



INFECTION PREVENTION AND CONTROL

Annual Report 2012/2013



How you want to be treated.

TABLE OF CONTENTS

Executive Summary	2
Introduction to Infection Prevention and Control (IPAC)	3
Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA)	4
Vancomycin-Resistant Enterococci (VRE)	6
<i>Clostridium difficile</i> Infection (CDI)	8
Hand Hygiene	10
Surgical Site Infection (SSI) Surveillance	12
Central-Line Associated Bloodstream Infection (CLABSI) Surveillance	14
Multi-drug resistant Gram-negative bacteria (MDR-GNB)	15
Outbreak Management	16
Pulmonary Tuberculosis (TB)	18
IPAC Links	19
Urinary Tract Infections (UTI) and Asymptomatic Bacteriuria (ASB)	20
Influenza	21
Education	22
APPENDICES	
Appendix A: Infection Prevention and Control Team	23
Appendix B: Providence Health Care Facilities	24
Appendix C: Definitions	25
References	26



Cover photo:
Surveillance swab being
inoculated onto chromogenic
MRSA media in the Medical
Microbiology Laboratory.

EXECUTIVE SUMMARY

On behalf of the Infection Prevention and Control (IPAC) team at Providence Health Care (PHC), I am pleased to share with you the 2012/13 IPAC Annual Report.

Since I started as Medical Director in 2005, the IPAC team has been able to implement significant and meaningful change in the prevention and control of healthcare-associated infections at PHC. In this regard, the past year was no exception: rates of antibiotic resistant organisms (MRSA, VRE) were stable or decreasing; hand hygiene compliance rates continued to improve approaching 80%; surveillance systems were expanded and further refined; and, new initiatives to protect patients from urinary tract infections, tuberculosis, and emerging multidrug resistant bacteria were successfully launched.

These successes are reported in the context of an exceptionally challenging healthcare environment, both in terms of our patient population (including a large proportion of socially disadvantaged and immunocompromised patients) and our limiting physical infrastructure. Changes in the strains and relative virulence of circulating micro-organisms add to the complexity of our work.

The foundation for this report is the IPAC surveillance program for healthcare-associated infections. Since 2005, IPAC surveillance at PHC has evolved to become one of the most epidemiologically sophisticated programs in BC healthcare. Data are collected, cleaned, analyzed, interpreted, and disseminated for action to multiple internal and external stakeholders. All outbreaks are managed using principles and practices commonly employed by our colleagues in public health (e.g., epidemic curves).

All of this would not be possible without the dedication of the staff and physicians at PHC. This report not only reflects the hard work of the IPAC team, but also the commitment of frontline staff to providing safe, high quality patient-centred care. The achievements you will read about in the subsequent pages are simply some examples of the innovative and exceptional care provided at PHC.

Marc G. Romney, MD, FRCPC, DTM&H

Medical Director, Infection Prevention and Control

INTRODUCTION TO INFECTION PREVENTION AND CONTROL

Infection Prevention and Control (IPAC) is aligned with the Values and Mission of Providence Health Care (PHC)

The Vision of the IPAC team is to create and sustain a culture in which infection prevention and control is integrated into all aspects of care at all PHC facilities.

The Mission of the IPAC team is to be dedicated to the prevention and control of healthcare-associated infections in a supportive working environment. The practices of the IPAC team are based on sound scientific principles. Infection control services are provided to PHC with structure and authority in collaboration with local, regional, and provincial partners.



St. Paul's Hospital



Mount Saint Joseph Hospital



St. Vincent's: Brock Fahrni



St. Vincent's: Langara



Holy Family Hospital



Youville Residence

Our vision and mission are carried out using the initiatives described below.

Surveillance: Monitoring healthcare-associated infections using standardized case definitions is critical to the prevention and control of infectious agents. At PHC, the objectives of surveillance are to:

- Detect cases through enhanced screening so that appropriate interventions can be implemented.
- Detect outbreaks of infectious diseases in order to implement control measures.
- Monitor trends in PHC-associated transmission, and provide a means of determining when interventions are required.
- Interpret trends with a focus on hospital-specific data as opposed to inter-hospital comparisons.
- Determine the burden of specific infectious diseases at PHC.
- Evaluate and improve interventions.

Case management: Control measures for patients identified with a communicable disease are based on how infectious agents are transmitted, and include education and implementation of standard, contact, droplet, or airborne precautions.

Outbreak management: In collaboration with Vancouver Coastal Health Public Health, IPAC is responsible for investigating clusters of cases and determining whether there is an outbreak at a PHC facility. Control measures are promptly implemented when each outbreak is declared.

Education: IPAC provides education to staff, patients and visitors in order to increase awareness of appropriate IPAC measures. Education is provided via classes, presentations, consultations, and the IPAC website.

Research: IPAC conducts research in order to support the integration of evidence-based practices into daily practice and evaluate the effectiveness of current strategies at PHC.

Policies and Procedures: IPAC continuously reviews, develops, and implements policies and procedures to guide evidence-based best practices.

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)

MRSA is an antibiotic resistant bacterium that can be transmitted in healthcare and community settings. MRSA has the potential to cause serious infections for which treatment options are limited. More patients are colonized rather than infected with MRSA. Medically complex patients, those with multiple chronic diseases, and those who undergo invasive procedures are at higher risk for MRSA infection. The primary mode of transmission within healthcare facilities is via the hands of healthcare workers. The data presented below represent newly identified cases of MRSA among patients admitted to a PHC facility.

In 2012/13, 672 new cases of MRSA were identified at PHC facilities. More precisely, 152/672 (23%) were classified as PHC-associated, of which 74% were associated with transmission on acute care wards at St. Paul's Hospital or Mount Saint Joseph Hospital. The overall incidence rate was 6.1 cases/10,000 patient-days (95% CI: 5.1-7.3)(Figure 1).

This corresponds to a 19% (statistically insignificant) decrease in the rate of PHC-associated MRSA cases compared to the previous fiscal year, and a 64% statistically significant decrease compared to 2006/07 ($p < 0.05$).

Overall, the rate at MSJ (5.1 cases/10,000 patient-days) was lower (statistically insignificant) than the rate at SPH (6.3 cases/10,000 patient-days) (Figure 2).

In 2012/13, 40% of PHC-associated cases were identified through hospital screening programs. The remaining cases were identified from clinical specimens. However, there are gaps in collecting screening specimens in a timely manner. Over the next year, our priority will be to improve adherence to standardized risk assessment and collection of screening tests on admission.

Overall, the incidence rate of PHC-associated MRSA cases has been declining over the last seven years with improved infection prevention and control practices among healthcare professionals. Additionally, accelerated laboratory result turn-around-times from improved molecular testing have likely contributed to decreasing rates.



Frozen bacterial isolates of MRSA stored at -70°C.

Classification of MRSA cases detected at the time of hospital admission: does the 'look-back' period matter? Leung V, Lloyd-Smith E, Romney M. *Journal of Hospital Infection* 2013; 84(3): 256-258.

Retrospective review of prior hospitalization is used to classify cases as being healthcare-associated. We examined whether changing our look-back period from 4 weeks to 1 year resulted in any significant changes in PHC-associated cases and found that only two additional cases met criteria for reclassification (a non-significant difference). Our findings reveal that using a 4 week look-back period does not significantly underestimate our MRSA rate and decreases time required for ICPs to review charts.

FIGURE 1:
INCIDENCE RATE OF
PHC-ASSOCIATED
MRSA IN ACUTE CARE
FACILITIES, 2006/07
TO 2012/13

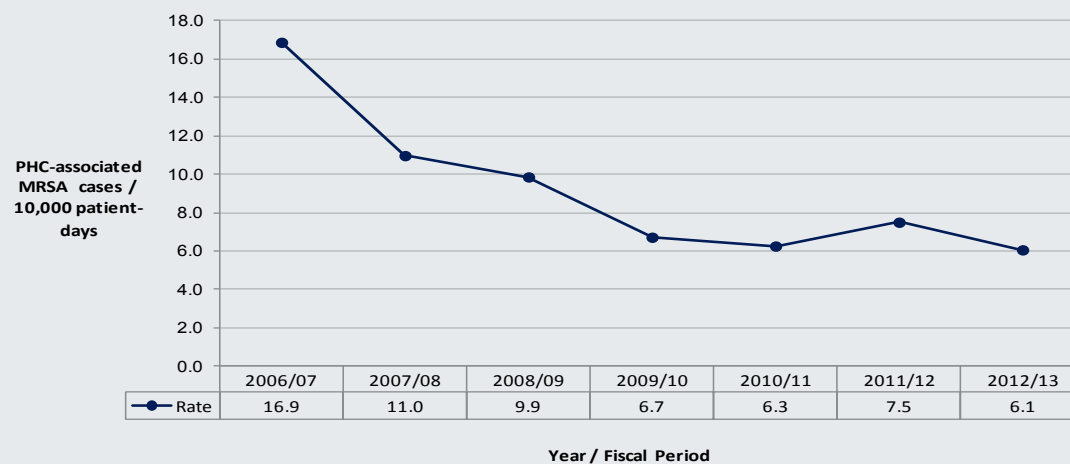
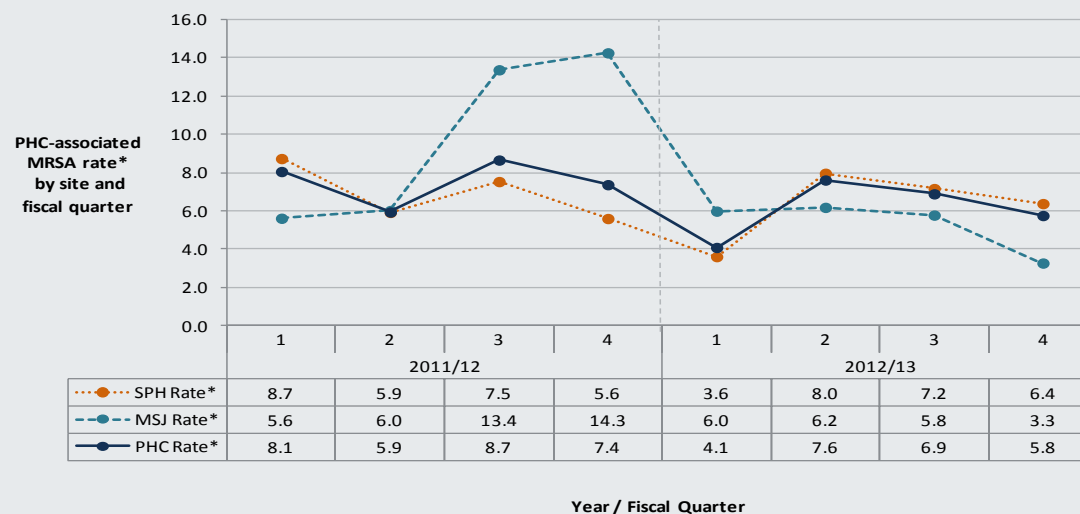


FIGURE 2:
INCIDENCE RATE OF
PHC-ASSOCIATED MRSA
BY SITE AND FISCAL
QUARTER, 2011/12
TO 2012/13



Note: * number of cases / 10,000 patient-days

VANCOMYCIN-RESISTANT ENTEROCOCCI (VRE)

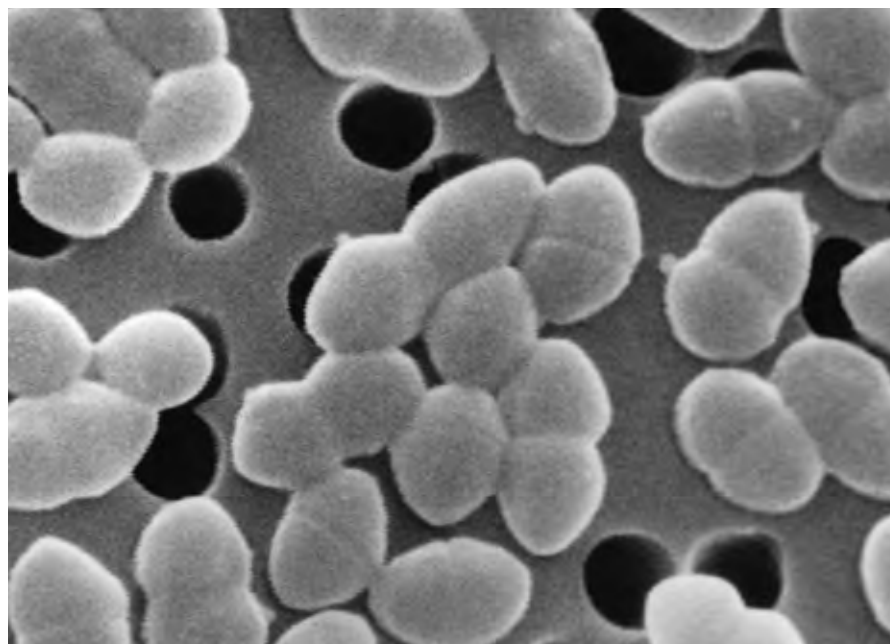
VRE refers to certain strains of enterococci that are resistant to the antibiotic vancomycin, making VRE infections more difficult and costly to treat. More patients are colonized rather than infected with VRE, but colonization is considered to be the first step to developing an infection.

In 2012/13, 529 new cases of VRE were identified at PHC. Nearly all of these cases (83%) were admitted to a PHC facility, and 326/529 (62%) of cases were classified as PHC-associated.

Of the PHC-associated cases, 315 (97%) were associated with presumed transmission on acute care wards at either MSJ or SPH, corresponding to an incidence rate of 16.8 cases/10,000 patient-days (95% CI: 15.0-18.8)(Figure 3). This is higher (statistically insignificant) than 2011/12 rate of 14.5 cases/10,000 patient-days (95% CI: 12.9-16.4).

Overall, the incidence rate at MSJ increased (statistically insignificant) from 11.5 (95% CI: 8.6-15.5) in 2011/12 to 16.4 (95% CI: 12.8-21.0) in 2012/13, while the incidence rate at SPH increased (statistically insignificant) from 15.3 (95% CI: 13.4-17.4) in 2011/12 to 16.9 (95% CI: 14.9-19.1) in 2012/13 (Figure 4). In Quarters 3 and 4 of 2012/13, we observed an increased number of cases on medical units and this contributed to the increase in VRE cases at this site. Interventions to control these clusters included: increased frequency of hand hygiene audits, transmission based precautions audits and environmental cleaning audits; enhanced use of chlorhexidine for bathing patients colonized or infected with VRE; increased education for front-line staff; and emphasis on improved cohorting of patients. At both acute care sites, patient population and medical complexity should be taken into consideration when interpreting rates.

In 2012/13, the majority (79%) of PHC-associated cases were identified through hospital screening programs. The remaining cases were identified through clinical specimens. Overall, VRE incidence rates have decreased by 37% since 2006/07.



This scanning electron micrograph (SEM) revealed numerous bacteria, which were identified as being Gram-positive *Enterococcus* sp.

Economic analysis of vancomycin-resistant enterococci at a Canadian hospital: assessing attributable cost and length of stay Lloyd-Smith P, Younger J, Lloyd-Smith E, Green H, Leung V, Romney MG. *Journal of Hospital Infection* 2013; 85(1): 54-59.

Competing resource demands have resulted in de-escalation of some VRE programs across Canada. We conducted an economic evaluation to determine the attributable costs and length of stay (LOS) of VRE colonizations/infections at SPH. Attributable cost of VRE was \$17,949 [95% CI: \$13,949-\$21,464] and attributable length of stay was 13.8 days [95% CI: 10.0-16.9]. Given the considerable attributable cost and length of stay associated with VRE, PHC will continue to actively implement a VRE prevention and control program.

FIGURE 3:
INCIDENCE RATE OF
PHC-ASSOCIATED
VRE IN ACUTE CARE
FACILITIES, 2006/07
TO 2012/13

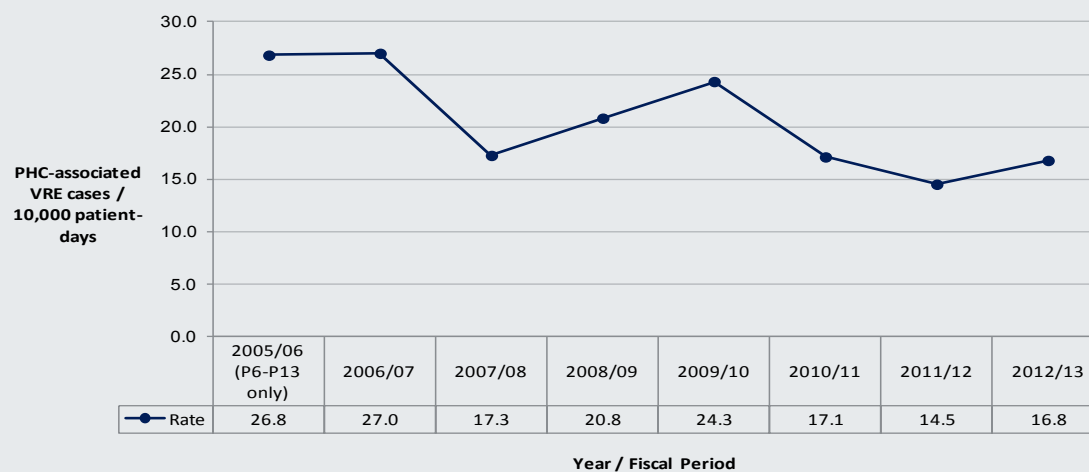
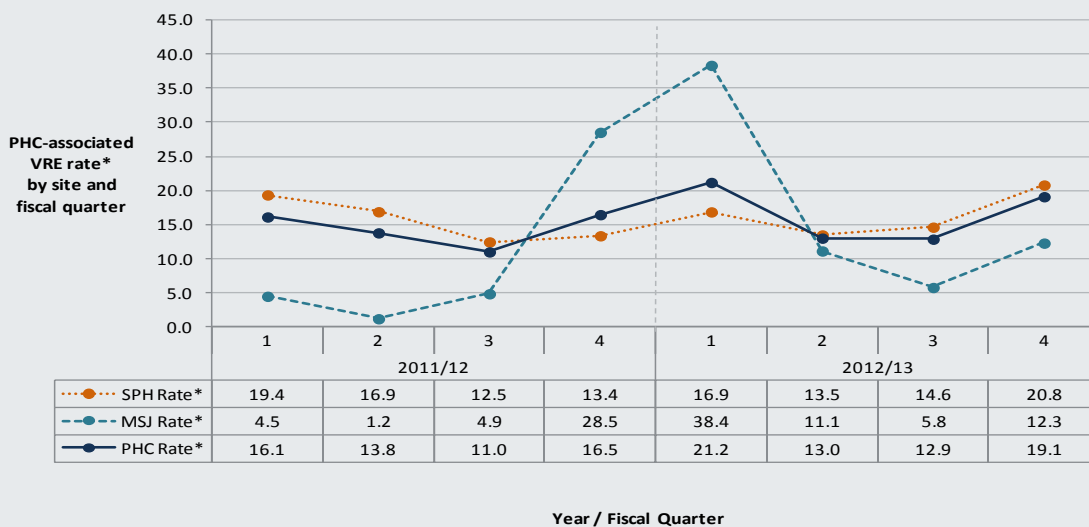


FIGURE 4:
INCIDENCE RATE OF
PHC-ASSOCIATED VRE
BY SITE AND FISCAL
QUARTER, 2011/12
TO 2012/13



Note: * number of cases / 10,000 patient-days

CLOSTRIDIUM DIFFICILE INFECTION (CDI)

Clostridium difficile infection (CDI) is the most common cause of healthcare-associated infectious diarrhea. CDI can present as mild diarrhea, but occasionally progresses to a severe infection resulting in potentially serious complications such as toxic megacolon and even death. CDI is known to be more common in hospitalized persons who are > 65 years old and those who have been on antibiotics in the preceding three months.⁴ Enhanced surveillance for CDI began at PHC on January 1, 2007, and polymerase chain reaction (PCR) for diagnosis of CDI was implemented in fiscal period 6 of 2010/11. To minimize transmission of CDI, measures such as appropriate hand hygiene, stringent environmental cleaning/disinfection, and judicious use of antibiotics need to be implemented.

In 2012/13, 368 new cases of CDI were identified at PHC. 232 (63%) of these were classified as PHC-associated cases. Of these, 196 (84%) were associated with either SPH or MSJ, corresponding to an incidence rate of 10.1 cases/10,000 patient-days (95% CI: 8.8-11.7). **This is a slight, but not statistically significant, decrease from 2011/12 (Figure 5).** As shown in Figure 6, the incidence rate of CDI at MSJ and SPH remained relatively unchanged over the four Fiscal Quarters of 2012/13.

Complications related to CDI in the 30 days following diagnosis are considered an indicator of the severity of illness, and are also closely monitored as part of our surveillance program. In 2012/13, 6 cases (3%) were admitted to the ICU, 2 cases (1%) were diagnosed with toxic megacolon and 0 (0%) cases underwent colectomy. In addition, CDI was determined to be a probable contributing factor in the death of 4 (2%) cases.

To ensure prompt initiation of enhanced environmental cleaning and disinfection, ICPs have increased frequency of communication with housekeeping staff to inform them of patient rooms that require enhanced cleaning.

ICPs actively follow patients with CDI to ensure that contact precautions are initiated and followed.



This micrograph depicts Gram-positive *C. difficile* bacteria

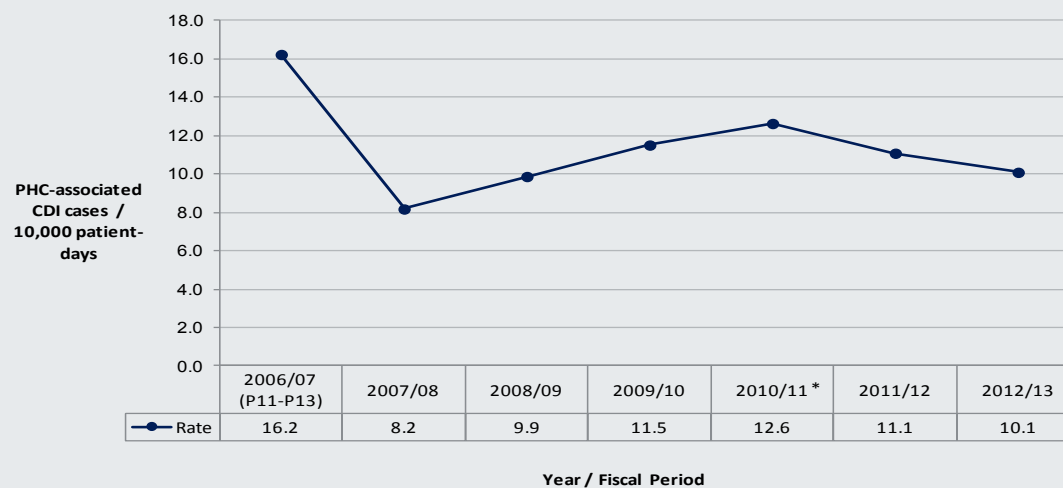
Polymerase chain reaction assay to detect *Clostridium difficile* tcdC variants is valuable in characterizing hospital epidemiology Wilmer A, Lloyd-Smith E, Leung V, Wong T, Ritchie G, Hoang L, Champagne S, Romney MG, *Journal of Hospital Infection* 2013; 84(3): 252-255.

A retrospective review was conducted over one year to determine whether there were different strains of CDI at our two acute care hospitals (SPH and MSJ). We found that more than half of hospital-associated CDI cases in this study were attributable to "tcdC variant" C. difficile strains, which were more commonly recovered from elderly patients at MSJ. This mutant strain is known to produce high levels of toxin, and has been associated with large scale CDI outbreaks in Quebec and abroad. The detection of these tcdC variants allowed us to identify reinfections with different strains within the recurrence period. This permitted more precise epidemiological classification of cases.

Furthermore, we worked with a consulting company to support research estimating the economic burden of CDI in Canada and the incremental length of stay and costs of CDI among hospitalized patients at SPH. CDI diagnosis increased length of stay by 14 days at an increased cost of \$11,210 (\$9,070-\$13,340) and \$15,340 (\$12,460-\$18,330) for primary and recurrent infections, respectively. These data may be useful to guide allocation of resources for prevention of CDI.

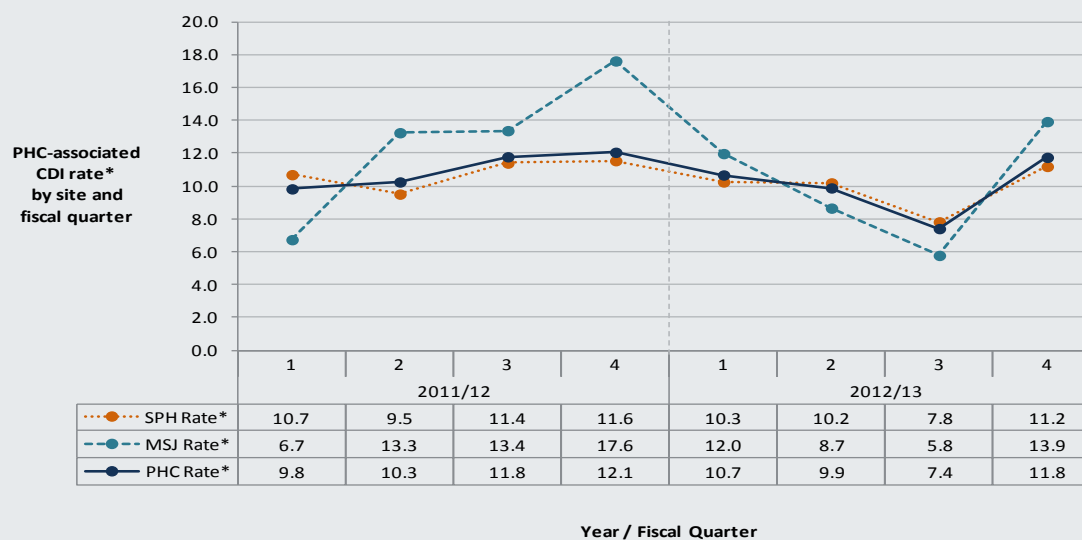
Currently, IPAC physicians are participating in a multi-centre randomized controlled trial comparing a novel antibiotic with vancomycin for the treatment of CDI.

FIGURE 5:
INCIDENCE RATE OF
PHC-ASSOCIATED CDI
CASES IN ACUTE CARE
FACILITIES, 2006/07
TO 2012/13



* PCR testing introduced in 2010/11 Fiscal Quarter 2 (Period 6)

FIGURE 6:
PHC-ASSOCIATED
CDI CASES BY
SITE AND FISCAL
QUARTER, 2011/12
TO 2012/13



Notes: * number of cases / 10,000 patient days

HAND HYGIENE

Hand hygiene (hand-washing with soap and water or using an alcohol-based hand rub) is considered the most important measure for preventing nosocomial infections. However, overall compliance with hand hygiene among healthcare professionals is known to be suboptimal.¹ At PHC, we continue to make progress in optimizing hand hygiene.

This year, major hand hygiene educational and promotional activities included:

- Health care workers pledge and commitment to being reminded if there are missed opportunities for hand hygiene
- Expansion of unit feedback boards
- Educational events highlighting the first of “5 Moments” for hand hygiene
- ICP led huddles on units focusing on hand hygiene
- Increased point of care alcohol-based hand rub dispensers
- Physician Hand Hygiene Champions

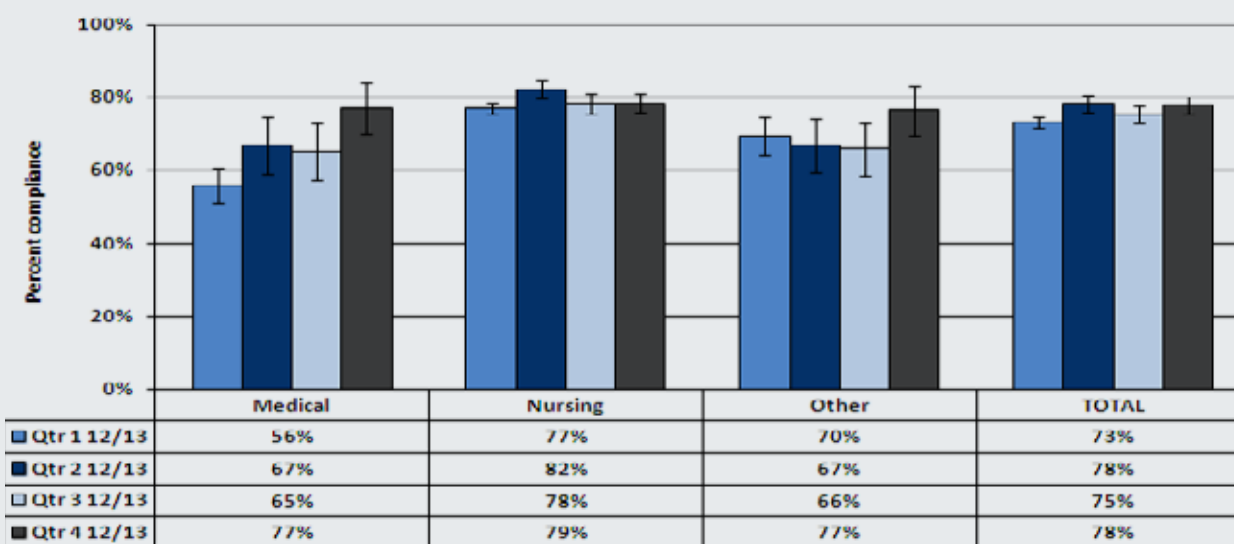
Systematic quarterly hand hygiene audits began in 2008/09 and are based on the “gold standard” methodology of direct observation by guidelines developed by the World Health Organization. Infection Control Practitioners (ICPs) measure compliance by direct observation of staff, and compliance is calculated using the following formula:

$$\% \text{ Compliance} = \frac{\# \text{ hand hygiene events}}{\# \text{ opportunities}} \times 100$$

Overall hand hygiene compliance was 76% for fiscal year 2012/13. Compliance varied by unit, healthcare worker type, and facility. Compared to last fiscal year, overall hand hygiene compliance improved steadily and significantly in 2012/13 and increased from 73% in Quarter 1 to 78% in Quarter 4 (Figure 7). Further initiatives to sustain and improve compliance above 80% are currently being implemented.



FIGURE 7: HAND HYGIENE COMPLIANCE BY HEALTH CARE WORKER TYPE AND BY FISCAL QUARTER, 2012/13



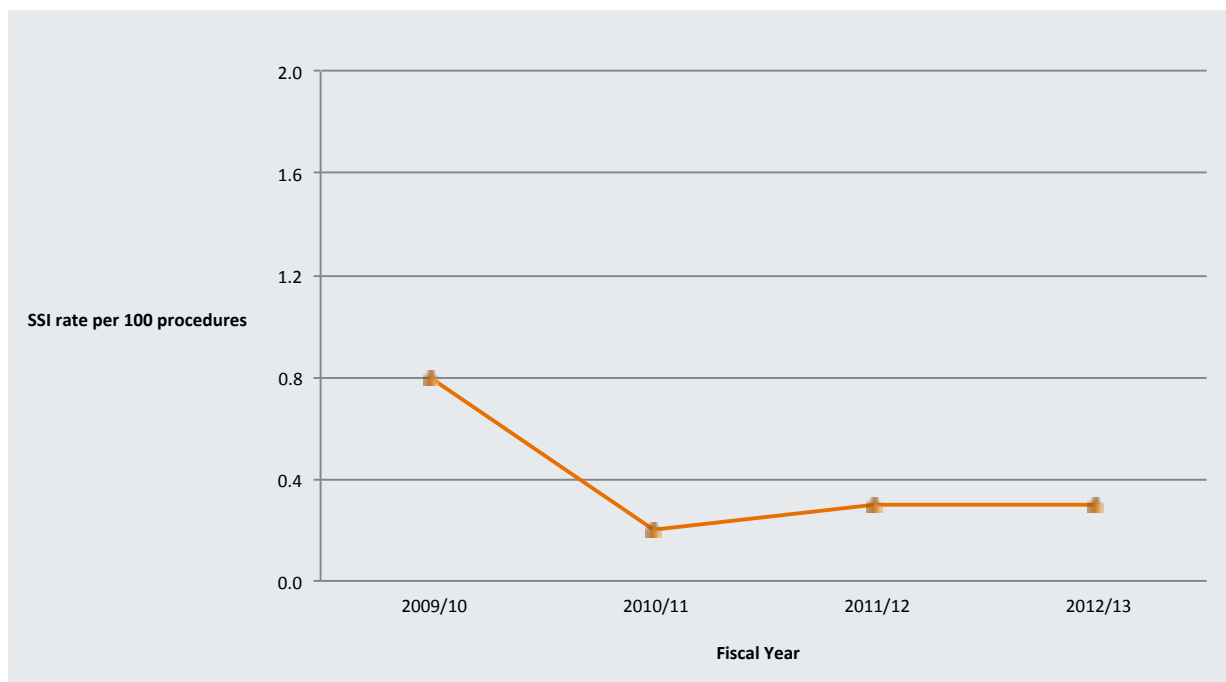
SURGICAL SITE INFECTION (SSI) SURVEILLANCE

Surgical site infections (SSI) continue to be a major source of post-operative morbidity, extended hospital stays, increased healthcare costs, and readmissions to hospital. SSI surveillance has been identified as a key priority for IPAC and the PHC Surgical Program, and is an Accreditation Canada required organizational practice.

Surgical site infections are identified following the development of an infection at the anatomical site of surgery within a specified period of time following the procedure. SSI surveillance is conducted while patients are in hospital; however, there is also an expectation to conduct surveillance after patients have been discharged home. For most surgeries, 30 days is the standard follow-up period. This is extended to 90 days if a prosthetic device or material has been placed (e.g., prosthetic joint or heart valve). The case definitions used for our SSI surveillance are consistent with the most recent definitions used by the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN).

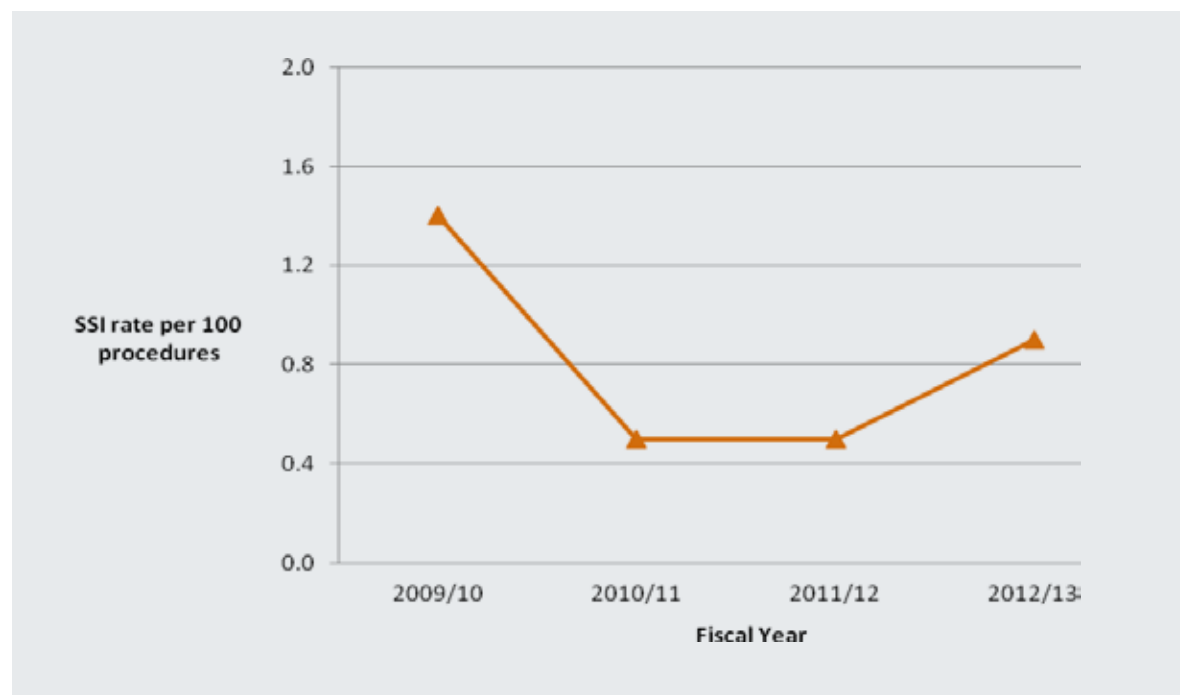
In collaboration with the Department of Surgery and the Surgical Program, IPAC has developed an electronic and semi-automated SSI surveillance system. Instead of conducting universal surveillance on all surgical procedures performed at PHC, IPAC's SSI surveillance programs are targeted to selected high-volume or high-risk procedures.⁶ Procedures currently under surveillance include: Caesarean sections, hip and knee arthroplasties, and cardiac surgery (coronary artery bypass grafting and procedures on heart valves).

FIGURE 8: SURGICAL SITE INFECTIONS FOLLOWING CAESAREAN SECTION FROM 2009/10 TO 2012/13



Caesarean section: Since 2008/09, we have worked with the Department of Obstetrics and Gynecology to conduct surveillance for SSI following Caesarean section. Fiscal year 2009/10 was the first complete year of this surveillance initiative. **As displayed in the graph, Figure 8, the SSI rate was consistent with the previous year (0.3 per 100 procedures per year) and has decreased from 2009/10 (0.8 per 100 procedures per year).** The rate is well below the pooled mean from NHSN. This year we expanded our surveillance program to include a post-discharge component. We investigated infections post-discharge using multiple methods: a SSI survey in the discharge package, telephone calls after 30 days and assessment of readmissions to hospital. **The post-discharge SSI rate was 1.4 per 100 procedures. When combined, the total SSI captured in 2012/13 was 1.7 per 100 procedures per year.** This combined rate is also below the pooled mean from the NHSN. For the next fiscal year, we are exploring the potential for using electronic technology to improve feedback rates for post-discharge surveillance.

FIGURE 9: SURGICAL SITE INFECTIONS FOLLOWING HIP OR KNEE ARTHROPLASTY FROM 2009/10 TO 2012/13

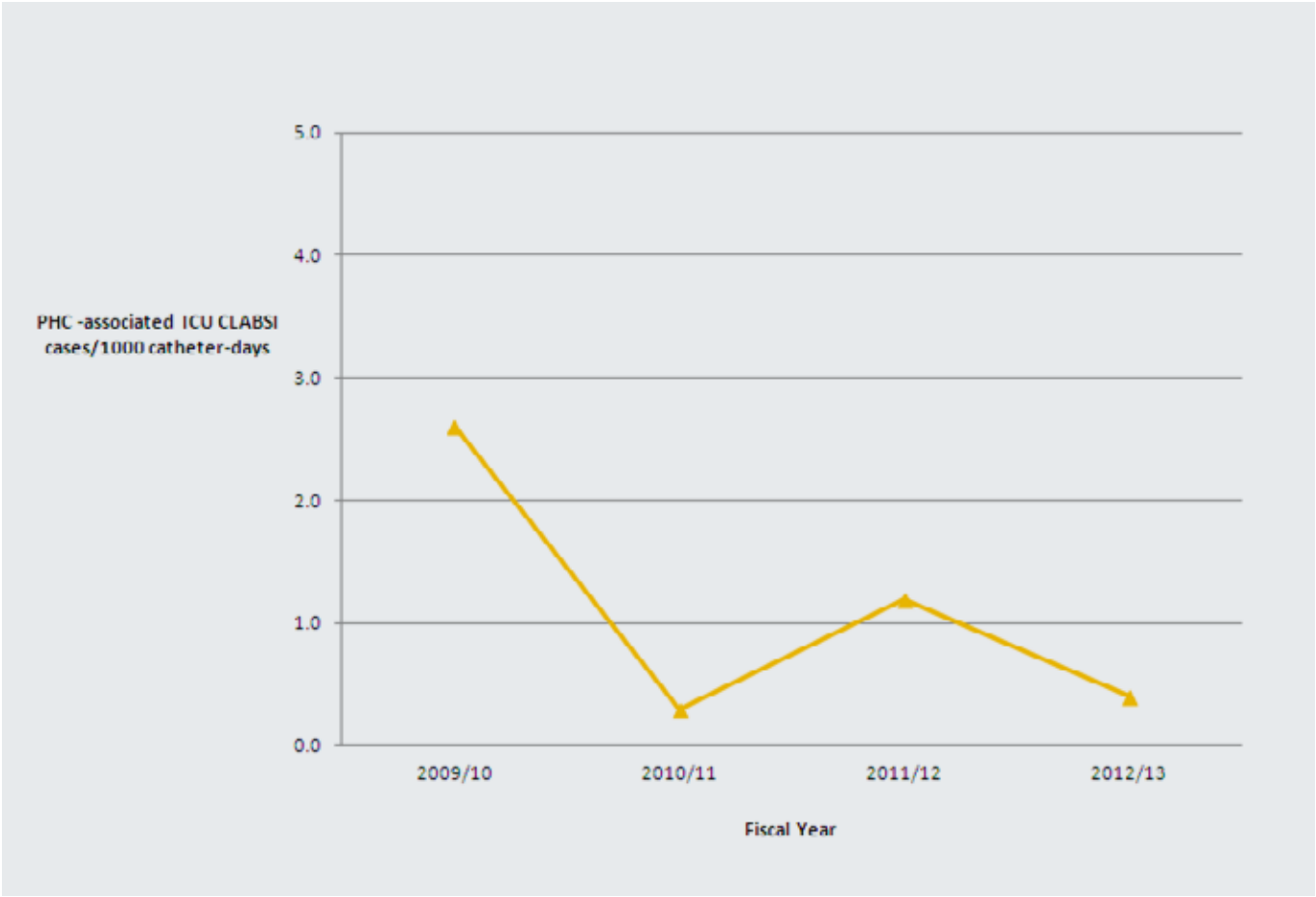


Cardiac surgery: In 2012/13, and in collaboration with the Division of Cardiac Surgery and the Surgical Program, we monitored SSI for coronary artery bypass graft surgery, as well as cardiac valve replacement surgery. The SSI rate was 1.2 per 100 procedures per year during the postoperative hospital stay and 0.8 per 100 procedures during post-discharge (either from readmission or outpatient data). Combining the two, the overall SSI rate was 1.9 per 100 procedures per year. Of the SSI detected, 59% were reported during the postoperative hospital stay, while 41% were detected post-discharge. We look forward to refining our surveillance system in the coming year.

Hip and knee arthroplasty: Surveillance for SSI following hip and knee replacement surgeries began in 2007. These procedures are recommended for surveillance by the CDC NHSN. This initiative was developed as a partnership between IPAC and the Department of Orthopedic Surgery at PHC. Figure 9 shows that the rate has slightly increased compared to the previous fiscal year (from 0.5 to 0.9 per 100 procedures per year) but has decreased since 2009/10 (1.4 per 100 procedures per year). The rate is below the pooled mean from the NHSN. The logistics of post-discharge surveillance for arthroplasties remain a challenge; however, there were no reported post-discharge SSI in 2012/13.

CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTION (CLABSI) SURVEILLANCE

FIGURE 10: CENTRAL LINE ASSOCIATED BLOODSTREAM INFECTIONS AMONG PATIENTS IN THE INTENSIVE CARE UNIT FROM 2009/10 TO 2012/13



CLABSI result in prolonged hospital stay, increased healthcare costs and excess patient morbidity. Intensive care unit (ICU) patients are particularly vulnerable to CLABSI.⁸ Surveillance for CLABSI is an important component of hospital prevention and control activities. Using standardized case definitions and methodology, IPAC (in partnership with the ICU) has developed a sensitive and timely CLABSI surveillance system. The ICU has focused its efforts in decreasing CLABSI by enhancing education provided to those inserting central lines and implementing established prevention bundles.

Since 2009, IPAC has implemented a semi-electronic, semi-automated surveillance system that tracks the rate of CLABSI in the ICU at St. Paul's Hospital and Mount Saint Joseph Hospital. We now have four years of data, as seen in Figure 10. In the ICU, the CLABSI rate was 2.6 per 1000 catheter days for fiscal year 2009/10, 0.2 per 1000 catheter days for fiscal year 2010/11 and 1.1 per 1000 catheter days for fiscal year 2011/12. This year, the rate was 0.4 infections per 1000 catheter days. [Note: based on a relatively low sample size in our CLABSI surveillance, we see intrinsic variability when rates are examined on a quarterly basis.]

MULTI-DRUG RESISTANT GRAM-NEGATIVE BACTERIA (MDR-GNB)

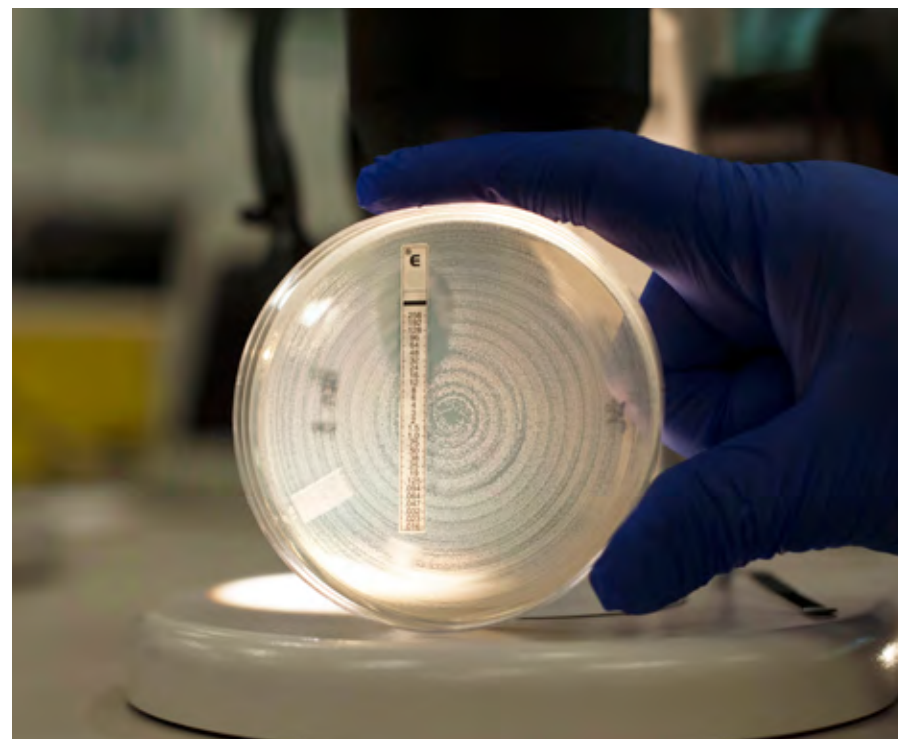
The emergence and dissemination of multi-drug resistant Gram-negative bacteria (MDR-GNB) represent a serious threat to hospitalized patients and to public health. More specifically, carbapenemase producing *Enterobacteriaceae* (CPE) and *Pseudomonas aeruginosa* are considered a “triple threat” because (1) they are resistant to last line antibiotics, (2) they are associated with a high mortality rate, and (3) they are difficult to control once established in health care facilities.

Since being reported in 2001, CPE have disseminated widely in many countries. In Canada, reported outbreaks of CPE have been difficult to control and are a significant drain on health care resources. Patients who receive medical care in countries where these organisms are endemic can serve as reservoirs for transmission when they receive care locally.

The approach to controlling transmission of CPE in healthcare facilities includes:

- Understanding the epidemiology of CPE and other MDR-GNB in our healthcare region
- Rapid identification of colonized and infected patients
- Implementation of regional and facility-based infection prevention and control interventions

In 2012-13, PHC cared for three patients with MDR-GNB (1 carbapenemase producing *E. coli* and 2 MDR *P. aeruginosa*). Two cases had received recent medical care while visiting an endemic country; the remaining case had no identifiable travel history. During the period of hospitalization for these patients, the IPAC team worked closely with the Medical Microbiology Laboratory and the affected units to prevent transmission. The following interventions were implemented: strict isolation of affected patients, enhanced education of front-line staff on basic infection control measures, early identification of colonization/infection status followed by systematic active surveillance screening, enhanced environmental decontamination, and regular reporting of results to staff. **As a result, there was no nosocomial transmission of MDR-GNB at PHC in fiscal year 2012-13.**



An Etest is utilized for antimicrobial susceptibility testing to determine the minimum inhibitory concentration to an antibiotic..

We have now developed a systematic approach to screen selected high risk populations. Currently, all patients in our hemodialysis (HD) units who receive temporary HD in another country will undergo active screening cultures to determine if they acquired MDR-GNB while abroad. The Medical Microbiology Laboratory is reviewing its capacity to scale-up systematic screening tests for other high risk groups. A real-time PCR (polymerase chain reaction) assay for CPE detection has been validated and is currently in use.

OUTBREAK MANAGEMENT

All PHC facilities are monitored for respiratory and gastrointestinal infection outbreaks. Surveillance allows for the early detection of clusters so that control measures can be implemented swiftly. Outbreaks are declared in collaboration with Vancouver Coastal Health Medical Health Officer. Recently, improved laboratory detection of influenza and norovirus using molecular methods has allowed for rapid implementation of control strategies. The frequency, duration, and severity of outbreaks depend on the type of organisms circulating in the community. In 2012/13, there was detection of a new strain of norovirus, GII.4 Sydney. It emerged as the predominant strain, and more cases of norovirus infection were observed over the outbreak period.

The following control measures are implemented to prevent and control nosocomial outbreaks:

- Prompt laboratory detection of the etiologic agent
- Early involvement of the IPAC team to support frontline staff
- Thorough review of each patient resident case and strict adherence to outbreak case definitions
- Isolation of affected patient residents in private rooms (or cohorting of patients if private rooms not available)
- Closure of the affected patient resident unit or ward
- Enhanced surveillance for the duration of the outbreak
- Targeted staff education to reinforce the need to implement syndromic based precautions
- Exclusion of sick staff from the workplace
- Restriction of visitors and postponement of group activities
- Enhanced environmental cleaning in the unit/facility



In 2012/13, 2 respiratory outbreaks and 3 gastrointestinal outbreaks were identified at PHC facilities (Tables 1 and 2). On average, respiratory outbreaks lasted 8 days (range: 7-8 days). All of the respiratory outbreaks occurred in residential care. On average, gastrointestinal outbreaks lasted 20 days (range: 17-21 days). We experienced a longer duration of norovirus outbreaks in 2012/13. One gastrointestinal outbreak was identified in acute care and 2 were identified in residential care. All gastrointestinal outbreaks were caused by norovirus.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6203a4.htm>

TABLE 1

Respiratory outbreaks at PHC facilities, 2007/08 TO 2012/13

Year	NUMBER OF OUTBREAKS			NUMBER OF CASES			CAUSATIVE ORGANISM	
	Total	Residential	Acute	Total	Residents/ patients	Staff	Influenza	Other
2012/13	2	2 (100%)	0 (0%)	18	15 (83%)	3 (17%)	2 (100%)	0 (0%)
2011/12	4	4 (100%)	0 (0%)	55	46 (84%)	9 (16%)	4 (100%)	0 (0%)
2010/11	1	0 (0%)	1 (100%)	3	2 (67%)	1 (33%)	1 (100%)	0 (0%)
2009/10	0	0 (0%)	0 (0%)	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2008/09	2	2 (100%)	0 (0%)	25	20 (80%)	5 (20%)	2 (100%)	0 (0%)
2007/08	4	4 (100%)	0 (0%)	116	107 (92%)	9 (8%)	2 (50%)	2 (50%)

TABLE 2

Gastrointestinal outbreaks at PHC facilities, 2007/08 TO 2012/13

Year	NUMBER OF OUTBREAKS			NUMBER OF CASES			CAUSATIVE ORGANISM	
	Total	Residential	Acute	Total	Residents/ patients	Staff	Norovirus	Other
2012/13	3	2 (75%)	1 (25%)	112	79 (71%)	33 (29%)	3 (100%)	0 (0%)
2011/12	4	2 (50%)	2 (50%)	80	51 (64%)	29 (36%)	4 (100%)	0 (0%)
2010/11	4	1 (25%)	3 (75%)	59	39 (66%)	20 (34%)	4 (100%)	0 (0%)
2009/10	2	2 (100%)	0 (0%)	56	50 (89%)	6 (11%)	2 (100%)	0 (0%)
2008/09	6	2 (33%)	4 (67%)	103	80 (78%)	23 (22%)	6 (100%)	0 (0%)
2007/08	6	0 (0%)	6 (100%)	48	28 (58%)	20 (42%)	3 (50%)	3 (50%)

PULMONARY TUBERCULOSIS (TB)

Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis*. TB is spread primarily via the aerosolization of respiratory secretions when someone with active pulmonary disease coughs or sneezes. The risk of TB transmission in healthcare settings is driven by the prevalence of disease in the patient population and the effectiveness of prevention and control measures. Successful prevention of in-hospital tuberculosis transmission depends on the early recognition of suspect cases and the appropriate use of airborne precautions. Early recognition of possible TB cases, however, can be a challenge. Active cases of TB do not always display specific clinical manifestations and active disease may be initially obscured by the patient's primary presenting complaint.

A relatively high number of individuals with active TB seek care at PHC. Over the past year, IPAC continued to develop its approach for enhanced monitoring of cases requiring airborne precautions. This work included reviewing all patients for whom TB diagnostic tests are ordered, raising awareness for early recognition (target to initiate precautions within 4 h of syndrome recognition) as well as ensuring precautions were maintained for an appropriate duration. In 2012/13, 509 cases required ICP evaluation. Of these cases, 281 (55%) required ongoing monitoring of airborne precautions until an alternate diagnosis was determined.

In addition, all patients entering the hemodialysis program are now screened for TB using interferon gamma release assays if appropriate.

In 2012/13, 16 new cases of pulmonary tuberculosis were diagnosed at PHC acute care facilities; 11 (69%) were among admitted patients. For 7 (63%) of the admitted cases, investigation of active pulmonary TB was not part of their initial work-up. Nevertheless, 73% of the admitted TB cases had appropriate precautions within 4 hours of symptom recognition. Five cases had roommates who required TB exposure follow-up. No nosocomial transmission of TB was detected in 2012/13.



Mycobacterial cultures on Löwenstein - Jensen medium.

IPAC LINKS

The “IPAC Links” program was established following the successful implementation and evaluation of the Infection Control Champions (ICC) project, a study which was led by IPAC and funded by the Canadian Institutes of Health Research (CIHR). The ICC project goal was to evaluate the feasibility and cost-effectiveness of supporting local front-line nurses in infection control leadership initiatives.

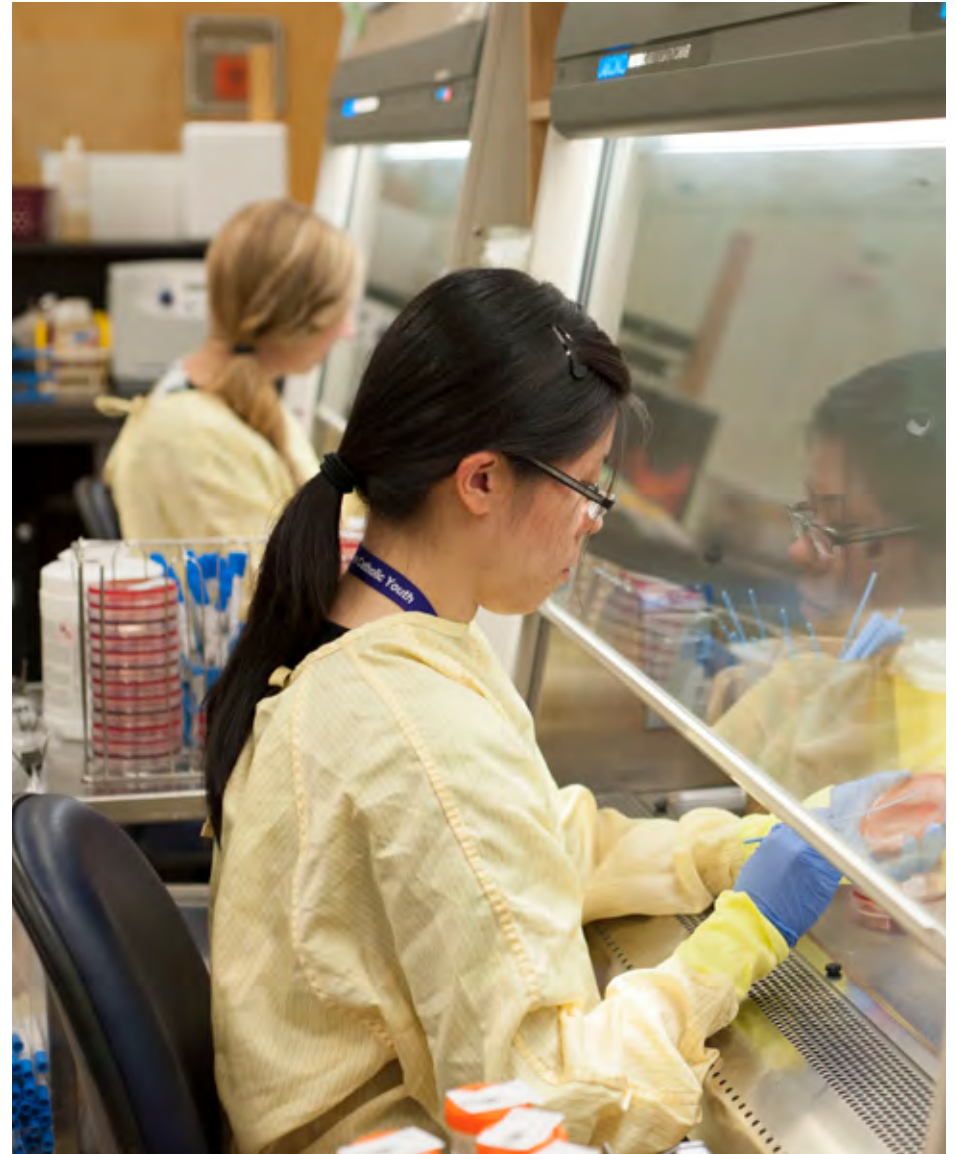
Local stakeholders considered the project a success and the ICC project was renamed and re-launched as the IPAC Links program. Since its inception, IPAC has trained 151 Links to the Link Program.

Building upon the previous accomplishments of IPAC Links, the scope of the program was broadened considerably. Based upon a distributed model of infection prevention and control, the Links program now includes Social Workers, Licensed Practical Nurses, Respiratory Therapists, Laboratory Technologists, Ward Aides and Radiology Technicians as well as Registered Nurses.

This year, the orientation program was reviewed and redesigned to be interactive and incorporate more adult learning strategies. A Links Workbook was created and distributed as a pilot project to empower Links to fulfill their roles more effectively. The Workbook incorporates check-ins and activities.

In addition to the orientation sessions, updates are presented through education and a newsletter entitled “The Bug Brief” sent out by IPAC.

Many Links have been playing a pivotal role in a number of local infection control issues including: increasing access to point of care alcohol-based hand rub, improving compliance with ARO screening and transmission-based precautions, and promoting educational material and surveillance data on unit feedback boards.



Medical Microbiology Laboratory technologists inoculating bacterial culture media.

URINARY TRACT INFECTIONS (UTI) AND ASYMPTOMATIC BACTERIURIA (ASB) IN RESIDENTIAL CARE

Urinary tract infections (UTI) are one of the most common infections in the residential care population. However, antibiotic prescriptions for suspected UTI are often inappropriate. Furthermore, antibiotics are over prescribed for asymptomatic bacteriuria (ASB), or the presence of bacteria in the urine without clinical symptoms or signs of UTI. ASB is very common in the elderly and differentiating between ASB and a true UTI can be challenging.

When urine cultures are inappropriately requested, a positive urine culture often serves as a trigger for inappropriate prescribing of antimicrobials. This can lead to adverse consequences, including *Clostridium difficile* infection, harmful drug interactions, drug related adverse events, and excessive drug costs.

From January 1 to April 30, 2013, IPAC piloted a multifaceted intervention targeted to nurses and physicians at St. Vincent's Langara residential care. Our goals were to reduce the number of urine specimens obtained when there was no indication, improve the communication between nurses and physicians as it pertained to suspected UTI, and reduce the inappropriate use of antibiotics prescribed for suspected UTI and ASB.

Our targeted interventions included:

- weekly review of patients who had urine cultures collected and sent to determine the appropriateness of urine sample collection
- weekly direct feedback, clinical guidance and education to frontline staff on the use of a diagnostic algorithm for UTI
- presentations and collaborative meetings with residential care nursing and physician leadership to review the structured education plan and implementation
- continuing medical education rounds for residential care physicians



Urine specimens submitted for bacterial culture.

During the 4 month pilot program, the number of urinary specimens sent to the Medical Microbiology Laboratory for culture decreased by 52% compared to the same time period in the previous year. Urine cultures were often collected and sent for inappropriate reasons including cloudy or foul smelling urine, and change in behavior without localizing urinary tract symptoms. We have started to introduce a diagnostic algorithm, which was developed from a published randomized controlled trial demonstrating the safety and effectiveness of using such an algorithm for the management of suspected UTI and ASB.

In collaboration with the residential care leadership team and clinical nurse educators, IPAC will continue with phase 2 of the implementation plan at Langara (May 1 to December 30, 2013). The goal will be to expand the same interventions to all residential care facilities at PHC.

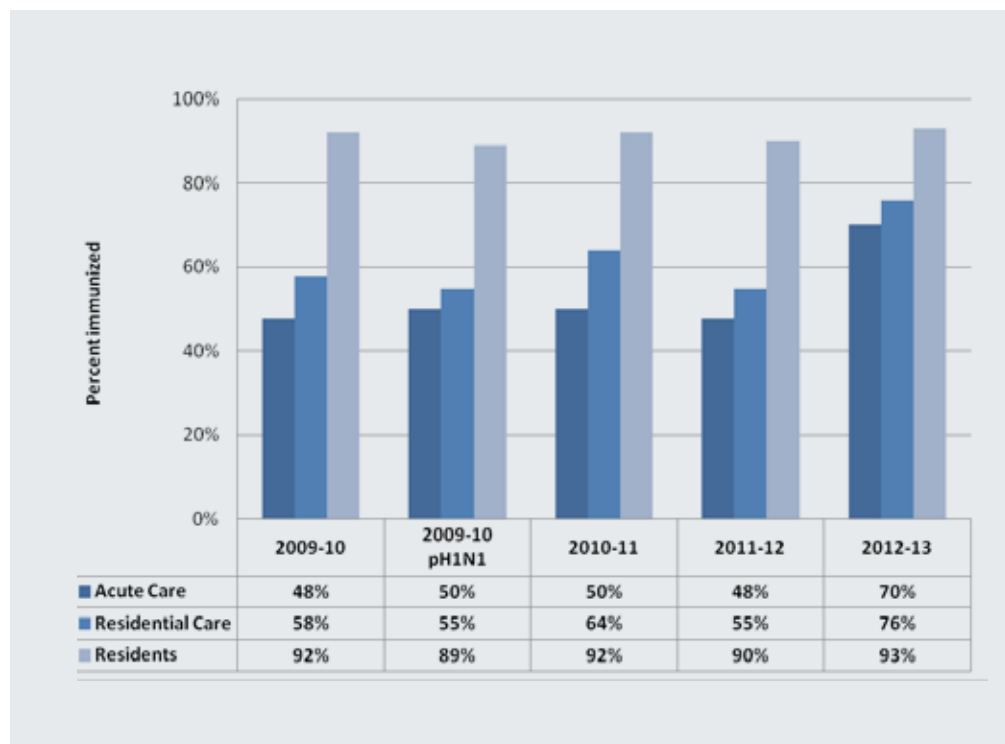
INFLUENZA

Every year, influenza infections result in a significant number of hospitalizations and deaths. The elderly, pregnant women and those with underlying medical conditions are at increased risk for influenza-related complications. In 2012/13, and consistent with previous years, nearly all of the residents at PHC residential care facilities were vaccinated against influenza (Figure 11).

Healthcare workers are also at an increased risk of acquiring and transmitting the influenza virus. Immunization is the most effective way to control the spread of influenza. Vaccine uptake rates among healthcare workers have improved in the last year. **In 2012/13, the percentage of acute care staff immunized against influenza increased to 70% (n= 2387) for seasonal influenza. Additionally, 702 (76%) residential care staff at PHC facilities were immunized against seasonal influenza which has also increased since last year (Figure 11).** These coverage rates are consistent with those reported in other health care facilities in BC.

IPAC is working closely with Occupational Health and Safety and VCH Communicable Disease Control to improve vaccination rates. In addition to receiving the influenza vaccine, health care workers are encouraged to always practice hand hygiene, respiratory etiquette, and to stay home from work if they have influenza-like symptoms.

FIGURE 11: INFLUENZA IMMUNIZATION COVERAGE RATES AMONG PHC STAFF AND RESIDENTS, 2009/10 TO 2012/13 (ESTIMATES)



EDUCATION



The IPAC team strives to provide PHC staff with timely and relevant education, based on current evidence-based recommendations. Messages are communicated using various strategies with the goal of promoting a culture in which IPAC is integrated into all aspects of care.

Educational resources, such as the infection control manual, information brochures, results from current research, and links to online courses, are made readily accessible to all PHC staff via the IPAC intranet website. In addition, the IPAC team provides consultations on a daily basis to address patient-, procedure- or unit-specific concerns. IPAC delivers educational sessions to all new employees at PHC. IPAC Physicians provide education through phone consultations, regular ward visits, resident teaching sessions and IPAC rounds.

Infection Control Practitioners (ICPs) deliver the bulk of infection control educational sessions at PHC. In 2012/13, IPAC delivered over 250 hours of educational sessions, reaching over 3200 staff. Most of the education delivered was on hand hygiene, with 80 hours of teaching to 1192 staff. The ICPs delivered 29 hours of education on influenza and gastrointestinal outbreaks to 367 staff this year. Furthermore, IPAC has doubled the hours (30 hours) and participant numbers (42) in Links education workshops compared to the previous year. Additional time by ICPs is spent on informal education by phone, email and front line staff safety huddles. The overall percent of education time was substantially higher than in recent years.

APPENDIX A:

INFECTION PREVENTION AND CONTROL TEAM

Marc Romney, MD
IPAC Medical Director / Medical Microbiologist

Howard Green, MBA
Leader, Infection Control

Victor Leung, MD
Infection Control Physician / Medical Microbiologist/
Infectious Diseases Consultant

Elisa Lloyd-Smith, PhD
Epidemiologist

Jim Curtin, RN CIC
Infection Control Practitioner

Mary McNaughton, RN MSA CIC
Infection Control Practitioner

Wayne Gilbert, RN
Infection Control Practitioner

Azra Sharma, MLT MSc
Infection Control Practitioner

Danielle Richards, RN MA
Infection Control Practitioner

Thomas Kind, RN
Infection Control Practitioner

Baljinder Sidhu, RN
Infection Control Practitioner

Leanne Wymam, MLT
Infection Control Practitioner

Camillia Palacios
Nursing Clerk

Luz Vierende
Administrative Assistant

Sylvie Champagne, MD
Medical Microbiologist

Christopher Sherlock, MD
Medical Microbiologist

APPENDIX B: PROVIDENCE HEALTH CARE FACILITIES

NAME	TYPE OF FACILITY	ACUTE CARE BEDS	RESIDENTIAL CARE BEDS
St. Paul's Hospital	Acute care	434	0
Mount Saint Joseph Hospital	Acute care Residential care	100	102
St. Vincent's Hospitals			
—Brock Fahrni Pavilion	Residential care	0	148
—Langara	Residential care	0	216
Holy Family Hospital	Rehabilitation care Residential care	74	142
Youville Residence	Residential care	0	64
Marion Hospice	Hospice Care	0	12
Total		612	698

APPENDIX C: DEFINITIONS

SURVEILLANCE DEFINITIONS

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

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

CDI case: Laboratory confirmation of *Clostridium difficile* in an unformed stool specimen.

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

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

For MRSA, VRE and CDI cases, the following sub-classifications are made:

PHC-associated case: Admitted for ≥ 72 hours in a PHC facility OR admitted to a PHC facility within the preceding 4 weeks/12 months.

Non PHC-associated case: Admitted for < 72 hours in a PHC facility AND has not been admitted to a PHC facility within the preceding 4 weeks/12 months. The assumption is that these cases were acquired in the community or in another healthcare facility other than PHC.

Patient-days: The number of patients currently admitted at a facility by day (counts are usually conducted at midnight) and multiplied by the number of days in a given time period. Patient days are used as denominators in the calculation of rates to adjust for length of stay. For MRSA and VRE rates, acute care (including newborns) patient days are used as the denominator. For *C. difficile* rates, acute care patient days exclude newborns.

Fiscal year/period: April 1 to March 31 of the following year, divided into 13 fiscal periods, and 4 fiscal quarters.

95% Confidence Interval (CI): An interval estimate of the rate with 95% degree of certainty.

OUTBREAK DEFINITIONS

Gastrointestinal outbreak: Three or more cases of suspected gastroenteritis among patients, residents, or staff, that cannot be explained by admitting diagnoses or by noninfectious 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.

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RECENT PUBLICATIONS

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