MUHC ASP | Antimicrobial Stewardship Program

2021-2022 Annual report

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EXECUTIVE SUMMARY

The MUHC ASP has been actively promoting appropriate antimicrobial use through a set of coherent activities, with oversight from a multidisciplinary ASP committee. Our goals are consistent with the patient safety mandate and the tertiary and quaternary care mission of the MUHC.

In the past year we have continued to expand our clinical practice guidelines and to make them easily and freely accessible to all users through our website. Traffic to our website has increased, a testimony to the quality and practicality of the guidelines' content and format.

After a difficult period of restrictions of in-person ASP activities due to COVID-19, we have resumed audit-feedback activities in earnest and in fact increased the scope of our audits. We routinely review patient cases involving targeted antibiotics and systematically provide immediate feedback to prescribers at two of the MUHC acute care sites (MGH and RVH). This year we also conducted additional "special" audits in units that until now have not been the targets of systematic activities, notably the Emergency Department and Intensive Care Units.

Our program's activities are beginning to show a positive impact on antimicrobial usage trends, and encouraging signs in the susceptibility profiles of hospital isolates – though these effects are limited to one site, the RVH, where antimicrobial use decreased by 21% compared to 2020-2021 and by 15% compared to the pre-pandemic period.

Ongoing challenges remain the lack of support for administrative tasks, and staffing shortages among clinical pharmacists. Although we strive to organize our time and efforts as effectively as possible, a dedicated ASP budget is rapidly becoming a crucial need.

We look forward to comments or questions regarding this report.

Francois Bourdeau, PharmD MSc
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INTRODUCTION

The Antimicrobial Stewardship Program (ASP) of the MUHC evolved from the Antibiotic subcommittee of the P&T to become a fully-fledged Program in 2019. The goal of the MUHC ASP is to promote optimal use of antimicrobials in ways that ensure access for patients that need antimicrobials and improve outcomes, while minimizing patient- and institutional-level unfavorable effects. The MUHC ASP follows a data-driven approach to drive improvement in antimicrobial prescription quality across the institution.

An ASP operational team conducts the daily activities of the program, with oversight from a multidisciplinary ASP committee. Members of the operational team play an essential role in developing therapy guidelines and clinical care pathways, in collaboration with clinical stakeholders and with endorsement by the P&T committee.

Starting in March 2020, the COVID-19 pandemic impacted service delivery at the MUHC with reductions in some clinical services, and restrictions of in-person ASP activities on care units. The ASP team modified their operations to support clinical teams by emphasizing COVID-19 therapeutic management guidelines, and by providing access to investigational therapies to our patients through our participation in national and international COVID therapeutic clinical trials. Members of the ASP additionally played an active role in the Federal Government of Canada's COVID-19 Therapeutics Task force (CTTF), an entity entrusted with specific recommendations for funding and procurement of therapeutics for COVID-19.

The MUHC ASP continues to deliver educational workshops and sessions on antimicrobial use and stewardship, and to work closely with national and international partners in collaborative research centered on Antimicrobial Resistance. The ASP chair is a founding member and co-Director of the newly launched inter-disciplinary McGill AMR centre, funded by the McGill Interdisciplinary Initiative in Infection and Immunity (MI4).

In this annual report, we review the MUHC ASP core activities, trends in antimicrobial consumption and costs, current trends in patterns of drug resistance, the challenges we continue to face, and outline strategic priorities for the year ahead.

CORE ACTIVITIES

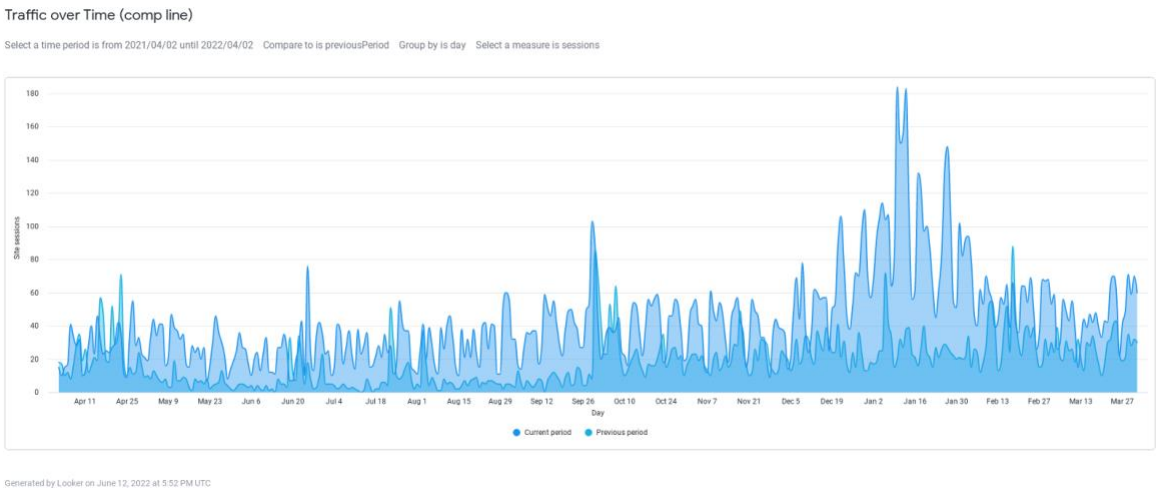
Guideline development

We have continued to develop institution-specific empiric management guidelines for common infectious conditions, and update previously endorsed guidelines based on new evidence. Each guideline is drafted by a member of the operational team with references to best available evidence; reviewed by the ASP co-leads, circulated to a selected group of stakeholders, and then presented to the ASP committee for feedback. The ASP-approved version is then presented to P&T committee for final approval. All guidelines are then posted on our website (muhcasp.com).
During the 2021-2022 period, we developed 12 new treatment guidelines. This represents an increase in pace compared to the preceding 2 years (2019-2021 period during which 17 new treatment guidelines were produced), and is in large part due to the involvement of Infectious Diseases Residents who now all do a minimum 2 week block in Stewardship at the MUHC . The latest guidelines include management of common fungal infections (candidiasis, aspergillosis, PJP, cryptococcosis, histoplasmosis); COVID outpatient management; healthcare associated CNS Infections, and gyne-obstetrical infections. Revised guidelines include COVID-19 inpatient management; Community acquired pneumonia and Febrile Neutropenia.

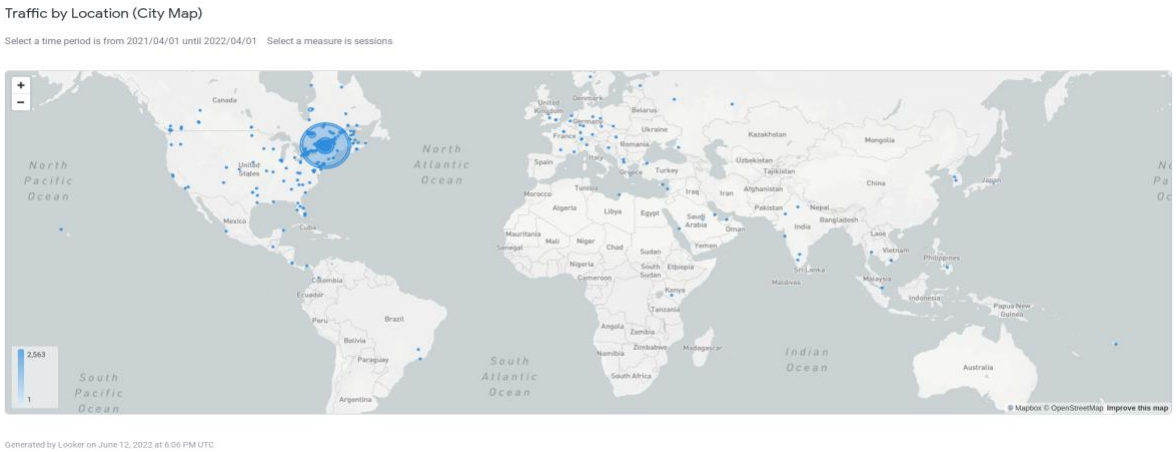
Website

All treatment guidelines are available at https://www.muhcasp.com/treatment-guidelines. Website analytics reveal that compared to the year 2020-2021, traffic is up: 139% increase in the number of visits to the website. The increase is partly driven by new users (73% increase), but also by more frequent visits of “regular” users (ie. fewer one-time clics).

Light blue shade = site visits in 2021-2022;
darker blue shade =site visits in 2020-2021



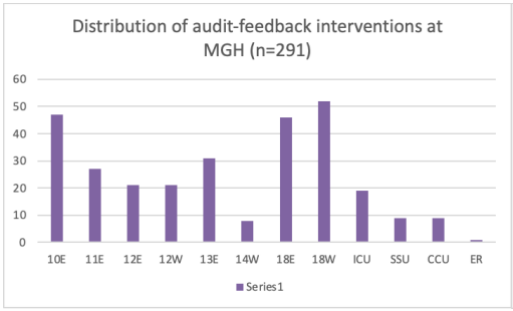
The majority of our website users are located in Quebec, however users from the rest of Canada, USA, Europe, the Middle East, India, and East Africa are accessing the site.
Not surprisingly, peaks of website traffic correspond to release of new guidelines, COVID-19 guideline updates or to peaks of COVID activity. Yet, compared to last year there is a "smoothing out" of website traffic suggesting that users are now accessing a variety of guidelines at various time points (rather than honly to te COVID guidelines), and more regularly than previously.

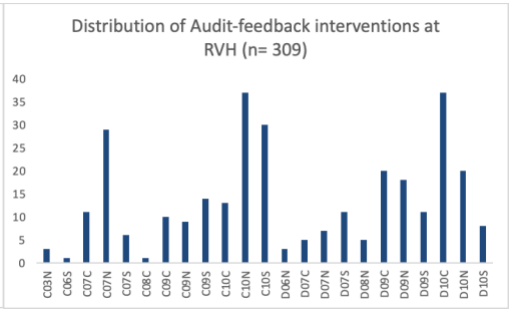


Audit-Feedback activities

Scope

In the past year we conducted 600 chart audits of antibiotic prescriptions with immediate (real-time) feedback on the appropriateness of the prescription, presented as a formal ASP consultation on O-word. As in previous years, the audit-feedback teams consist of a 1:1 pairing of ID specialist (assigned to specific wards) and pharmacist (rotating). The audited prescriptions correspond to 468 unique patients, who were receiving an average of 1.3 antibiotics; 291 of the audits were conducted at the MGH, 309 at the RVH. Compared to 2020-2021, our audits were conducted on more clinical care units at both hospital sites.





Audits were focused on parenteral or oral broad spectrum antibiotic prescriptions, excluding prescriptions that were recommended or approved by ID, or prophylactic regimens (ex: peri-op, TMP-SMX for Pneumocystis prophylaxis, antifungal prophylaxis post stem-cell transplant). The most frequently audited antibiotic, as in previous years, remains Piperacillin-tazobactam (Pip-tazo), followed by ceftriaxone, amoxicillin-clavulinic acid, meropenem, vancomycin and ciprofloxacin.

Overall quality of antibiotic prescriptions

Based on a review of the clinical information available in the medical chart (patient demographics, duration and reason for hospitalization, documented indication for antibiotic therapy, microbiological and clinical diagnostics in support of the indication), the ASP team formulates a brief narrative of the case, and assigns a rating of the quality of the prescription using the following parameters:
Optimal: antibiotics are clearly indicated AND the choice of antibiotic is optimal for this indication and for this patient (follows guidelines if empiric therapy; narrowest spectrum and least side effects if targeted therapy)
Appropriate: antibiotics are clearly indicated AND the choice is acceptable BUT other options may be better (eg. spectrum adequate but does not follow institutional guidelines; may be slight "over-treatment")
Inappropriate: antibiotics are indicated (or *may b*e indicated, reasonable suspicion) BUT choice is clearly too broad spectrum, or duration is too long)
Very inappropriate: antibiotics are clearly not indicated, OR antibiotics may be indicated but the choice is clearly unacceptable (eg. clearly "under-treatement" for the indication, or the antibiotic poses a known risk to the patient)

Using this assessment grid, we found the following:

MGH prescriptions	**N**	**%**
Optimal	46	15%
Appropriate	130	43%
Inappropriate	100	**33%**
Very inappropriate	15	**5%**

RVH prescriptions	**N**	**%**
Optimal	43	14%
Appropriate	142	47%
Inappropriate	119	**39%**
Very inappropriate	5	**2%**

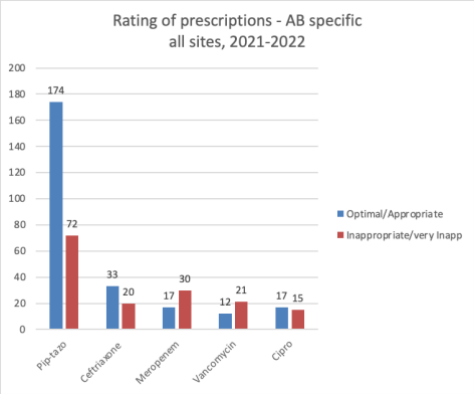
Compared to last year when 30% of prescriptions were rated as inappropriate or very inappropriate, 40% of all audited prescriptions (RVH and MGH combined) were rated as inapropriate or very inappropriate in 2021-2022. This increase is likely due to the fact our audit activities now include wards previously considered too challenging for audits, and perhaps also because we are shedding an earlier tendency to "err on the side of generous ratings" - rather than reflect a significant deterioration of prescription practices in the past year.

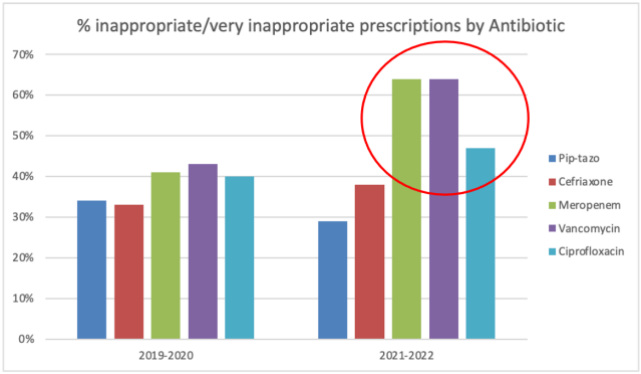
The antibiotics most frequently implicated in inappropriate or very inappropriate prescriptions were Meropenem and Vancomycin (64% of audited prescriptions were rated as inappropriate/very inappropriate).

Ceftriaxone and ciprofloxacin were inappropriate in 38% and 47% of audited prescriptions, respectively. In contrast, pip-tazo (the most frequent) prescriptions were deemed inappropriate/very inappropriate in 29% of cases, an improvement compared to previous years..

Trends in prescription quality:

Compared to previous years, we note the use of pip-tazo is trending towards more appropriate/optimal, while that of meropenem and vancomycin now stands out as mostly inappropriate.





Feedback/recommendations

The team provided specific recommendations for the antimicrobial(s) in the form of a consultation on O-word (flagged in the chart). The recommandations are discussed with clinical ward pharmacist when possible. The recommendations fall under 3 main categories:

- **Continue** current antimicrobial with a timeline for reassessment;
- **Change** the current antimicrobial (dose, route, or type);
- **Discontinue** the current antimicrobial (duration sufficient, inappropriate choice, ..)
- **Consult ID**

The table below shows the proportion of each category of recommendations, and the proportion of recommendations accepted for each site.
There were significant differences between RVH and MGH in the type of feedback provided and in the acceptance of the recommendations (by clinicians). We specifically note a greater proportion of audits resulting in a recommendation to consult ID at the MGH, whereas

recommendations to discontinue antibiotic because the choice of agent was inappropriate was more common at the RVH. While this might suggest site-specific differences in prescription practices, it is may also be reflective of inter-auditor variability - particularly since the audit teams have been assigned to specific sites (with only one pharmacist rotating between sites).

Recommendations	**RVH**	**MGH**
Continue same	47%	46%
Discontinue - duration sufficient	10%	9%
Discontinue - inappropriate choice	**21%**	**9%**
Discontinue other reasons: Tx guidelines, workup results, posology..)	15%	11%
CONSULT ID	**2%**	**14%**
RECOMMENDATION ACCEPTED	**78%**	**68%**

SPECIAL ACTIVITIES

Following the recommendations stemming from our previous review, we conducted 3 special audits this year in collaboration with members of the ED and ICU departments.

Retrospective audit of piperacillin-tazobactam for pneumonia in ED

This audit was requested by the CQI lead for the Emergency Department (Dr Andreas Krull), based on his observation of a high proportion of pneumonia cases being treated with Piperacillin-tazobactam in ED. We conducted a retrospective audit of pip-tazo use for Lower Respiratory Tract Infections (LRTI) in the ED (RVH and MGH) over one month (October 2021). We found piperacillin-tazobactam use for LRTI to be inappropriate in 68% of cases, and that inappropriate use tended to occur mostly in cases where aspiration pneumonia was suspected. These findings led to:

- A revision of the Community Acquired Pneumonia (CAP) guidelines, with addition of a section on aspiration (and recommendation to treat aspiration pneumonia with clavulin or ceftriaxone)
- A presentation to the ED department during their CQI rounds, which was well received
- A plan to re-audit pip-tazo prescriptions for pneumonia in ED, to monitor changes in practice following the guideline revision and the information session

Audit of piperacillin-tazobactam use for UTI in ED

This audit was also requested by the CQI lead, following similar observations of high numbers of UTI cases being treated with pip-tazo in the ED (MGH and RVH). A retrospective audit (conducted in March 2022) revealed that use of this agent for UTI in the ED was inappropriate in 64% of cases, mostly attributed to a label of “urosepsis” for cases that in fact were complicated UTI but were hemodynamically stable. These findings led to:

- A revision of the UTI guidelines, with addition of clear definition for urosepsis; specification of recommended duration of treatment; addition of UTI in pregnancy
- Generation of a cumulative antibiogram for urinary isolates at the RVH and the MGH – this in turn led to a modification of first line therapy for uncomplicated cystitis in our guidelines
- A presentation of the findings and the guideline changes to the ED during their CQI rounds
- A plan to re-audit pip-tazo prescriptions for UTI in ED to monitor changes in practice following the guideline revision

Audit of Meropenem use in ICU

An audit of all meropenem prescriptions in ICU (MGH and RVH) was conducted over a period of one month (August 2021). Because of the complexity of ICU cases, we defined appropriate if the case had a documented infection with an isolate that was resistant to other antibiotics; if the case had a documented penicillin-allergy; nosocomial CNS infection; documented treatment failure to first line therapy. We found meropenem prescriptions were inappropriate in 30% of cases at the RVH ICU (most frequent reason being a mis-label of penicillin allergy), and 43% of cases at the MGH ICU (most frequent reason being an alternative narrower option was possible). These findings led to:

- Develop a cumulative antibiogram for ICU isolates
- A decision to re-audit meropenem use in ICU
- Share findings with ICU department after collecting more audit data (fall 2022)

COVID-19 specific activities

The ASP team led the development and continuous updates of clinical practice guidelines for the inpatient care of COVID (currently on its 11th version), as well as care pathways for outpatient management and for pre-exposure prophylaxis, in collaboration with members of the ID division, Pharmacy, Nursing managers for the CVIS/ID Day Hospital, and stakeholders from Internal Medicine, Respirology and ICU.

Starting in May 2020, inpatients with COVID-19 were offered access to investigational therapies through the active contribution of ASP members in large clinical trials, notably CATCO, the Canadian arm of the WHO-led Solidarity trial (in which enrolled patients were offered repurposed and novel antiviral drugs in an adaptative trial platform) and CONCOR-1 (where they were offered convalescent COVID-19 plasma) – participation in these clinical trial networks optimized the quality of care, with close follow-ups by clinical teams and pharmacists.

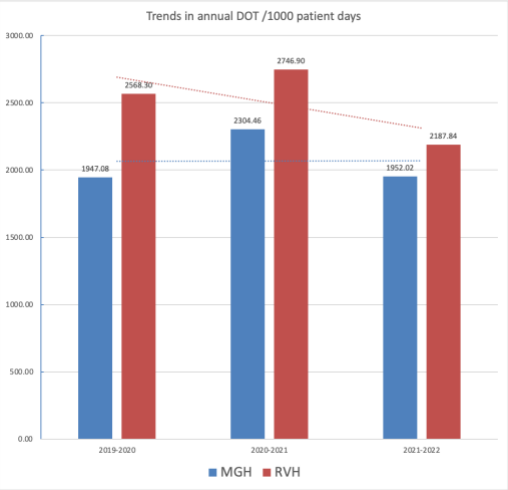
It is important to note that the earliest versions of the COVID guidelines (first released in March 2020) recommended empiric antibiotics for suspected COVID cases, given the uncertainty on the clinical course of the disease and delays in laboratory testing. We predicted the decision to offer empiric pneumonia treatment would lead to an increase in the consumption of specific antimicrobials (ceftriaxone and azithromycin) across the institution, but that it would at least limit inappropriate or irrational use of broader spectrum antimicrobials such as Meropenem. As of June 2020 (4th revision), our guidelines recommended *against* the use of empiric antibiotics.

In addition to periodic audit-feedback of antimicrobial prescriptions on COVID wards, we have collected data for a retrospective analysis of the use of monoclonal antibodies for pre-emptive (outpatient) therapy of COVID-19. Analyses are ongoing to determine the impact of guideline-supported care pathways on clinical outcomes.

ANTIMICROBIAL USE (AMU)

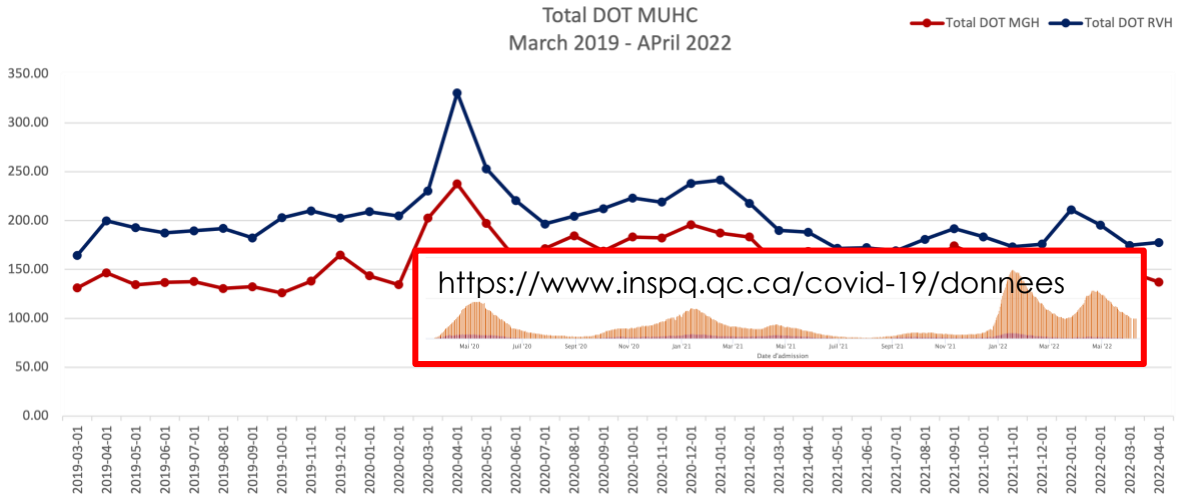
Total Antimicrobial Use and costs

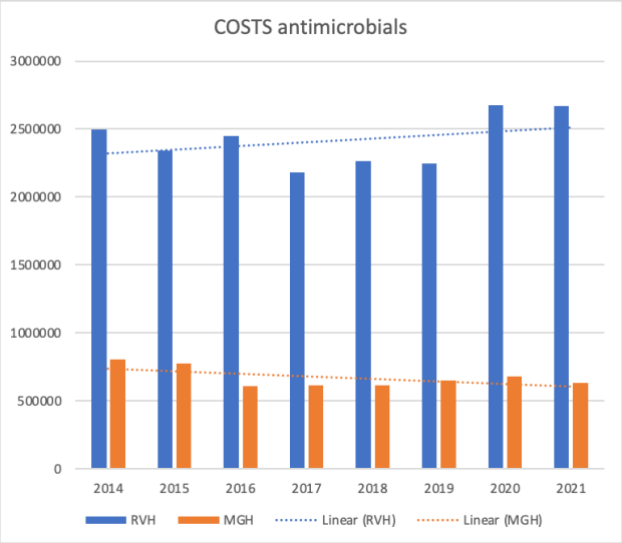
Our primary reporting metric is days of therapy (DOT), which is the number of days that a patient receives an antimicrobial regardless of dose. This is the most accurate (and preferred) measure of AMU endorsed by several health agencies. Normalizing to a common denominator of 1000 patient-day enables us to account for hospital size and patient volume, though it cannot account for inter-hospital differences in case-mix and patient acuity. Overall AMU has decreased at the RVH since 2019 but stayed stable at the MGH.



While there was a marked increase in AMU in 2020 (attributed to the first COVID wave), AMU dropped significantly in 2021-2022 at the RVH: **22% decrease** compared to preceding year, and **15% decrease** compared to 2019-2020 (pre-pandemic). At the MGH, AMU has remained stable compared with pre-pandemic levels.

<u>Trends of AMU in relation to COVID waves</u>: Marked increase in AMU during COVID wave 1&2, but sustained decrease in AMU during subsequent waves up to waves 5-6.

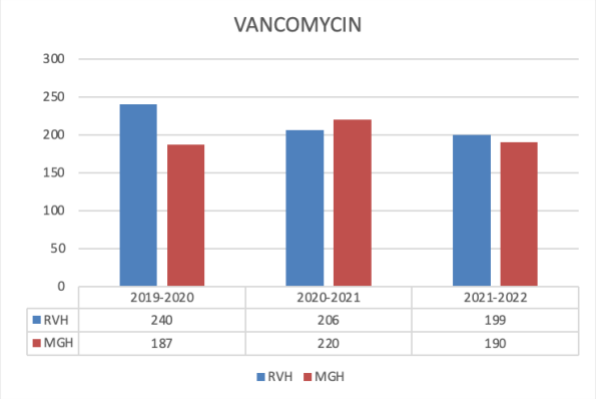


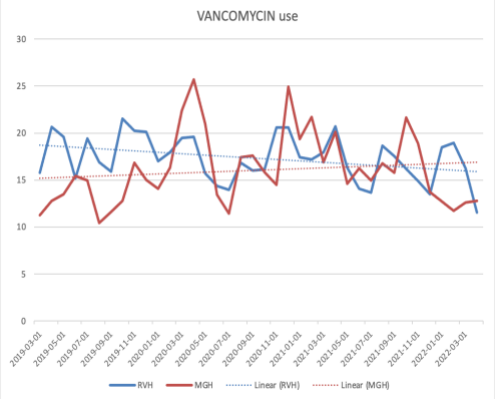


In contrast, despite the decrease in total use of antimicrobials, costs have increased for the RVH (2.6Million Can$ per year) in 2021-2022, compared with 2.5M in 2014). This is attributed to the fact that antifungals now account for 39% of total costs of antimicrobials at the MUHC, and are significantly more costly than antibiotics; specifically, Amphotericin B alone accounts for 18% of total antimicrobial costs.

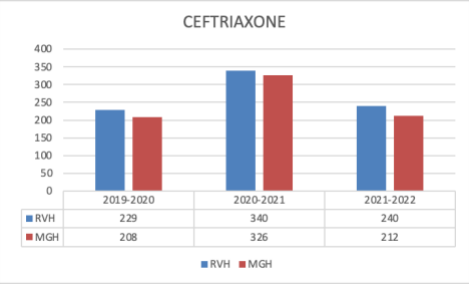
Trends in AMU over time, for selected antibiotics

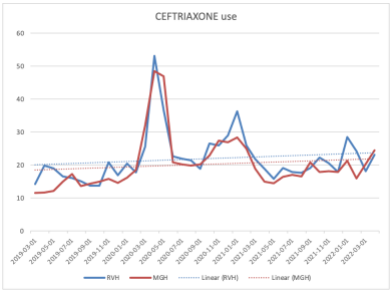
Vancomycin: Compared to 2019, 17% decrease in use at RVH, unchanged at MGH



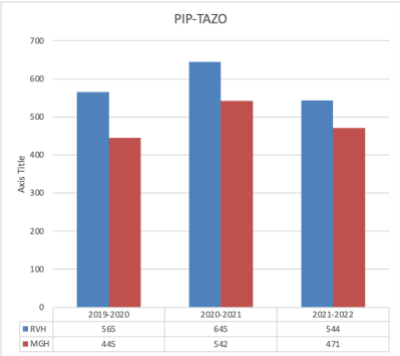


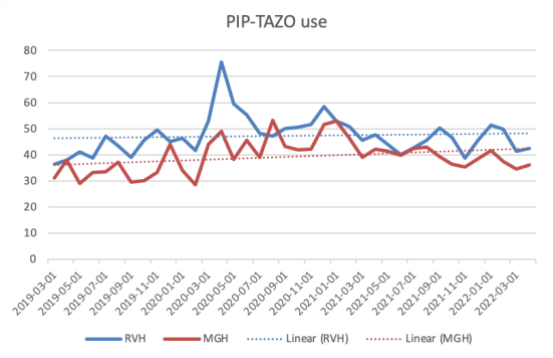
Ceftriaxone: Sharp increases in use in April 2020 and Dec 2020 (COVID waves 1 and 2), then return to pre-pandemic levels in 2021-2022.



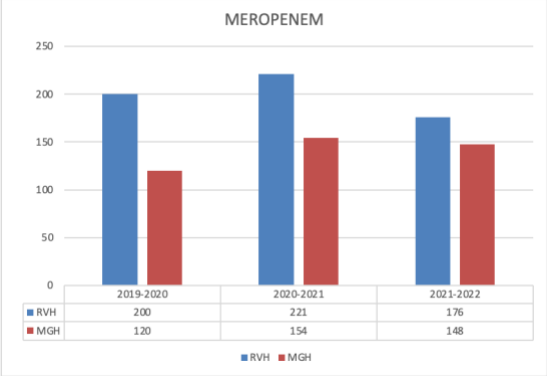


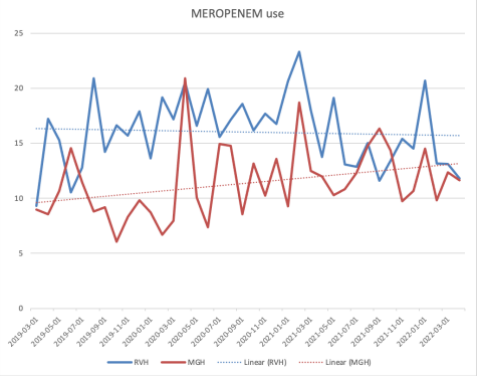
Piperacillin-tazobactam: Increased use during 2020 (22% increase at MGH, 14% at RVH, with peak during COVID wave 1), but decrease in 2021-2022 especially at RVH (4% decrease compared to pre-pandemic period).



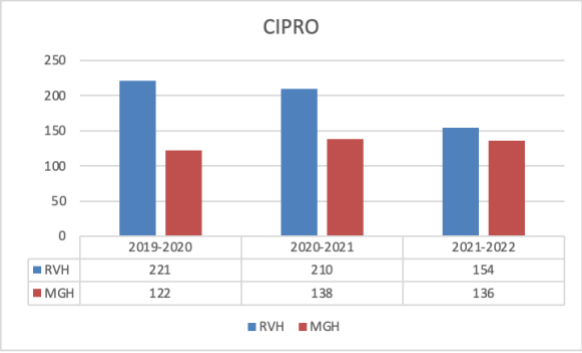


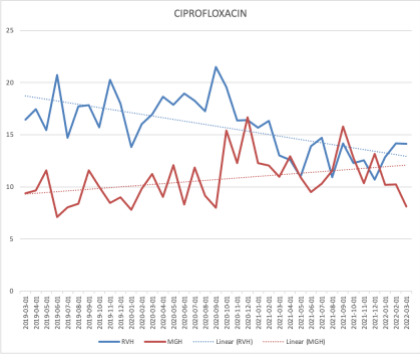
Meropenem: Significant increase (23%) in use of meropenem at MGH since 2019, but 12% decrease at RVH.





Ciprofloxacin: Marked decrease (30%) in the use of ciprofloxacin at RVH since 2019; 11% increase in use at MGH.

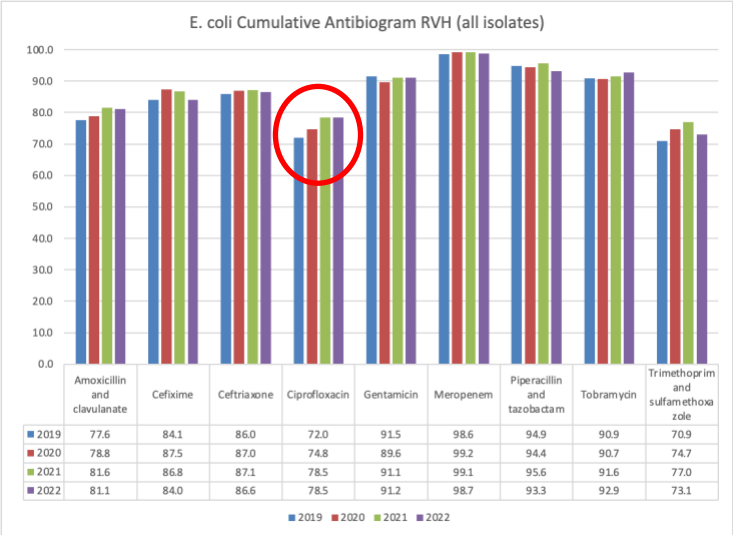




TRENDS IN CUMULATIVE ANTIBIOGRAMS

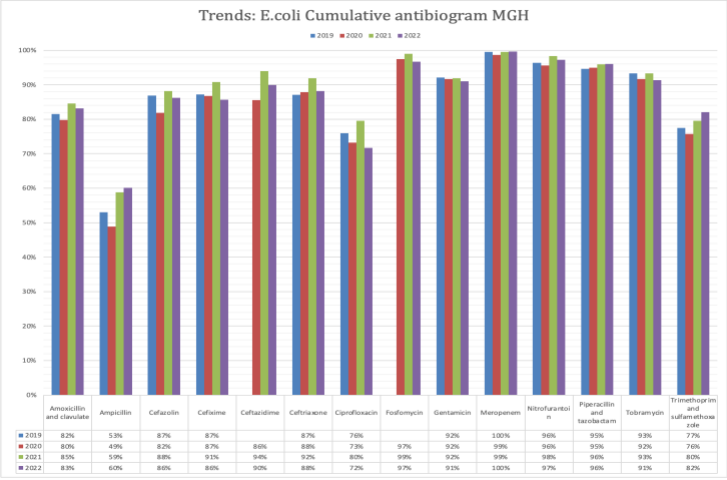
Rates of susceptibility to antibiotics for common bacterial pathogens (isolated from the MUHC patient population) are used to support first-line empiric antimicrobial treatment choices in guidelines (ex. UTI guidelines), and to monitor overall resistance trends over time.

The graph below shows susceptibility rates of *E. coli* isolates towards different antibiotics since 2019. Remarkably, susceptibility to ciprofloxacin has increased at RVH (where use of ciprofloxacin - therefore selective pressure - has dropped by 30% in the same period). Susceptibilities to most other antibiotics (ceftriaxone, piperacillin-tazobactam and meropenem) remain stable.



	Amoxicillin and clavulanate	Cefixime	Ceftriaxone	Ciprofloxacin	Gentamicin	Meropenem	Piperacillin and tazobactam	Tobramycin	Trimethoprim and sulfamethoxazole
2019	77.6	84.1	86.0	72.0	91.5	98.6	94.9	90.9	70.9
2020	78.8	87.5	87.0	74.8	89.6	99.2	94.4	90.7	74.7
2021	81.6	86.8	87.1	78.5	91.1	99.1	95.6	91.6	77.0
2022	81.1	84.0	86.6	78.5	91.2	98.7	93.3	92.9	73.1

At the MGH, susceptibility to ciprofloxacin has steadily been decreasing (and use of ciprofloxacin has increased by 11%) since 2019; isolates appear increasingly more susceptible to trimethoprim-sulfamethoxazole.

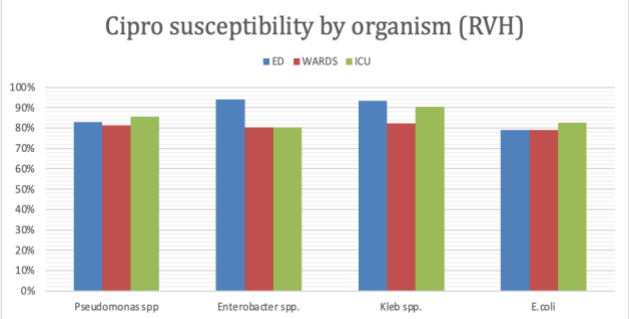


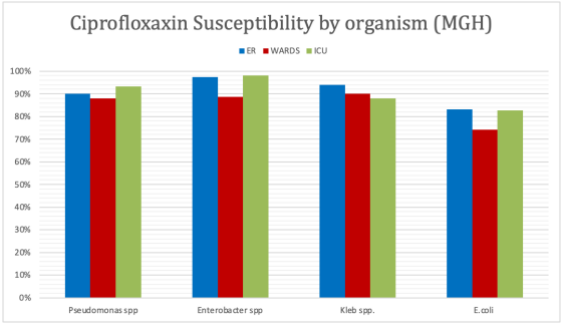
	Amoxicillin and clavulate	Ampicillin	Cefazolin	Cefixime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Fosfomycin	Gentamicin	Meropenem	Nitrofurantoin	Piperacillin and tazobactam	Tobramycin	Trimethoprim and sulfamethoxazole
2019	82%	53%	87%	87%		87%	76%		92%	100%	96%	95%	93%	77%
2020	80%	49%	82%	87%	86%	88%	73%	97%	92%	99%	96%	95%	92%	76%
2021	85%	59%	88%	91%	94%	92%	80%	99%	92%	99%	98%	96%	93%	80%
2022	83%	60%	86%	86%	90%	88%	72%	97%	91%	100%	97%	96%	91%	82%

Cumulative Susceptibiity of selected gram-negative bacteria

Susceptibility to ciprofloxacin (by organism and by location)

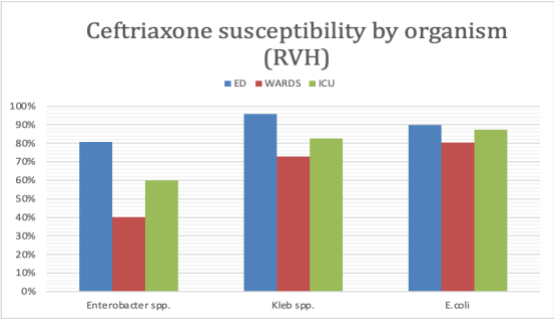
Of gram-negative organisms isolated from wards and ICU patients, susceptibility to ciprofloxacin varies between 80-90%, confirming that ciprofloxacin is a poor choice for empiric management of infections caused by gram-negative organisms at both sites. Isolates from the ED (more reflective of the community setting) tend to be slightly more susceptible to ciprofloxacin, but this is organism-dependent.

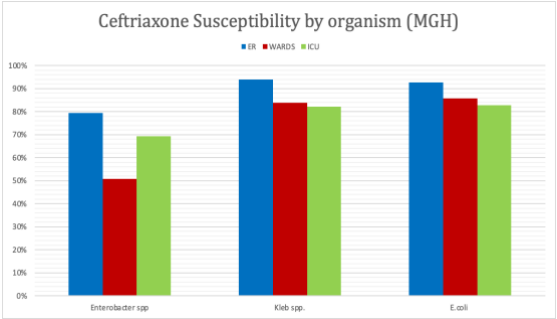




Susceptibility to Ceftriaxone (by organism and by location)

As expected hospital isolates (ward and ICU) are less susceptible to ceftriaxone compared with community (ED) isolates, with significant variability among different species of *Enterobacterale*s. Ceftriaxone remains a poor therapeutic option for empiric management of hospital-associated infections, but a reasonable option for pyelonephritis acquired in the community (where *E. coli* is the predominant pathogen).

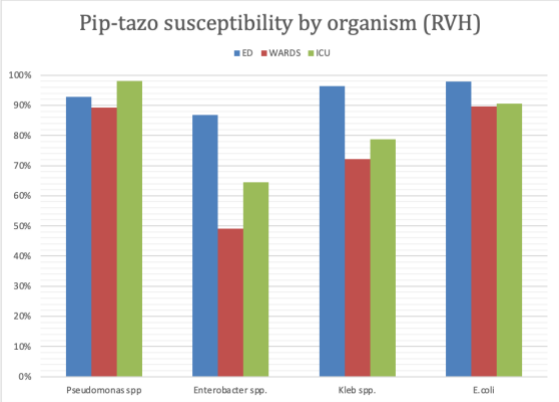


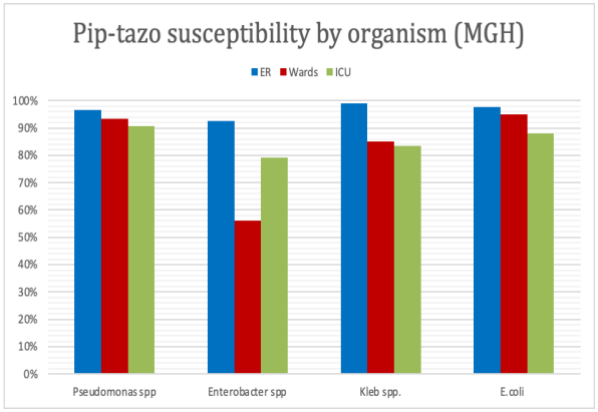


Susceptibility to Piperacillin-tazobactam (by organism and by location)

For *E. coli* and *Pseudomonas spp* isolated from hospitalized patients (wards and ICU), close to 90% are still susceptible to piperacillin-tazobactam (MGH and RVH), however susceptibility to this agent is much lower for *Enterobacter spp* and *Klebsiella spp*. This antibiotic remains a

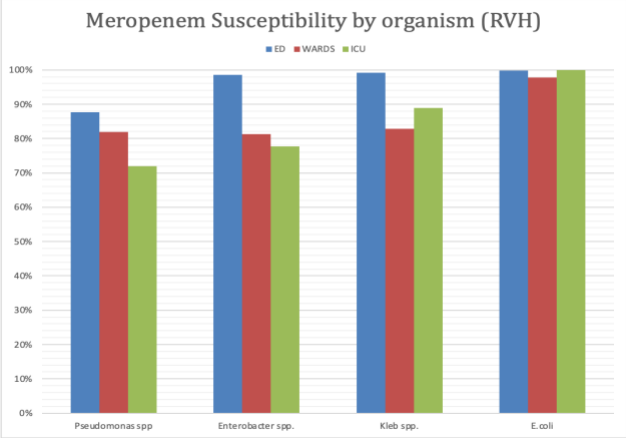
reasonable choice for empiric management of hospital-associated infections, in which *E. coli* and *Pseudomonas* are among the most frequent etiological agents.

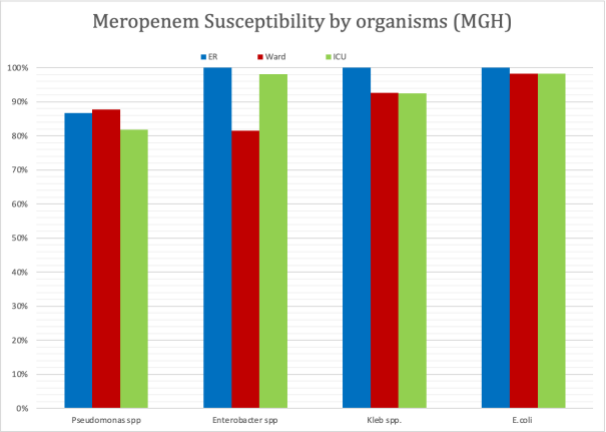




Susceptibility to Meropenem (by organism and by location)

Meropenem is a poor choice for the initial empiric management of hospital-associated infections at the MUHC, given that only 70-80% of *Pseudomonas* isolates from wards and ICU are susceptible to this agent (adequate susceptibility rates for K*lebsiella spp* and *E. coli*).





EDUCATIONAL ACTIVITIES

The ASP team (pharmacists and infectious diseases MDs) have provided teaching longitudinally to pharmacy residents on rotation at the MUHC (2 residents x 2 months each in 2021-2022), to ID-Microbiology residents on rotation in Antimicrobial Stewardship (3 residents x 3 weeks each).
We have additionally delivered didactic educational sessions on stewardship to a diverse audience (intra- and extra-mural).

Title of presentation/teaching session	Given by	Name and date of activity
Antimicrobial Stewardship at the MUHC: upping our game	Makeda Semret	MUHC Medical Grand Rounds, March 2021
MUHC Antimicrobial stewardship Program (an introduction to hospital leadership)	Makeda Semret	MUHC Medical Advisory Committee April 2021
COVID-19 therapy guidelines: where are we?	Makeda Semret	McGill Annual Drug Therapy Course (CME) – May 2021
COVID treatment at the MUHC	Makeda Semret	MUHC Emergency Department – CQI rounds - May 2021
Invasive fungal infections Intra-abdominal infection Multi-resistant gram negative infection HAP, VAP and empyema	François Bourdeau Marc Dobrescu Alexandre Rivard	Teaching to MUHC pharmacy resident First session : August 2021
COVID-19 treatment updates for ED	Makeda Semret	MUHC ED CQI rounds - November 2021
Antimicrobial Stewardship: what can the ED doc do?	Makeda Semret	McGill Emergency Medicine Update course (CME) Dec 2021
Pip-tazo use for LRTI in ED results of retrospective audit	Luke Harrison and Tillman Schober	MUHC ED CQI rounds January 2022
Commonly prescribed antibiotics: spectra and side effects	Makeda Semret	McGill Internal Medicine Training Program - Academic half-day, March 2022
Pip-tazo use for UTI in ED: findings from retrospective audit	François Bourdeau	MUHC ED – CQI, April 2022

HIGHLIGHTS

We have been encouraged by the contributions of ASP to the quality of care of MUHC patients. A summary of the highlights for this year include:

- Effective structure and organization
- Increased visibility and reach of our team (research collaborations, advisory roles)
- Increasing demand for ASP educational activities by clinical teams and university
- Increasing use of our clinical practice guidelines (within and outside the institution);
- Productive collaborations with colleagues in infectious diseases and other specialities
- Successful management of COVID (inpatient and outpatient) across institution
- Increased audit-feedback coverage of clinical care units
- 21% decrease in the use of broad spectrum antimicrobials at the RVH compared to last year (15% compared to 2019)
- Trend towards decreasing resistance of *E. coli* isolates towards ciprofloxacin at RVH and no notable increase in resistance to antimicrobials since 2019.

Challenges/Disapointments

- Acceptance of ASP recommendations at MGH are below expectations, and no significant improvements in AMU seen for this site - will require further tailoring of our approach
- We are still operating without a dedicated ASP budget and without administrative or database support: the 2 ASP co-chairs (in addition to their expert activities) continue to organize committee meetings/take minutes, maintain the website and tabulate data - all tasks that could easily be done by non-experts. Providing the ASP leads a budget to recruit part-time assistance for these tasks would support implementation of further data-driven ASP interventions, increase our ability to deliver educational activities, and conduct more scholarly work – which will in turn expand the footprint of the program provincially and nationally.
- Continued uncertainty on the purchase of the Lumed software, despite the fact it has become an integral part of our activities including measurement of AMU and cumulative antibiograms.

Priorities for 2022-2023

- Modify audit-feedback approach (implement a site-rotation) to limit effect of inter-auditor variability and increase impact at MGH
- Focus on meropenem and vancomycin through increased remote audits with immediate feedback, using Lumed as the primary tool to flag and assess cases
- Periodic retrospective audits for ED to continue for pip-tazo (LRTI and UTI)
- Period retrospective audits for ICU (meropenem and caspo use) with sharing of results

1) New clinical ASP fellow recruited (to start July 2022): Scholarly projects

ACKNOWLEDGEMENTS

We thank the members of the core team (pharmacists and MDs) for their dedication and constant efforts; the ASP committee members for their engagement and contributions; the Directors of ID and Pharmacy for their continued support of the ASP.
Many thanks also to Barbara Ann Jardin and Romina Georghe (research employees at the RI-MUHC) for their help with data.

We are grateful to the Department of Medicine for the opportunities to showcase ASP through Medical Grand Rounds and Academic half-day; the Director Of Professional Services for her invitation at the Medical Advisory Committee and facilitation of the outpatient care pathway for COVID-19.

Our very special thanks go to the nursing managers, nurses and clerical staff of the CVIS/ID Medical Day Hospital – without their collaboration and flexibility, many many more patients would have needed hospitalization and probably received unnecessary antibiotics!

ANNEX 1: ORGANISATIONAL STRUCTURE

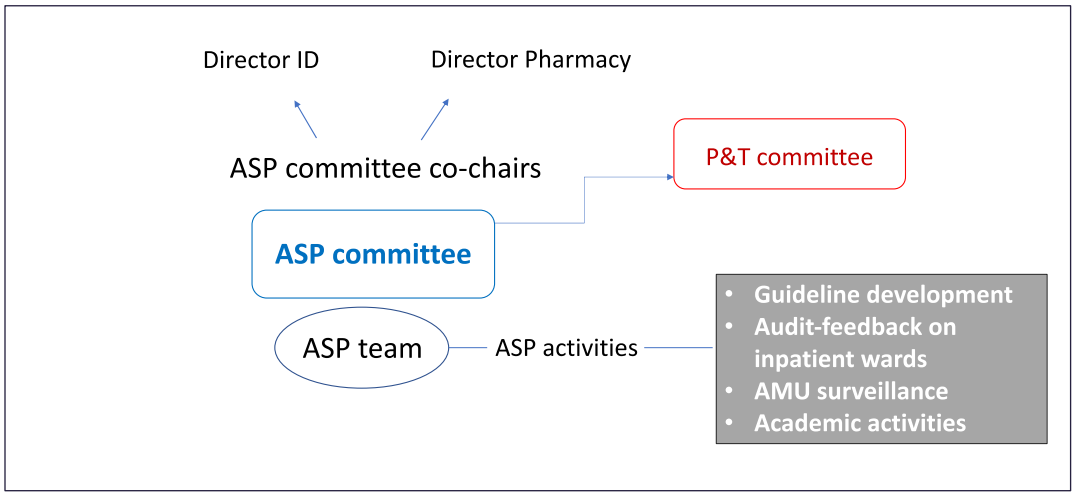
VISION AND MISSION:

Optimize antimicrobial effectiveness while minimizing the potential for adverse events, antimicrobial drug resistance and costs

To achieve our primary aim of improving quality of patient care and safety, we employ a systematic approach forcused on:

- *Advising* best practice: policies and treatment guidelines for the use of antimicrobial agents at the MUHC
- *Tracking (surveillance)* antimicrobial use within the institution
- *Reporting (feedback)* information on antibiotic use and resistance profiles to relevant clinical and administrative staff
- *Educating* health professionals on matters related to antimicrobials and their appropriate use
- *Researching* the impact of specific interventions on antimicrobial use in the MUHC

The MUHC ASP organizational structure:



ANNEX 2: MEMBERS OF THE ASP COMMITTEE

Name	Position, Discipline
Makeda Semret*	Chair; Infectious Diseases
Francois Bourdeau*	Co-Chair, Pharmacy
Anne Marie Bourgault*	Member, Infectious Diseases, Medical Microbiology
Vivian Loo	Member, Infectious Diseases
Charles Frenette*	Member, Infection Prevention and Control
Ruth Horn*	Member, Infectious Diseases
Don Vinh	Member, Transplant Infectious Diseases
Todd Lee	Member, GIM and Infectious Diseases
Kelly Davison	Member, Hematology-Oncology
Sal Qureshi	Member, Intensive Care and Respirology
Cristian Toarta^/Gary Lee	Member, Emergency Medicine
Emily Macdonald	*Member, GIM (stepped down April 2022)*
Tarek Razek	Member, General Surgery
Derek Lee*	Member, Pharmacy
Daniel Thirion*	Member, Pharmacy
Celine Dupont	P&T committee co-chair, Pharmacy
Sebastien Landry*	Member, Pharmacy
Van Dong Nguyen*	Member, Pharmacy
Kym Archambault*	Member, Pharmacy
Raphaelle Lauly*	Member, Pharmacy (Maternity leave)
Marc Dobrescu*	Member, Pharmacy
Alexandre Rivard*	Member, Pharmacy
Samuel de L'etoile-Morel^^ / Ilyse Darwish	Member, ID Chief resident
Andre Bonnici	Ex-officio, Director Pharmacy
Marcel Behr	Ex-officio, Director Infectious Diseases

*: these individuals are also core team members (conduct audit-feedback activities of the ASP)
^: Dr Cristian Toarta until Jan 2022, Dr Gary Lee since Jan 2022;
^^: Dr Sam De L'etoile until June 2021, Dr Ilyse Darwish since July 2022