. However, a review of preliminary data indicates the rate of SSIs for these procedures at Royal Jubilee Hospital may decline to approximately 3% in fiscal year 2012-13.

The infection rate following a procedure related to cardiac device implants (permanent pacemakers and implantable cardiac defibrillators) increased between 2009-10 and 2010-11 (1.0 to 2.0) but dropped to 1.1 in 2011-12. Surveillance of infections following pacemaker implants at Nanaimo Regional General Hospital was also carried out. The rates recorded at Nanaimo Regional General Hospital tended to be lower than those at Royal Jubilee Hospital.
What is VIHA doing to decrease SSI rates?

In response to the increase rate of SSIs following joint replacement surgery at Cowichan District Hospital in 2011-12, the IPC program conducted an audit of the OR and Medical Device Reprocessing Department environments, along with the processes for the transportation and storage of sterile and contaminated devices. Meetings were arranged with orthopaedic surgeons, the facility director and OR manager to review findings and plan actions to address the increased rate of infections.

The IPC program has continued working closely with the Heart Health program to conduct reviews and implement best practices to reduce the incidence of SSIs. Identified cases were reviewed to examine medical risk factors. An extensive audit was conducted to review environmental factors, dress codes, transportation and storage of sterile medical devices. Recommendations following the audits were implemented resulting in a number of environmental and process improvements within the Heart Health department. These joint audits and reviews will continue in designated areas.

The IPC Program will continue to provide the Orthopaedic and Heart Health portfolios with the SSI rates and work with the programs to review cases of SSI on a regular basis. Informatics tools for SSI surveillance, utilizing data from VIHA’s data warehouse, will be further developed to assist ICPs with surveillance. The use of photodynamic therapy to decrease nasal Staph colonization will be investigated.

The IPC program continues to collaborate with the National Surgical Quality Improvement Program (NSQIP) and Heart Health Program to develop surveillance and reporting strategies that provide more inclusive information to the clinical team. The combined data sources afforded by NSQIP and IPC will assist the cardiac surgery QI team in understanding the nature of infected cases, and therefore how to implement appropriate best practices such as a SSI bundle.
How does VIHA’s rate compare to other areas?
There are no published national or provincial rates specific to these targeted surgeries. The 
Canadian benchmark for surgeries classified as clean surgeries is 3.0%. VIHA is above this target 
for open heart surgeries but lower for all other procedures under surveillance.

What is the Annual Target VIHA seeks to reach?
For 2012-13 a target of 3% was established based on Canadian benchmark for clean surgeries. 
VIHA is aiming to lower the rates of SSIs related to cardiac surgeries in 2013-14. The IPC 
program will work with NSQIP, Heart Health and surgical programs to establish future targets.

6. CDI and ARO Infections in Residential Care Facilities

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012-13 Rate</th>
<th>2012-13 Target</th>
<th>Trend</th>
<th>Improvement Direction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare Associated Antibiotic Resistant Organisms &amp; CDI: Residential Care</td>
<td>CDI: 0.07 per 10,000 pt. days</td>
<td>CDI: 0.09 per 10,000 patient days and a stretch target of 0.075</td>
<td>Lower rates indicate improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESBL: 0.05 per 10,000 pt. days</td>
<td>ESBL: 0.027 per 10,000 patient days and a stretch target of 0.023</td>
<td>It is difficult to trend because a small number of cases are reported each year, the rates will fluctuate from year to year.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRSA: 0.16 per 10,000 pt. days</td>
<td>MRSA: 0.08 per 10,000 patient days and a stretch target of 0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VRE: 0.00 per 10,000 pt. Days</td>
<td>VRE: 0.0 per 10,000 patient days and a stretch target of 0.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transmission of organisms within VIHA Residential Care Facilities remains low; often with the 
source cases being transfers from the acute care system. Specimens are taken for diagnostic 
and treatment purposes when there are clinical manifestations. Chart 15 provides the rates for 
new cases of CDI, ESBL, MRSA, and VRE that were acquired in Residential Care Facilities. During 
fiscal year 2012-13, four new cases of CDI were acquired in a residential care facility, which 
translated into a rate of 0.07 cases per 10,000 resident days. During the same period, eight new 
cases of facility acquired MRSA were reported (six residents were infected and two colonized). 
Six of the nine new ESBL cases acquired in a residential care facility in 2012-13 were colonised. 
There were no reported cases of VRE.

What is VIHA doing to decrease incidence rates?
Any resident positive for MRSA or ESBL has their health record flagged. Care plans specific to 
the organism are placed on the patient’s chart, and education is provided as required. If a 
person has a flag for MRSA, efforts are made to treat the resident in order to remove the flag at 
the earliest point in time; decolonization treatment is considered on a case by case basis.
To prevent the transmission of CDI and AROs, education is provided to all VIHA residential care facility staff on how to apply IPC principles in this environment, including how additional precautions can be applied.

Results of admission swabs taken over the last three years have identified very low transmission rates in residential care facilities. In 2010-11, the practice of taking swabs on all new admissions/readmissions was discontinued. Any increased transmission within residential care will continue to be captured through screening when the resident is admitted to acute care.

*Chart 15: Facility Acquired CDI & ARO Rates by Organism Type, VIHA Residential Care*

Note: The error bars in the chart refer to 95% confidence intervals

**How does VIHA’s rate compare to other areas?**
There are no provincial or national benchmarks for infections in residential care facilities (nor under other nomenclatures: nursing homes, residential facilities, long term care facilities, etc.)

**What is the Annual Target VIHA seeks to reach?**
VIHA is aiming for no transmission, and where there is room for improvement has set a target of 10% reduction (yellow if reached); and a stretch target of 25% reduction (green if achieved).

**VIHA’s Target Rates**

<table>
<thead>
<tr>
<th></th>
<th>2012-13 Actual</th>
<th>2013-14 Target (10%)</th>
<th>2013-14 Stretch Target (25%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDI</td>
<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
</tr>
<tr>
<td>ESBL</td>
<td>0.05</td>
<td>0.045</td>
<td>0.037</td>
</tr>
<tr>
<td>MRSA</td>
<td>0.16</td>
<td>0.14</td>
<td>0.12</td>
</tr>
<tr>
<td>VRE</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Moving Forward into 2013-2014

Priority 1

*Develop the capacity and capability of the IPC Team by continuing recruiting and training a cadre of highly skilled IPC Practitioners and Consultants – “grow our own”.*

Priority 2

*Enhancing the IC Cerner module through Phase II with systematic realization of its benefits for case monitoring, outbreak detection and routine surveillance.*

Priority 3

*Implementation of on-line physician Infection Control Training Module.*

Priority 4

*Application of informatics and VIHA`s Business Intelligence Data Warehouse.*
## Appendix 1 - Surveillance Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012-13 Target</th>
<th>2012-13 Rate</th>
<th>Trend</th>
<th>Improvement Direction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Hygiene Compliance</td>
<td>90% or more</td>
<td>80% in acute 90% in residential</td>
<td></td>
<td>Higher rates indicate improvement</td>
<td><img src="triangle.png" alt="triangle" /></td>
</tr>
<tr>
<td>CDI-Acute Care Facilities</td>
<td>3.7 per 10,000 patient days and a stretch target of 2.4 per 10,000 patient days</td>
<td>3.6 per 10,000 patient days</td>
<td><img src="down.png" alt="down" /></td>
<td>Lower rates indicate improvement</td>
<td><img src="square.png" alt="square" /></td>
</tr>
<tr>
<td>MRSA-Acute Care Facilities</td>
<td>2.3 per 10,000 patient days and a stretch target of 2.0 per 1,000 patient days</td>
<td>2.4 per 10,000 patient days</td>
<td><img src="right.png" alt="right" /></td>
<td>Lower rates indicate improvement</td>
<td><img src="circle.png" alt="circle" /></td>
</tr>
<tr>
<td>Infections due to Antibiotic Resistant Organisms: Acute Care Facilities</td>
<td>1.0 per 10,000 patient days and a stretch target of 0.8</td>
<td>ESBL: 1.0 per 10,000 patient days</td>
<td><img src="down.png" alt="down" /></td>
<td>Lower rates indicate improvement</td>
<td><img src="triangle.png" alt="triangle" /></td>
</tr>
<tr>
<td></td>
<td>0.9 per 10,000 patient days and a stretch target of 0.8</td>
<td>MRSA: 1.3 per 10,000 patient days</td>
<td><img src="up.png" alt="up" /></td>
<td></td>
<td><img src="circle.png" alt="circle" /></td>
</tr>
<tr>
<td></td>
<td>0.2 per 10,000 patient days and a stretch target of 0.15</td>
<td>VRE: 0.2 per 10,000 patient. Days</td>
<td><img src="right.png" alt="right" /></td>
<td></td>
<td><img src="triangle.png" alt="triangle" /></td>
</tr>
<tr>
<td>Antibiotic Resistant Organisms Infections – Residential Care</td>
<td>CDI: 0.09 per 10,000 patient days and a stretch target of 0.075</td>
<td>CDI: 0.07 per 10,000 pt. days</td>
<td><img src="down.png" alt="down" /></td>
<td>Lower rates indicate improvement</td>
<td><img src="square.png" alt="square" /></td>
</tr>
<tr>
<td></td>
<td>ESBL: 0.027 per 10,000 patient days and a stretch target of 0.023</td>
<td>ESBL: 0.05 per 10,000 pt. days</td>
<td><img src="up.png" alt="up" /></td>
<td></td>
<td><img src="circle.png" alt="circle" /></td>
</tr>
<tr>
<td></td>
<td>MRSA: 0.08 per 10,000 patient days and a stretch target of 0.07</td>
<td>MRSA: 0.16 per 10,000 pt. days</td>
<td><img src="up.png" alt="up" /></td>
<td></td>
<td><img src="circle.png" alt="circle" /></td>
</tr>
<tr>
<td></td>
<td>VRE: 0.0 per 10,000 patient days and a stretch target of 0.0</td>
<td>VRE: 0.00 per 10,000 pt. Days</td>
<td><img src="right.png" alt="right" /></td>
<td></td>
<td><img src="square.png" alt="square" /></td>
</tr>
</tbody>
</table>

- ![triangle](triangle.png): Significantly outside range
- ![outside](outside.png): Outside range
- ![within](within.png): Within range

*Vancouver Island Health Authority*

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Development and implementation of electronic solution for IPC Program

The difficulties of identifying and managing healthcare associated infections within VIHA has been exacerbated by the utilization of data collection and reporting tools that do not integrate information across the Electronic Health Record. As identified in the IM/IT strategic plan, the Cerner clinical information system will be leveraged and additional functionality implemented to enable sound infection control principles and practices across VIHA acute and residential care. VIHA will work with Cerner as a localization partner to identify VIHA/BC/Canadian specific IPC requirements.

Work Completed:

- Tested the Infection Control module and implemented it VIHA-wide in July 2012; the project team provided transition support during the stabilization period.
- Tested the Power Forms to capture surveillance data for IPC.
- Developed training manual and conducted training sessions with all IPC staff.
- Developed and deployed communication and education strategies in conjunction with Clinical Informatics staff.
- Continued planning Phase 2 (the need for a second phase was realized prior to go-live).
- Conducted project evaluation activities including an audit of precaution log usage and a focus group with users.
- Developed high-level requirements and included in a Statement of Work that was presented to project sponsors and approved.
- Commenced detailed requirements gathering for Phase 2.

Issues and Risks:

- Technical and workflow issues for ICP practitioners were caused by the following factors:
  - The Cerner module running slowly; and
  - The continuum of information flow from the nursing units to the ICP module not yet optimized.

Next Steps:

- Phase 2 of the IPC project has commenced and will address technical and workflow issues.
- Cerner is redesigning the Infection Control module to address system performance issues and improve usability. Key enhancements will include: a faster user experience; streamlined data viewing; easier to maintain lab data within the module.
Appendix 2-b: Application of informatics and VIHA’s Business Intelligence Data Warehouse

Surveillance of device-related Surgical Site Infections (SSIs) has relied on manual review of laboratory reports, chart review of the positive patients for the history of device-implant surgery, and entry of a large number of patient attributes into a dedicated database. Such a procedure is labour intensive for ICPs. In addition, the review of multiple pages of laboratory reports makes the accurate identification of the surgery related culture positive cases difficult, which could result in an underestimation of SSI cases.

VIHA’s Business Intelligence Data Warehouse (BIDW), which has been rarely utilized for operational practice to date, was used to remove some of the manual processes outlined above. Specifically, a tool was developed to scan laboratory reports to extract the microbiology culture positive results attributable to the surgical procedure. Surgery records in BIDW are accessed to verify the history of surgery among the positive culture cases. The information necessary for reporting is then collected. The tool will report the number of most likely SSI cases to ICPs for confirmation.

Initial assessment:

The conversion of laboratory records into computer-readable format took approximately ten minutes, and the screening of laboratory and surgery records was completed in approximately two minutes, in comparison to more than 200 hours of practitioner’s time for the equivalent work. Confirmation of the cases presented by the screening tool was also faster and easier, as the tool can present the vast majority of information used to determine SSI cases, thus reducing the ICP’s time for OR chart review.

Currently, the IPC program is utilizing the data provided by the tool in conjunction with the traditional procedure. The tool detected cases that were previously unidentified. The ICPs also identified a number of cases using their traditional method that were not detected by the tool, since the tool’s search criteria is narrower in scope at this point.

Work to be completed:

Sensitivity and specificity of the tool in comparison to the traditional method needs to be determined. Due to the tool’s role as a screening instrument, sensitivity would be a critical performance measure. Although the tool seems to detect a higher number of SSI cases than the previous method, its screening algorithm may need to be less restrictive.

The format and amount of information provided to ICPs by the tool needs to be discussed. Ideally, the software output should be concise (contain only the relevant information for case definition and reporting), able to be shared and tracked by multiple ICPs, and be secure. As well, the output should be easily linked to the report generating software.

Establishing a strong communication channel with the surgical informatics and data warehouse team is important. OR records are stored in the Operating Room Scheduling Operating System (ORSOS), which is owned by the former team, while the data from ORSOS is mapped to BIDW by the latter team. As the performance of the tool is largely dependent on the quality of the data, any changes to the data definitions and data cleaning procedure needs to be constantly communicated to all stakeholders.
A small number of SSI cases are not tested for laboratory diagnoses, thus undetectable by the screening tool. However some of these cases could be identified by reviewing Discharge Abstract Database (DAD) in BIDW. A tool to scan the DAD and report to ICP for confirmation should be developed.

**Implications**

The Surgical Site Infections screening tool is one of the first and clear examples of how the utilization of BIDW and informatics approach can improve operational workflow by liberating ICPs from the manual task of potential case detection. Other available datasets in BIDW, such as FirstNET, DAD, and Admission, Discharge, and Transfer (ADT) (in addition to the future addition of microbiology laboratory records) and PharmaNet would promote a similar shift in other infection control practice and research activities.

**Issues and Risks**

Although the tool is based on a short script of statistical and database query languages, it could fail to generate proper output if incorrect parameters are applied. Understandings in statistical software, database query language, and relational databases are required to prevent such error, validate output, and fix the program in case of failure. This is true for any future development work involving BIDW, data management and analysis.

The data in ORSOS is not cleaned until two weeks after the end of each accounting period. Thus, the accuracy and completeness of OR records in the previous period is not accurate nor complete which means the program should not be run with this timeframe included.
Appendix 3 - Surveillance Case Definitions

Clostridium difficile Infection
A diagnosis of CDI applies to a person with an acute onset of persistent diarrhea (three or more liquid stools within a 24 hour period) without another aetiology, along with one or more of the following: a laboratory confirmation of positive *Clostridium difficile* or culture with evidence of toxin production, diagnosis of typical pseudo-membranes, diagnosis of toxic megacolon.

A CDI case is classified as “hospital acquired” when:

- The patient’s symptoms occurred in the hospital equal to or greater than 72 hours after admission; or
- Symptoms are seen in a patient that has been hospitalized or discharged within previous 4 weeks, and patient is not a resident of a residential care facility.

Methicillin-resistant *Staphylococcus aureus* (MRSA)
MRSA case is defined as meeting ALL of the following criteria:

- Laboratory identification of MRSA;
- Includes *Staphylococcus aureus* cultured from any specimen that tests oxacillin-resistant 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 tests for MRSA;
- Patient must be admitted to an acute care facility; and
- Patient is a newly identified MRSA case at the time of hospital admission or identified during hospitalization.

This includes:

- MRSA cases identified for the first time during their hospital admission;
- Cases that have been previously identified at another facility outside of a VIHA facility; and
- Identified at a VIHA facility but are currently diagnosed with a different strain than the one previously recorded.

This DOES NOT include:

- MRSA cases previously identified at a VIHA facility;
- Cases identified in the emergency department who were not subsequently admitted, clinic or other outpatient cases; and
- Cases re-admitted with MRSA.
Once the patient has been identified with MRSA, they will be classified as healthcare-associated based on an assessment of the ICP using the following criteria:

- length of time in hospital prior to MRSA identification (> 48 hours);
- knowledge of previous MRSA status;
- date of admission;
- length of stay in hospital;
- prior hospitalization or other healthcare facility history (previously admitted in past 12 months); and
- from where the patient was admitted (e.g., long term care).

**Vancomycin-resistant *Enterococci* (VRE)**

While VIHA does not screen patients for VRE infections where the specimen tested positive for VRE are monitored. A VRE case is defined as meeting ALL of the following criteria:

- Laboratory identification of *Enterococcal* bacterium;
- Excluding where the organism is identified as *E. gallinarum* or *E. Casselilflavus*;
- Vancomycin MIC > 8 ug/ml;
- Patient is admitted to the hospital;
- Is a "newly" identified VRE-infection at the time of hospital admission or identified during hospitalization; and
- The patient exhibits signs and symptoms of infection; i.e. the VRE is recovered through clinical investigation rather than screening.

This includes:

- VRE cases identified for the first time during their hospital admission;
- Cases that have been previously identified at another facility outside of a VIHA facility; and
- Identified at a VIHA facility but are currently diagnosed with a different strain than the one previously recorded.

This DOES NOT include:

- VRE infection cases previously identified at a VIHA facility;
- Cases identified in the emergency department who were not subsequently admitted, clinic or other outpatient cases; and
- Cases re-admitted with VRE infection.

Once the patient has been identified with VRE, they will be classified as healthcare-associated based on an assessment of the practitioner using the following criteria:

- length of time in hospital prior to VRE identification (> 48 hours);
- knowledge of previous VRE status;
- date of admission;
- length of stay in hospital;
- prior hospitalization or other healthcare facility history (previously admitted in past 12 months); and
- from where patient was admitted (e.g., long term care).

**Extended Spectrum Beta-Lactamase (ESBL)**

ESBL case is defined as meeting ALL of the following criteria:

- Laboratory identification of ESBL;
- Patient is admitted to the hospital; and
- Is a “newly” identified ESBL-infection at the time of hospital admission or identified during hospitalization.

This includes:

- ESBL cases identified for the first time during their hospital admission;
- Cases that have been previously identified at another facility outside of a VIHA facility; and
- Identified at a VIHA facility but are currently diagnosed with a different strain than the one previously recorded.

This DOES NOT include:

- ESBL infection cases previously identified at a VIHA facility;
- Cases identified in the emergency department who were not subsequently admitted, clinic or other outpatient cases; and
- Cases re-admitted with ESBL infection.

Once the patient has been identified with ESBL, they will be classified as healthcare-associated based on an assessment of the practitioner using the following criteria:

- length of time in hospital prior to ESBL identification (> 48 hours);
- knowledge of previous ESBL status;
- date of admission;
- length of stay in hospital;
- prior hospitalization or other healthcare facility history (previously admitted in past 12 months); and
- from where the patient was admitted (e.g., long term care).