



Promoting wellness. Ensuring care.

Quality and Patient Safety
Infection Prevention and Control
Annual Report
2016/17



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EXECUTIVE SUMMARY

This has been a year of transition, reflection and subsequent realignment of our department to meet the needs of our patients, their families, and our staff. Embedding quality improvement and infection prevention and control at the point-of-care, while ensuring teams have reliable, relevant data to effect improvement has, and will continue to be, the primary focus for the department. With previous experience and learnings from Releasing Time to Care over the past 6 years, the department has worked extremely hard in realigning to a team based structure to develop competency, collaboration, and connection in continuous quality improvement. The goal of this work is to enable the skills, resources, facilitation, and support for individuals and teams who are providing direct patient/client care. We are thankful for the continued support of our donors for the opportunity to build quality improvement capacity with point-of-care teams.

We said our heartfelt goodbye to our Executive Director Nancy Desrosiers as she fulfilled her passion of working closely with patients and families in her new role as Director of the Medicine for Vancouver General Hospital. During her tenure with our team, Nancy successfully led the health authority through the largest and most comprehensive accreditation site visit ever experienced by VCH (surveyors toured over 40 sites and evaluated more than 20,000 criteria). We successfully achieved our highest rating ever at 96.7%.

The National Surgical Quality Improvement Program (NSQIP) continues to excel by providing risk adjusted reports to physicians, programs, committees, and leadership across VCH to drive quality improvement activities and research initiatives. A targeted model for NSQIP sampling has occurred for 9 high risk procedures at VGH which allows us to fully investigate 100% of the cases identified. Enhanced Recovery after Surgery (ERAS) is showing significant reductions in overall complications and the greater adherence to bundles has resulted in reduced morbidity. The program has received awards and the opportunity to present at Provincial, National, and International conferences.

The reduction of pneumonia and urinary tract infections (UTI) remain a key organizational priority. UTI rates are decreasing but remain high and pneumonia rates have not decreased. A subsequent robust process review has resulted in enhanced documentation, case identification and coding, and improved evidence-based practices. The infection control team at VGH and RH participated in a national one-day point prevalence survey cataloguing all healthcare associated infections (HAIs). On that one day, 64 patients had HAIs resulting in approximately 230 additional days stay; at an average cost per case of \$15,052, the burden to our healthcare system was over one million dollars. This was despite an overall reduction in C.difficile, MRSA, and surgical site infections compared to a similar survey in 2009.



EXECUTIVE SUMMARY

This year, our canine scent detection team (Angus and his handler Teresa Zurberg) became an official part of the Quality and Patient Safety and Infection Prevention and Control team. VCH is the first healthcare organization in North America to use canine scent detection to identify *C. difficile* (CDI) within a hospital environment. The team can accurately detect CDI with 97% accuracy through hundreds of scans. One in three scans identifies a reservoir of CDI that is then cleaned and UVC disinfected. This program is not just about detection - it provides a way of identifying common reservoirs, immediately engaging staff, and problem-solving together to prevent further recurrences. Finally, our continued partnership with Emily Carr University of Art + Design resulted in a refresh of our regional hand hygiene campaign. The focus of this was the patient and their family as well as clearer messaging about empathy and caring.

These are a few highlights of the work we have accomplished over the past year. Ensuring safety and quality in the care we deliver involves many dedicated clinicians, physicians, staff, and interdisciplinary teams across our health authority. We are proud of our team and thankful to our colleagues for their partnerships and continued support. This report reflects that commitment.



Allison Muniak, Executive Director Quality & Patient Safety, Infection Prevention & Control (left) and Dr. Elizabeth Bryce, Regional Medical Director Medical Microbiology, Infection Prevention & Control (right)



ACCREDITATION

Accreditation is an external assessment that helps us evaluate and enhance the quality of our services and demonstrate that they meet national standards of best practice. The process is voluntary and all health authorities in BC participate. Accreditation is also an opportunity to showcase our leading practices and success stories and celebrate the excellence of our staff, physicians, and volunteers.

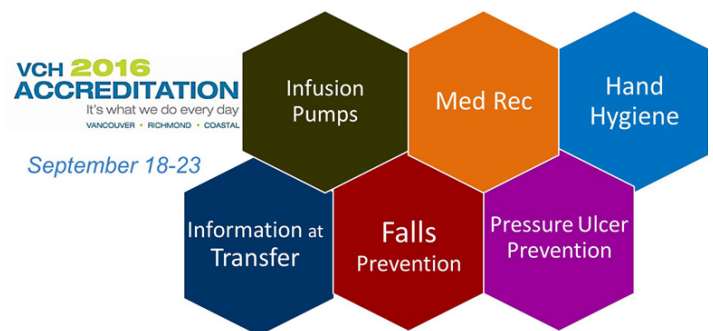
Between September 18-23, 2016, a team of 22 Accreditation Canada surveyors from across Canada toured 40 different VCH sites across all our Communities of Care (CoC) and conducted observations and interviews with staff, physicians, patients, and families to assess how our day-to-day care and services align with the Accreditation Canada Standards of Excellence. In total, they rated over 4,000 criteria spanning 25 different sets of standards, representing the full scope of clinical and support services across the CoC.

This was by far the largest and most complex accreditation site visit ever experienced by VCH and one of the largest and most complex in Canada. It was also the first time for VCH to be surveyed in its entirety as a single integrated region. Previous practice had been to assess each CoC separately, over the course of a four-year cycle.

Approach

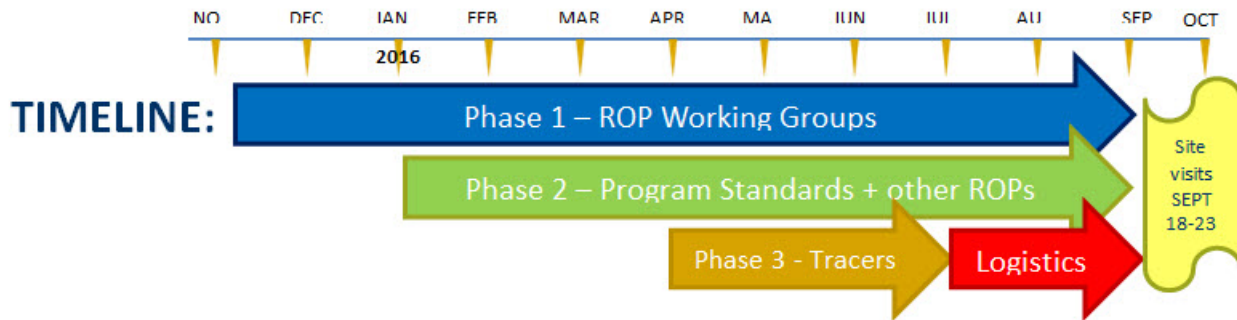
Over the course of 2016, VCH prepared for the site visit using a regionally coordinated approach.

Six regional priorities for improvement were identified for Required Organizational Practices (ROPs) that had systemic challenges across VCH: medication reconciliation, falls prevention, pressure ulcer prevention, infusion pump safety, communication at care transitions, and hand hygiene.



Working groups were convened for each of the six ROPs, with leadership from both regional and local content experts. A team of Accreditation Coordinators was also convened to provide locally-relevant guidance and support to programs and clinical teams on interpretation and implementation of standards into “what we do every day”. The regional ROP working groups and the Accreditation Coordinators guided and collaborated closely with regional programs, local operations leaders, clinical leaders, and Professional Practice to implement regionally consistent standards of practice within available local resources. A regional Accreditation Steering Committee oversaw VCH’s progress towards

ACCREDITATION



readiness and reported to the Senior Executive Team.

Accomplishments in FY 2016/17

The site visit outcome demonstrated the value of combining regionally focussed priorities with local support at the point of care. Together VCH met 96.7% of over 20,000 criteria evaluated, one of the highest ratings we ever achieved. VCH also successfully minimized the number of unmet ratings in the six top-priority ROPs, resulting in a small, locally manageable number of conditions requiring formal follow-up after the site visit. On January 19, 2017, VCH was awarded Accreditation for all its sites and services.



Accreditation Canada Survey Team

Plans for FY 2017/18

The transition to a single integrated accreditation cycle and site visit affords a better opportunity for sharing learnings across our geography and sustaining the accreditation standards into practice beyond site visit preparation. Having all of VCH use the same version of the accreditation standards is also an opportunity to continue to align with other regional priorities such as CST and Care Sensitive Adverse Events, which rely on common definitions, systems and processes, and understanding of standard work. VCH's next regionally integrated accreditation site visit is projected for the Fall of 2020.



CANINE SCENT DETECTION

Reducing environmental contamination is a key prevention strategy to decrease the risk of CDI. CDI spores are shed into the hospital environment, and, depending on conditions, can live on dry-surfaces and medical equipment for many months. The overarching goal of this program is to reduce the transmission of CDI spores in our acute care environment utilizing canine scent detection to identify CDI spores and use the data to design quality improvement initiatives that will prevent environmental contamination.

Approach

VCH is the first healthcare organization in North America to use canine scent detection to identify CDI spores within the hospital environment. Since 2015, a multi-disciplinary team have worked to train and validate an English Springer Spaniel named Angus to detect CDI. Angus was able to



accurately detect CDI with 97% accuracy.

The canine handler and Angus screen patient units and public areas at VGH. When Angus alerts on a contaminated surface or item, our housekeeping and/or nursing staff take immediate action to clean and disinfect the area. Alert trends are then used to identify and prioritize initiatives to prevent future contamination from occurring.

What We Found

From November 2016 to March 2017, 195 searches were completed at VGH, of which 32% resulted in one or more CDI environmental contamination alerts. Thirty percent of alerts were reported in patient rooms that were occupied by a patient with a CDI.

The program has received extensive international media coverage, and overwhelming support from our healthcare workers, infection control specialists, cleaning staff, and patients. Angus provides a fantastic channel to engage, increase awareness, and educate people about CDI infection prevention and control practices.

Plans for Fiscal Year 2017/18

Over the next year, VCH plans to expand screening services to RH and LGH by training a second canine detection team.

NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM

The goal of the National Surgical Quality Improvement Program (NSQIP) is to reduce surgical morbidity (infection or illness) and mortality (death). NSQIP samples approximately 7,500 cases annually between UBC, LGH, RH and VGH. Data is collected by reviewing patient records and conducting 30 day post-surgery patient follow-up telephone surveys.

NSQIP provides risk adjusted reports accounting for patient characteristics which compensate for differences among patient populations. Non risk adjusted reports are also available which

data to support research initiatives.

Enhanced Recovery after Surgery (ERAS)

Is a multi-modal, evidence based peri-operative care pathway designed to achieve early recovery after surgery. VGH has sustained the initiative for colorectal and radical cystectomy patients and spread to include urgent/emergent colorectal patients. VGH and UBCH implemented ERAS for Gynecological/Oncology patients in October 2016 while next steps include the addition of hepatobiliary patients. RH and LGH are in the early stages of implementing ERAS order sets and

ERAS Patient Outcomes VGH				
Colorectal Surgery	Pre ERAS n=99	Post ERAS n=487	<75% Adherence n=179	>75% Adherence n=260
Overall Morbidity	28.2%	15.3%	18.2%	12.8%
Pneumonia	5.1%	3.3%	5.9%	0.8%
Ventilator >48 hrs	4.0%	2.5%	4.1%	0.8%
Intubation	5.1%	2.8%	5.0%	0.8%
Superficial Surgical Site Infection SSI	11.1%	7.0%	10.5%	4.2%
Pooled SSI	20%	11.4%	14%	8.8%
Median Length of stay (days)	7.0		6.0	5.0

provide a current source of outcome data to guide improvement projects. The coordinators provide in-depth data analysis and interpretation of available data through a variety of reports, which are presented to physicians, programs, committees, and leadership. The data is used by quality improvement teams to inform a number of VCH quality initiatives. NSQIP also provides Surgeons, Anesthetists, and Surgical/Anesthesia Residents alike with a comprehensive source of

pathways for colorectal and cystectomy patients. NSQIP data is used to drive and compare the progress of the ERAS initiative at all sites pre/post implementation. VGH has demonstrated improved patient outcomes for colorectal and radical cystectomy procedures. Of significance, we have seen a 45.7% reduction in overall complications post ERAS implementation and where greater than 75% adherence to the bundle is achieved the reduction in morbidity increases



NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM

to 54.6%. We've seen similar improvement within the radical cystectomy data. These improvements have been presented at several Provincial, National, and International conferences.

Emergency General Surgery Pilot

From March 2015 to December 2016, the VGH General Surgery Department participated in the American College of Surgeons (ACS) Emergency General Surgery (EGS) Pilot project. The project tracked outcomes of operative and non-operative emergency general surgery patients that presented with the diagnosis of acute appendicitis, acute cholecystitis, or small bowel obstruction. From the total of 18 participating hospitals, VGH was one of the two Canadian hospitals included in the pilot.

The final report for the project was issued in May 2017 and revealed that overall VGH performs similar to the other participating hospitals in terms of surgical outcomes. However, there was a notable difference in the "Median Time to Operation" variable; VGH's time of diagnosis to operation was 50% longer for acute cholecystitis and small bowel obstruction and 100% longer for acute appendicitis. Since completion of the EGS pilot, VGH's General Surgery Department completed a mapping of the patient flow from the Emergency Department to the OR to mitigate this process.

Targeted Procedures

On January 1, 2017 VGH switched to a procedure targeted model for NSQIP sampling. Rather than sampling the usual 20% of the surgical cases, we now collect 100% of the cases for 9 high risk procedures. These high risk procedures were selected through careful analysis of the overall morbidities in the NSQIP July 2015 risk-adjusted report. Several of the targeted procedures also align with the implementation of ERAS. RH and LGH are not impacted by this change.

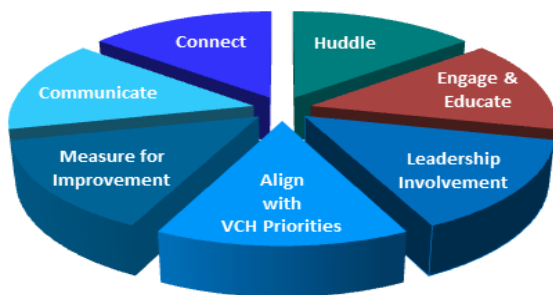


QUALITY IMPROVEMENT

The VCH Quality Improvement Strategy is an inclusive team based structure and approach to quality improvement. The strategy has three primary components: competency development, collaboration, and connection, supporting the goal of creating a community of continuous quality improvement within VCH.

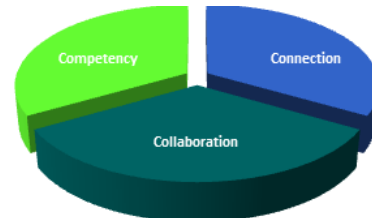
Approach

The end of 2016 was an opportunity to assess the current state and plan for the future state of Releasing Time to Care (RT2C). A fourteen question RT2C Needs Assessment tool was designed to assess the training, competency, education and support needs of RT2C team members. In addition, a series of questions captured the impact of RT2C learnings and recommendations, as well as challenges and obstacles, as identified by members of established teams. Over 50 face to face interviews across all three CoCs were completed with ward



leads, educators, nursing leadership, managers, and directors. The responses were collated and common themes identified across the communities of care. RT2C critical success factors

were identified and utilized to develop the VCH Quality Improvement Strategy.



Analysis of the assessment resulted in the identification of improvement opportunities that were categorized into 3 core components. The VCH Quality Improvement Strategy was then developed, with goals and direction for the future state.

Plans for 2017/18

Implementation will continue with the VCH Quality Improvement Strategy through the development of processes, structures and tools. The strategy includes two desired culture shifts that are critical in supporting the strategic direction and proposed outcomes. The first is a shift from exclusive ownership of quality improvement by initiative name, department, position or title. VCH Quality Improvement Strategy recognizes that successful improvement initiatives are enabled through a team approach with shared vision and responsibility for the outcome. The second is a shift from “Releasing Time to Care” to “VCH Quality Improvement”. The strategy extends beyond the implementation of one single quality improvement tool but rather focuses the outcomes related to the development of inclusive team based structure and approach to quality improvement.

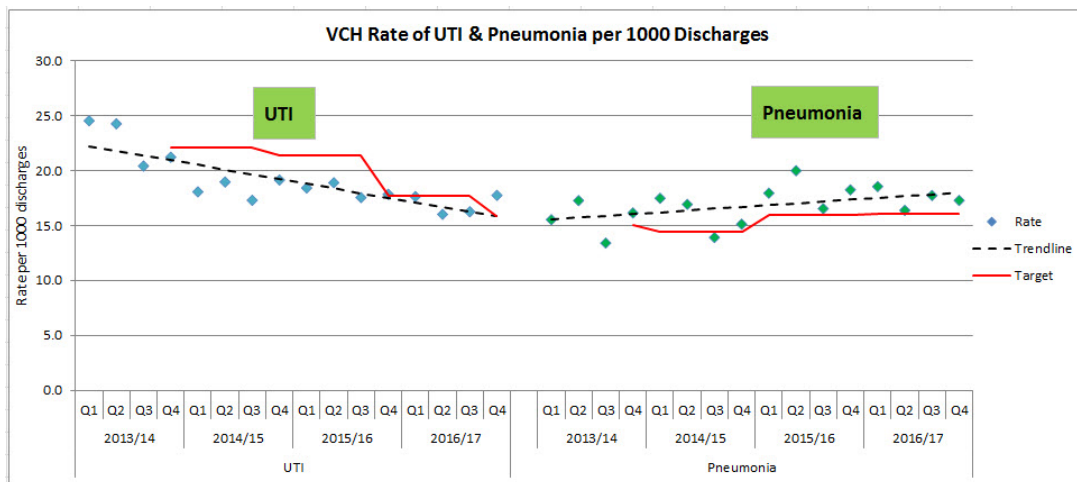
CARE SENSITIVE ADVERSE EVENTS

Care sensitive adverse events (CSAE) include pneumonia, urinary tract infections (UTI), falls with fracture, and pressure ulcers. Pneumonia and UTI have been identified as two of the leading causes of HAIs that result in increased patient mortality, length of stay, and overall health care costs. It has been shown that 70 – 80% of healthcare-associated UTIs result from the placement of an indwelling urethral catheter. Catheter associated urinary tract infections

the knowledge and tools required to prevent these adverse events.

How are we doing

VCH has shown continued improvement of UTI rates since 2013/14 tracking below regional targets, while the pneumonia rate has trended up slightly with many data points above the regional target.



(CAUTI) are also the leading cause of secondary healthcare-associated bloodstream infections. The regional pneumonia and UTI initiatives are multi-disciplinary collaboratives supported by Quality and Patient Safety in partnership with Professional Practice and in alignment with the regional Antimicrobial Stewardship Program. The reduction of pneumonia and UTI remains a key organizational priority. VCH is committed to improving the care we provide our patients by implementing the best evidence-based practices to prevent HAIs including CAUTI. Our goal, therefore, is to provide health care workers with

Despite the implementation of a regional pneumonia prevention strategy (ICOUGH), primarily aimed at the surgical patient population, VCH continues to record higher rates of hospital-acquired pneumonia than our national counterparts. We recognize that all patients may benefit from the ICOUGH prevention strategy so we have spread this knowledge to other inpatient units including medicine.



CARE SENSITIVE ADVERSE EVENTS

What have we accomplished

Since the regional CAUTI collaborative was initiated in 2011, point-of-care teams continue to drive various strategies to promote the prevention of UTIs. Basic care practices around regular mouth care and mobilization are key approaches teams are taking to prevent hospital-acquired pneumonia.

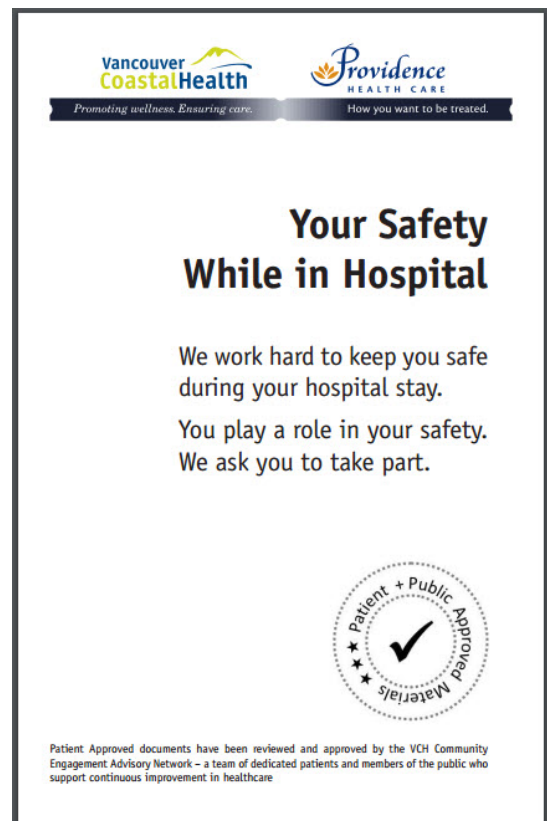
Additionally, teams are able to:

- 1) Access unit-specific UTI and pneumonia rates on the VCH intranet;
- 2) Collect real-time data on how they are doing with practicing evidence-based processes by tracking on their at-a-glance Quality Improvement Boards;
- 3) Discuss root cause and plan improvement actions through daily team huddles;
- 4) Provide information on how to prevent UTI or pneumonia (“Your Safety While in Hospital” patient pamphlet, ICOUGH poster in different languages); and
- 5) Engage patients to have a role in their own prevention plan.

Plans for 2017/18

Based on a series of retrospective patient chart reviews across VCH we have identified several key areas of improvement that would support the reduction of adverse events. These include the process of case identification and coding, physician documentation and evidence-based practices. Together these will form the basis of a comprehensive strategy to reduce both

hospital-acquired UTI and pneumonia. A regional CSAE steering committee will be formed to provide oversight for the initiative which aims to reduce UTI and pneumonia events. This is a multidisciplinary committee led by Quality and Patient Safety in partnership with Operations, Physicians, Professional Practice, Pharmacy, Decision Support, and Health Information Management.



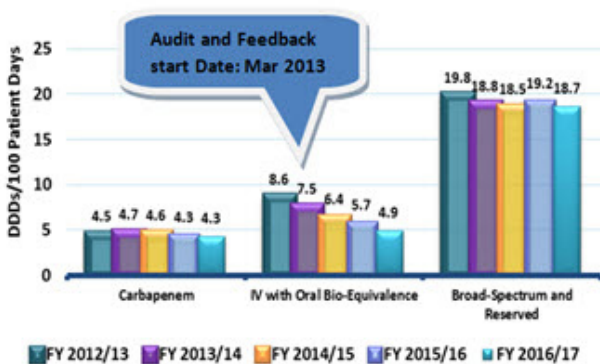
ANTIMICROBIAL STEWARDSHIP

Antimicrobial stewardship is the practice of optimizing antibiotic use for the treatment of infections. This practice is essential as inappropriate use of antibiotics is associated with increased resistance of bacteria. Antimicrobial stewardship aims to preserve the effectiveness of antibiotics, treat infections more effectively, and improve patient outcomes through the following main activities:

Prospective Audit and Feedback of Antibiotic Prescriptions

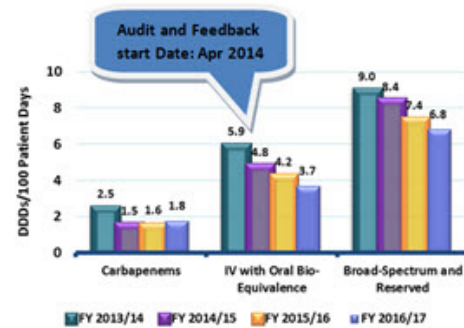
Audit and feedback is an evidence-based practice of reviewing a patient’s antibiotic therapy with the prescriber and making recommendations to optimize treatment, when appropriate. So far, ASPIRES’ clinical team has made treatment recommendations for 3,132 patients in VCH (2,319 patients at VGH; 347 at RH; and 466 patients at LGH). Besides optimizing treatment for patients, ASPIRES’ audit and feedback efforts will continue to focus on reducing inappropriate use of IV and broad-spectrum antibiotics (Figures 1-2).

Figure 1. Utilization of Target Antibiotics at Acute Care Wards, VGH



Quality Improvement Initiatives and Clinical

Figure 2. Utilization of Target Antibiotics Acute Care Wards, RH



Guidelines

IV to PO Antibiotic Stepdown: In January 2017, ASPIRES and an Infectious Diseases trainee conducted a research project to measure the magnitude of prolonged IV antibiotics administration at medical wards at VGH. This project aimed to identify areas where IV to PO stepdown education and audit and feedback activities should focus, in order to reduce adverse outcomes associated with prolonged IV administration. Table 1 summarizes the results of the findings. The results also indicate that the infections most commonly treated with prolonged IV antibiotics were CAP, Aspiration Pneumonia and UTI with additional antibiotic days of 1.8, 2.5, and 2.6 respectively.

Research and Evaluation

Antibiotic Utilization:

Measures	N	%
Total number of patients assessed (receiving IV antibiotics)	70	47.8%
Number of patients eligible for stepdown to PO antibiotics at 48 hours	43	61%
Number of patients on prolonged IV antibiotics at 7 days	24	34%
Number of unnecessary antibiotics days	63	--

ANTIMICROBIAL STEWARDSHIP

Since the launch of Audit and Feedback we have identified several areas in which the utilization of targeted antibiotics has decreased. Compared to baseline, this year at our three main sites, we measured:

RH: A reduction of 2.1 DDDs/100 Patient Days in broad-spectrum and 2.2 DDDs/100 Patient Days in IV antibiotic

LGH: a decrease of 0.9 DDDs/100 Patient Days in IV antibiotics.

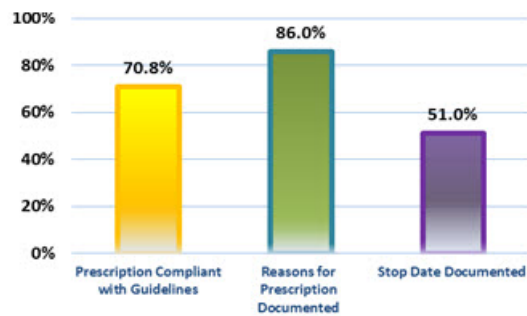
VGH: A decrease of 3.7 DDDs/100 Patient Days in IV antibiotic use

Global Point-Prevalence Survey: Antibiotic Prescriptions Appropriateness

In March 2017, SPIRES systematically assessed the appropriateness of all antibiotic prescriptions at VGH and RH to measure the magnitude of inappropriate antibiotic prescriptions and identify priority areas for education and intervention. This project is part of a global point prevalence survey of antibiotics use and will be repeated each year to provide reliable measures and enable participants to not only identify target areas for improvement but to measure the change in prescribing behavior over time. Table 2 and Figures 3-4 summarize a sample of the findings from this survey.

Measures	VGH	RH
Total Number of Wards Surveyed	24	11
Total Number of Patients Reviewed	742	213
Number of Patients Receiving Antimicrobials	309	54
Antimicrobial Use Prevalence	41.6%	25.3%
Number of Antimicrobial Prescriptions	463	73
Number of Antimicrobials Per Patient Receiving Therapy	1.5	1.4

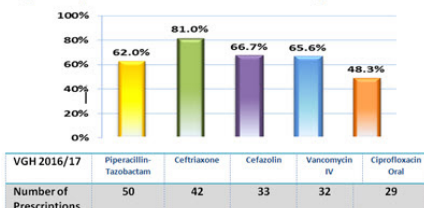
Figure 4. Proportion of Prescriptions: Compliance with Guidelines and Appropriate Documentation



Plan for FY 2017/18

ASPIRES is working on a number of new QI projects including penicillin allergy testing to help reduce broad-spectrum antibiotics use, Daptomycin utilization evaluation, and collaboration with transplant infectious diseases to reduce overuse of antibiotics in the transplant population. ASPIRES will also expand audit and feedback and point prevalence survey of antibiotics to LGH as well as rural and coastal sites.

Figure 3. Compliance with Treatment Guidelines for Most Commonly Prescribed antibiotics



VGH 2016/17	Piperacillin-Tazobactam	Ceftriaxone	Cefazolin	Vancomycin IV	Ciprofloxacin Oral
Number of Prescriptions	50	42	33	32	29

MEDICATION RECONCILIATION

Medication reconciliation (MedRec) is a formal, systematic process in which health care professionals partner with patients to ensure accurate and complete transfer of medication information at transitions of care. Prescribers are expected to reconcile patient/client/resident medications at admission, transfer, and end of care utilizing the Best Possible Medication History (BPMH).

MedRec is widely recognized as an important patient safety best practice and is an Accreditation Canada ROP. Research indicates that over 50% of patients have at least one unintended medication discrepancy upon admission to hospital. Of those unintended medication discrepancies, almost 40% are significant enough to potentially lead to moderate to severe harm.

Approach

The two key strategic areas of focus for MedRec consisted of:

Accreditation

- Preparation for the September 2016 visit: implement and sustain regionally consistent end-to-end MedRec processes at care transitions in maternity, acute care and residential care, and continue rollout to additional areas, such as mental health, ambulatory care, and cancer care.
- Address unmet areas from the site visit, including appeals of ratings where needed.

Clinical and Systems Transformation (CST)

- Participation in CST as Subject Matter Experts

to inform design decisions that affect the functions of BPMH and MedRec at care transitions.

- Participation in the provincial discussions regarding potential solutions for integration of PharmaNet system with Cerner.

Accomplishments in FY 2016/17

Throughout 2016, content experts from VCH participated in a national consultation group led by Accreditation Canada to streamline the definitions and tests for compliance of the MedRec ROPs across the CoC. The recommendations by the consultation group informed revisions to the standards version that will be released in January 2018.

Plans for FY 2017/18

MedRec program leads for each of the CoC continue to work with programs on the two key strategic areas: implementing and sustaining accreditation requirements for MedRec at care transitions across the CoC as part of “what we do every day”, and providing content expertise to embed MedRec best practices into CST design and implementation.

One key goal that aligns with both strategic areas is to improve MedRec workflows and quality of information through collection of a fulsome BPMH. A pilot of Pharmacy Technicians in the Emergency Department at Richmond Hospital to complete the BPMH is showing a lot of promise, and was submitted to Accreditation Canada’s consideration as a Leading Practice.

HAND HYGIENE

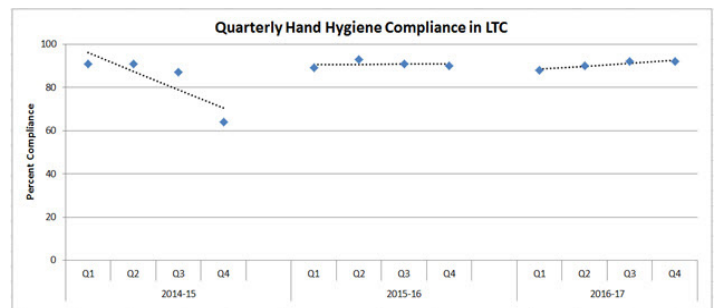
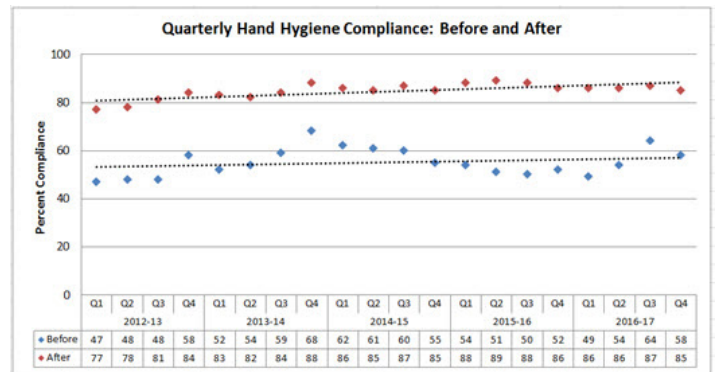
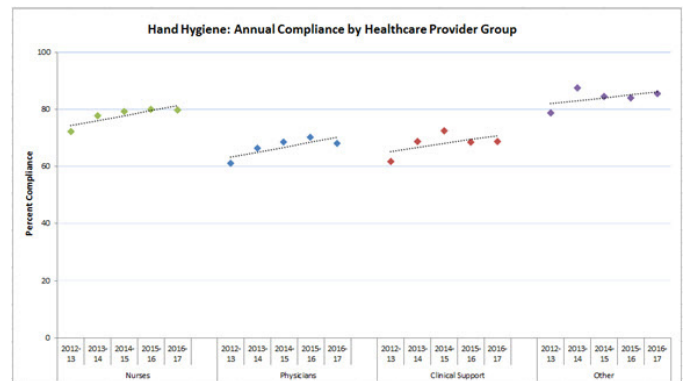
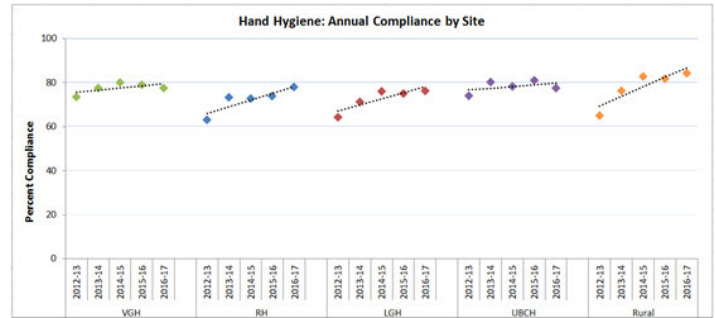
Hand hygiene includes washing your hands with soap and water and cleaning your hands with an alcohol based hand rub. VCH has a Hand Hygiene Policy in place that requires all healthcare providers including physicians, contracted employees and students to perform hand hygiene before and after touching the patient and/or their environment. Hand hygiene is universally accepted as the single most important method of infection prevention and control.

The VCH annual target for hand hygiene compliance is 100% in non-emergency situations – a goal that will significantly reduce the transmission of infection. In 2016/17 VCH once again had a compliance rate of 78% in our acute care facilities.

LTC hand hygiene compliance is on the rise at 91% as we now have all of our facilities performing audits and reporting their results.

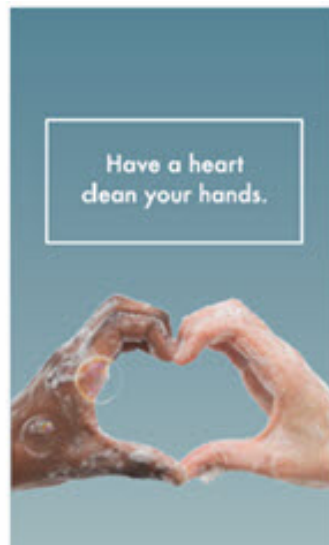
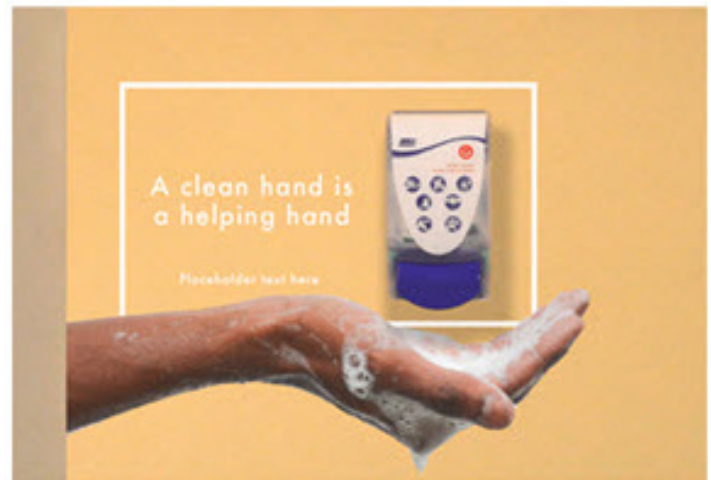
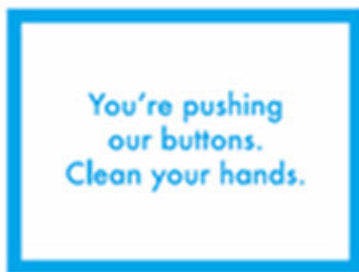
As well, as part of the Accreditation ROP all of our Ambulatory Care, Public Health, Home Health, and Mental Health staff complete an online hand hygiene self-assessment once per year.

In 2017/18 we are changing our auditing methodology to more of a “measurevention” process. Units will receive their audit results same day and all staff who are observed “missing” an opportunity will be given in the moment feedback/teaching.



HAND HYGIENE

As part of a Hand Hygiene Refresh, we once again worked with the Emily Carr University of Art + Design to update our hand hygiene promotional material in public spaces throughout the region. Seven student groups submitted ideas to our team and while they were all excellent, we chose “Clean Hands, Warm Heart” as our winning campaign. We have updated our posters, elevator wraps, stop signs, and dispenser covers throughout the region with very positive feedback from staff and the public.



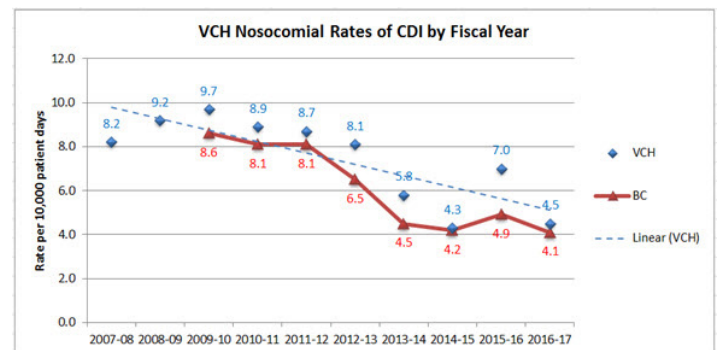
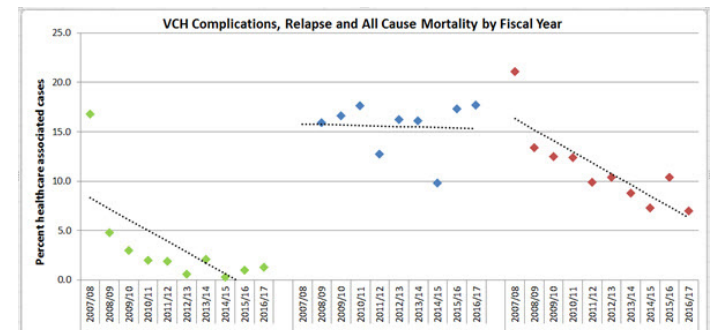
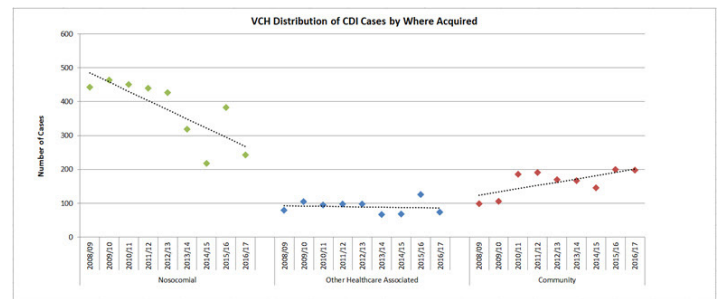
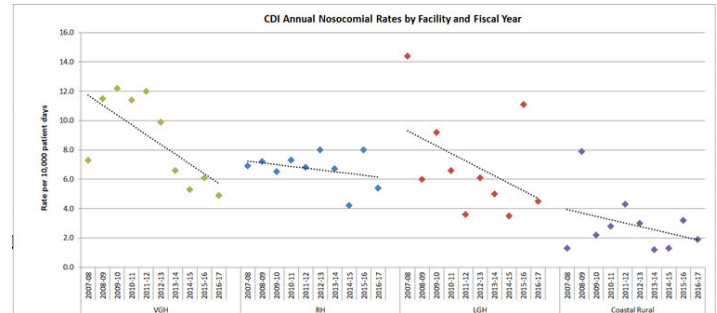
CLOSTRIDIUM DIFFICILE

Clostridium difficile is a bacterium that can cause infections of the gastrointestinal system. Clostridium difficile infection (CDI) happens when antibiotics kill the good bacteria in the gut and allow Clostridium difficile to grow and produce toxins that can damage the bowel. CDI can cause infections ranging from diarrhea to rare but serious complications. All hospitalized patients diagnosed with CDI are followed for 30 days or up until discharge/transfer for complications (i.e., toxic megacolon, total or partial colectomy, bowel perforation, gastrointestinal bleed and secondary bacteremia) and all-cause mortality.

Over the 2016/17 fiscal year there was a total of 514 cases of CDI identified among admitted patients of which 436 (84.8%) were new infections, 76 (14.8%) relapses and two (0.39%) unknown. Of the total, 316 (61.5%) were healthcare associated and 198 (38.5%) community acquired. Of the 316 healthcare associated cases, 243 (76.9%) were acquired within a VCH acute care hospital (i.e., nosocomial) and 73 (23.1%) from another healthcare facility. The number of nosocomial cases continues to trend downwards whereas community-acquired cases are trending upwards.

Our regional annual rate decreased to 4.5 from 7.0 per 10,000 patient days last fiscal year which is only slightly higher than the non-risk adjusted provincial rate of 4.1. As noted in the graph above, the reduction is driven by declines in all our communities of care but most notably at VGH and LGH. The percent of patients experiencing complications remains low at 1.3%. Relapses are

relatively stable at 17.1% and all-cause mortality was 7.0% and continues to trend downwards.



BLOODSTREAM INFECTIONS

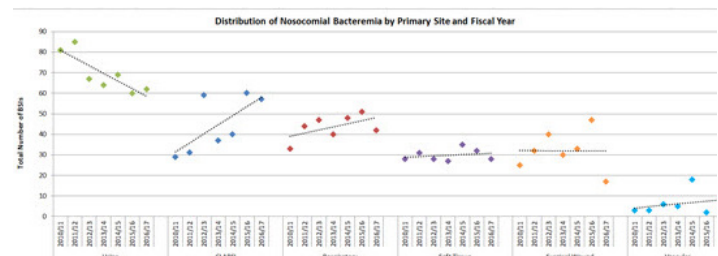
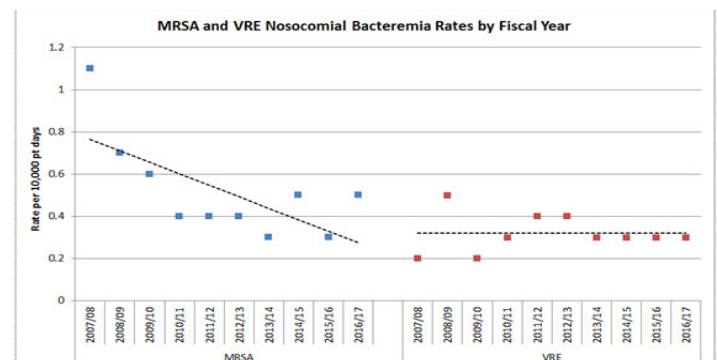
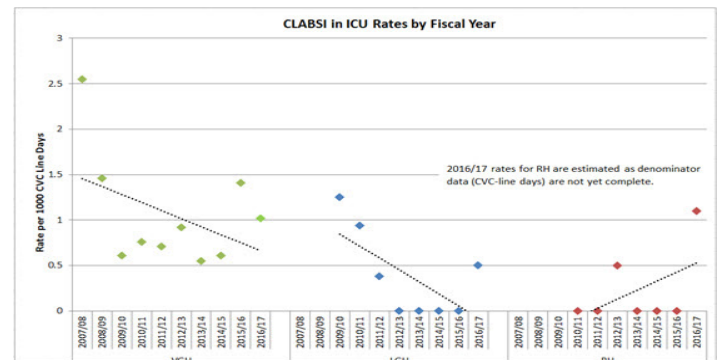
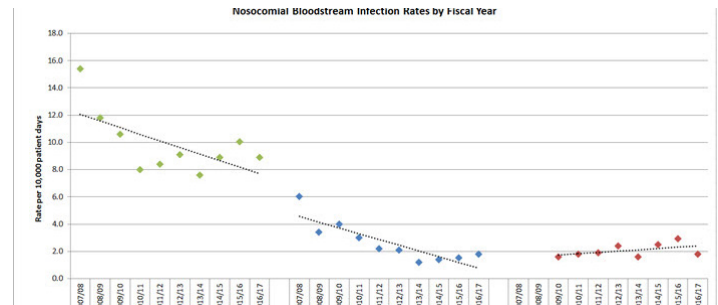
Bloodstream infections (BSI) occur when bacteria enter the bloodstream either through a wound, surgery or other invasive procedure or as a consequence of a pre-existing disease. Comprehensive BSI surveillance is performed at Vancouver General Hospital (VGH), Richmond Hospital (RH) and Lions Gate Hospital (LGH). The focus of the surveillance is on nosocomial bacteremias acquired as a result of a hospital stay.

For 2016/17 there were 293 nosocomial BSI cases for a combined rate of 6.3 per 10,000 patient days. This is a decrease compared to last year when the rate was 6.9. The rates for RH have remained low and rates for VGH and LGH are trending downwards. Central line associated BSI (CLABSI) in ICU patients is also trending downwards with the exception of RH which had two cases after three years of no cases.

MRSA- and VRE-associated bacteremia are low with rates of 0.5 and 0.3 per 10,000 patient days, respectively. MRSA-associated rates are trending downwards whereas those associated with VRE remain low and steady.

All nosocomial BSIs are investigated to determine the primary source of the infection. Of those with a known source, urinary, CLABSI and respiratory sources are the highest contributors. Though contributing most, urinary tract associated BSIs are trending downwards whereas those associated with CLABSI and respiratory sources

are trending upwards. The majority of CLABSI-associated BSIs occurred outside of the ICU setting (85% in 2014/15 and 77% in both 2015/16 and 2016/17).



CARBAPENEMASE PRODUCING ORGANISMS

Carbapenemase producing organisms (CPO) are emerging pathogens that have limited antibiotic treatment options and, as a result, have poor clinical outcomes for patients with serious infections. In an effort to more fully understand the epidemiology of CPOs in BC, provincial surveillance within acute care facilities was initiated in July 2014. In December 2016, CPO became a reportable condition in BC.

In 2016/17, a total of 17 patients were identified with a CPO. Most of the patients had one carbapenemase gene involved, though two had two different genes and one had three different genes. NDM was the most prominent carbapenemase gene identified (63.6%) followed by OXA-48 and KPC at 13.6% each. Other genes including OXA-23 and VIM accounted for 4.5% each. The distribution by gene is similar to previous years and is consistent with what has been observed provincially.

Of the 17 patients identified in 2016/17, all were inpatients of which six (35.3%) were detected through admission or ring screening, and three (17.6%) were attributed to the reporting facility. In terms of risk factors, eight patients (47.1%) reported a healthcare encounter outside of Canada in the 12 months prior to detection. A total of seven (41.2%) patients had infections (vs colonizations) of which none required ICU admission and all survived.

Fiscal Year	Patients	1 gene	2 genes	3 genes	Total Genes
2014/15	10	9	1	1	14
2015/16	16	15	2	0	19
2016/17	17	15	2	1	22
Total	43	39	5	2	55

Fiscal Year	NDM	OXA-48	KPC	OXA-51	OXA-23	Other
2014/15 (N = 14)	8 57.1%	1 7.1%	1 7.1%	1 7.1%	1 7.1%	2 (CYM, OXA) 14.2%
2015/16 (N = 19)	6 31.6%	5 26.3%	2 10.5%	3 15.8	2 10.5%	1 (TEM) 5.3%
2016/17 (N = 22)	14 63.6%	3 13.6%	3 13.6%	0	1 4.5%	1 (VIM) 4.5%
Total (N = 55)	28 50.9%	9 16.4%	6 10.9%	4 7.3%	4 7.3%	4 7.3%

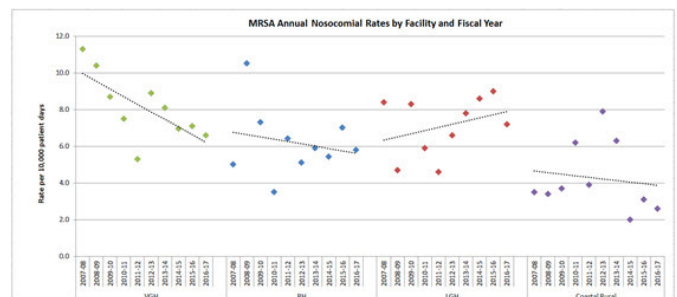
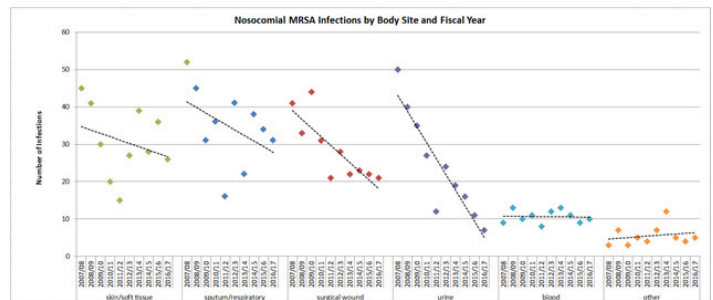
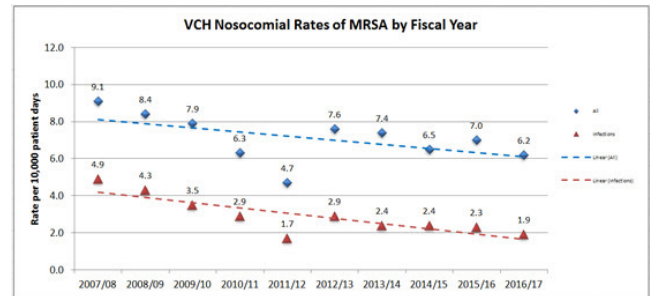
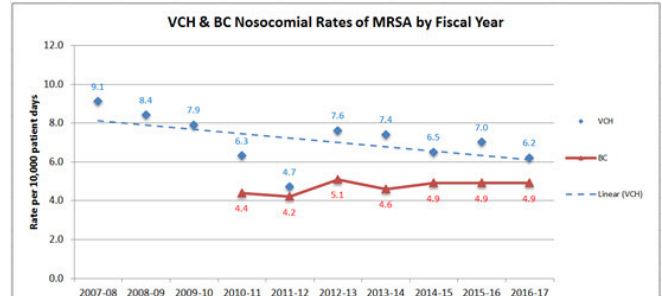


METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a strain of *Staphylococcus aureus* (*S. aureus*) bacterium that is resistant to a number of antibiotics. *S. aureus* normally lives on human skin and in the noses of about 25% of the general population (i.e. colonization). However, *S. aureus* can cause skin infections and more serious diseases such as bloodstream and respiratory infections.

Over the 2016/17 fiscal year there was a total of 717 cases of MRSA identified among patients admitted to a VCH hospital. Of these 548 (76.4%) were healthcare associated, 141 (19.7%) community acquired and 28 (3.9%) of unknown origin. Of the 548 healthcare associated cases, 285 (52.0%) were acquired within a VCH hospital, 228 (41.6%) from another healthcare facility and 35 (6.4%) were associated with another healthcare exposure (e.g., outpatient treatment). Of those acquired within a VCH hospital, 44% were associated with a previous admission to the reporting facility within the last 12 months. Our regional annual rate decreased to 6.2 from 7.0 per 10,000 patient days last fiscal year but still remains higher than the non-risk adjusted provincial rate of 4.9. As noted in the graph above, with the exception of LGH, hospital rates have been trending downwards. Our rate of infections remains low at 1.9 with skin/soft tissue/burn, sputum/lower respiratory and surgical wounds accounting for 78% of infections. Though infections in all body sites are trending downwards the greatest declines have been with

urine and surgical wound-associated infections.

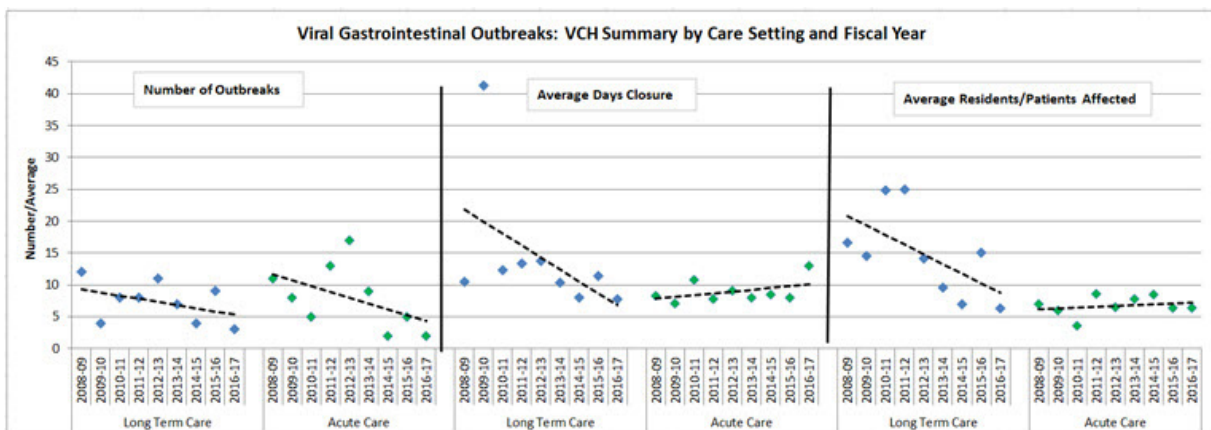
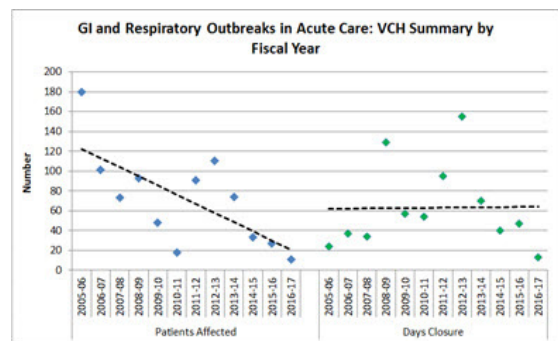


OUTBREAK MANAGEMENT

Control and management of respiratory and gastrointestinal illness (GI) is a key role of Infection Prevention and Control (IPAC) team. Hospitalized patients and residents of residential care facilities are at increased risk for such illnesses due to pre-existing medical conditions and advanced age. Early identification, management and containment of these illnesses requires a multidisciplinary team effort to prevent transmission to patients, residents and staff.

A comparison of the viral gastrointestinal outbreaks over the last nine years shows that the number of GI outbreaks is trending downwards in both AC and LTC settings. Declines have also been observed for average days closure and average number of residents affected in our LTC sites. There has been a slight trending upwards for days closure in AC while the number of patients affected has remained low and stable.

In 2016/17 there was a total of 19 outbreaks in VCH acute (AC) and long term care (LTC) facilities. Of these 2 were in AC (both GI) and 17 (3 GI and 14 respiratory) in LTC. A total of 112 patients/residents were affected (11 AC and 101 LTC). The total days closure of affected areas was 148 days of which 118 days were associated with outbreaks in LTC and 13 in AC. Within the acute care setting, there has been a decreasing trend in the number of patients affected particularly in the last three fiscal years. Similarly, the total days closure has also seen decreases with the lowest total observed this fiscal year with 13 days closure.



POINT PREVALENCE

In February 2017, VGH and RH participated in a national CNISP point prevalence survey aimed at establishing the burden of healthcare associated infections (HAIs) in Canada. The survey involved evaluating the medical records of all eligible hospitalized patients. To be eligible, patients had to have an admission of 48 hours or more, including patients admitted in the Emergency Room awaiting placement. Patients with a length of stay of less than 48 hours were included if they had been previously admitted to the same facility within the last month. All patient units, with the exception of the mental health, rehabilitation, maternity and well-baby nurseries and day surgery were included. A similar survey was conducted in 2009 and the results were compared.

A total of 674 and 730 patients were surveyed in 2009 and 2017, respectively. The overall proportion of patients on isolation precautions was approximately 21% and did not differ between the two years, though RH had a higher proportion of patients on isolation in 2017 (22.1%) compared to 2009 (12.3%) the difference was not statistically significant. The most common reason for isolation was MRSA.

The proportion of patients with an HAI acquired at the participating hospital was statistically significantly lower in 2017 than in 2009 for both VGH (22.5% to 9.2%) and RH (18.4% to 4.4%). The most common HAI identified were pneumonia (2.6%) and urinary tract infections (2.7%). The

proportion of HAIs across all five HAI types were lower in 2017 than in 2009 with statistically significant reductions observed for all but

# Patients Surveyed	VGH	RH	Total
2009	560	114	674
2017	617	113	730

% Patients Isolated	VGH	RH	Total
2009	23.9	12.3	22.0
2017	19.4	22.1	19.9

% Patients with HAI	VGH	RH	Total
2009	22.5	18.4	21.8
2017	9.2*	4.4*	8.5*

* Statistically significant (<0.01) difference between years

% Treatment	VGH	RH	Total
Antimicrobial	41.9	38.9	41.4
Antiviral	0.5	5.3	1.2

% HAI Type	VGH		RH		Total	
	2009	2017	2009	2017	2009	2017
Pneumonia	5.4	2.8*	7.9	1.8	5.8	2.6*
Urinary Tract Infection	9.6	2.8*	8.8	2.7	9.5	2.7*
Surgical Site Infection	4.6	1.9*	1.8	0.0	4.2	1.6*
Clostridium difficile Infection	2.3	1.1	0.0	0.9	1.9	1.1
Bloodstream Infection	2.1	0.8	2.6	0.0	2.2	0.7*

* Statistically significant (< 0.05) difference between years

Clostridium difficile infections.

In 2017, additional questionnaire items on the topic of antimicrobial and antiviral therapy were included to determine the prevalence of antimicrobial and antifungal utilization. In total 302 of the 730 patients (41%) were receiving some form of systemic antimicrobial treatment accounting for 42% of patients at VGH and 39% at RH.



SURGICAL SITE INFECTION

A surgical site infection (SSI) is an infection of the tissue in and around a surgical wound. To be considered a SSI the infection must occur within a designated time following surgery. A SSI is a potential major complication after surgery leading to a longer hospital stay, prolonged recovery, higher costs and patient dissatisfaction.

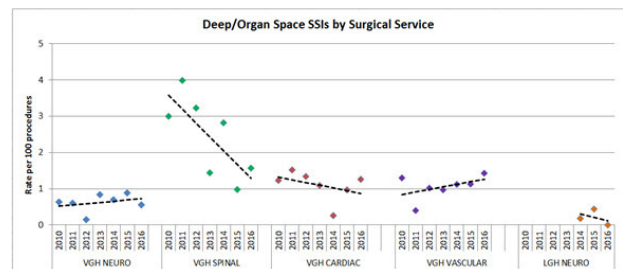
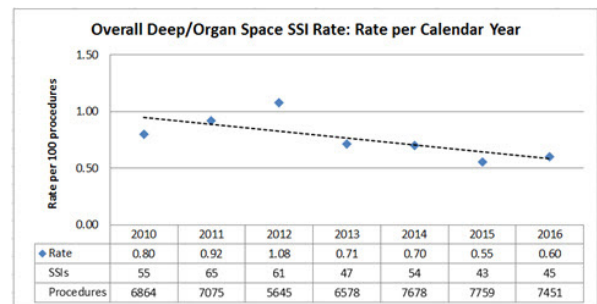
Measuring the incidence of SSIs is an important measure of surgical quality. It allows IPAC to identify potential infection-related sources and work collaboratively with surgeons and our NSQIP team to reduce the risk of infection to patients. Using internationally-accepted standard definitions (CDC/NHSN 2016) we perform surveillance on targeted cardiac, orthopedic, spinal, vascular, thoracic and neurosurgical procedures. In 2016 we changed our trending reports to focus on deep and organ space SSIs as these represent significant infections for which we have more complete information. Superficial infections that are identified are still monitored.

A total of 7451 targeted procedures were performed in 2016 in VCH hospitals, of which 45 developed a deep/organ space SSI for a rate of 0.60 per 100 procedures. The overall SSI rate for deep/organ space SSIs is less than one percent and is trending downwards.

Four VCH hospitals perform total hip and knee (primary) replacements. Combined, the four hospitals performed 3652 total hip and knee replacements in 2016 of which, 19 developed a

deep/organ space SSI for an overall rate of 0.52 per 100 procedures. The rates for VGH/UBCH and RH have been trending downwards whereas the rate for LGH, though still less than 1%, has been trending upwards.

In addition to orthopedics, VGH performed surveillance on 2830 targeted cardiac, spinal, vascular, thoracic and neurosurgical procedures, LGH 801 neurosurgical procedures, and SGH, SH and PRGH a combined total of 168 cesarean section procedures. Rates for neurosurgery at both VGH and LGH are consistently below 1%. The most notable improvement is for VGH spinal procedures where the rate has declined significantly over the last few years. VGH has also experienced a reduction in their cardiac SSI rate whereas their rate for vascular surgery is slowly trending upwards. No deep/organ space SSIs were identified for cesarean section or thoracic procedures.



TUBERCULOSIS

In 2016/17 a total of 50 Mycobacterium Tuberculosis (MTB) cases were identified of which 19 (38%) required patient screening for exposure. A total of 116 exposed patients were screened. This compares to 33 cases identified in 2015/16 of which 10 (30%) required patient screening and 102 exposed patients screened.

The number of TB cases requiring screening has been trending upwards over the last five fiscal years whereas the number of exposed patients requiring screening has been trending downwards.

It is important to note that some cases of MTB are identified in patients who have no apparent symptoms and therefore would not have met the criteria for isolation and enhanced precautions with the respiratory algorithm.

Tuberculosis is a disease caused by the bacterium called Mycobacterium tuberculosis (MTB). The bacterium usually attacks the lungs. Tuberculosis is spread through the air from person to person.

Cases of MTB that are not promptly identified can have a significant impact on the hospital resulting in the screening of many other patients and hospital staff that may have been exposed to the patient with MTB. All VCH acute care facilities use the following algorithm for the immediate management of patients with undiagnosed respiratory and/or febrile illness. The aim of the protocol is to quickly identify at-risk patients for isolation to prevent potential transmission to

other patients and/or staff.

We monitor the number of MTB cases identified in hospital that required patient screening for exposure.

