MSH + UHN

ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

FISCAL YEAR 2014 | 2015
Q2 REPORT

MOUNT SINAI HOSPITAL
Joseph and Wolf Lebovic Health Complex
Bright Minds. Big Hearts. The Best Medicine.

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Toronto General
Toronto Western
Princess Margaret
Toronto Rehab
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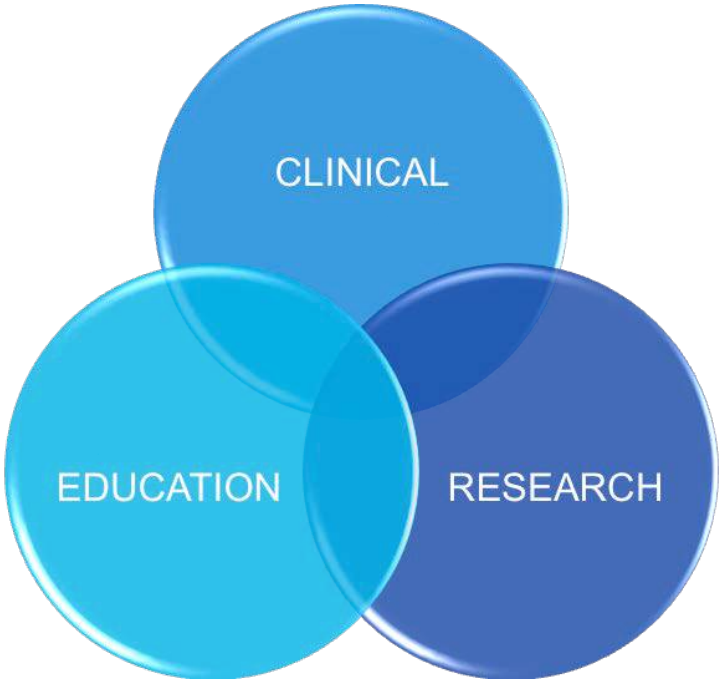
MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

"Getting patients the right antibiotics, when they need them"

EXECUTIVE SUMMARY

The Mount Sinai Hospital-University Health Network Antimicrobial Stewardship Program (MSH-UHN ASP) has been active since 2009. The MSH-UHN ASP uses a collaborative and evidence-based approach to improve the quality of antimicrobial use by getting patients the right antibiotics, when they need them. The ASP follows quality improvement methodology to pursue the best possible clinical outcomes for its patients, relying heavily on patient-centred data.



The MSH-UHN ASP uses research and education, alongside clinical care, to take a leadership role in increasing antimicrobial stewardship capacity and improving the quality of health care.

MOUNT SINAI HOSPITAL Joseph and Wolf Lebovic Health Complex

UHN Toronto General Toronto Western Princess Margaret Toronto Rehab

KEY HIGHLIGHTS

ANTIMICROBIAL CONSUMPTION AND COSTS:

The ASP continues to work with clinical teams across all five hospitals (Mount Sinai Hospital, Princess Margaret, Toronto General, Toronto Rehab, and Toronto Western). Antimicrobial consumption and costs by site are included below. Detailed tables and graphs are appended. There is a trend of decreased use and expenditures for antimicrobials per patient day, however, there are two adult intensive care units where an increase in consumption and cost has been identified. One possible explanation is an antifungal prophylaxis regimen. A thorough review of the factors involved is being undertaken with the ASP team and ICU site leaders. We will be focusing the next two quarters on understanding this trend and, if possible, reversing it over the next fiscal year.

MOUNT SINAI HOSPITAL ICU

FY 14/15 Q2 highlights include:

- Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) remained largely unchanged (i.e. increased by 1.3%) compared to last year.
- Antimicrobial costs per patient day decreased by 23% compared to YTD last year.
- NB: Princess Margaret patients accounted for 17% of patient visits and 41% of the antimicrobial costs.

TORONTO WESTERN HOSPITAL ICU

FY 14/15 Q2 highlights include:

- Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) decreased by 29% compared to last year.
- Antimicrobial costs per patient day decreased by 42.5% compared to last year.

TORONTO GENERAL HOSPITAL MEDICAL SURGICAL ICU

FY 14/15 Q2 highlights include:

- Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 15% compared to last year.
- Antimicrobial costs per patient day remained largely unchanged compared to last year.
- Antibacterial costs per patient day increased (↑) by 32% compared to last year.
- Antifungal costs per patient day decreased by 18% compared to last year.

TORONTO GENERAL HOSPITAL CARDIOVASCULAR ICU

FY 14/15 Q2 highlights include:

- Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 15% compared to last year.
- Antimicrobial costs per patient day increased (↑) by 55% compared to last year.
- Antibacterial costs per patient day increased (↑) by 22% compared to last year.
- Antifungal costs per patient day increased (↑) by 282% compared to last year. (Note: there continued to be a different antifungal prophylaxis regimen for heart transplant recipients in place until the end of September 2014 that contributed to this difference.)

MOUNT SINAI HOSPITAL NEONATAL ICU

NICU ASP rounds have been temporarily on hold due to ongoing challenges with human resources. We hope to reassess in Q4 of FY14-15. However, we have continued to collect data. Specifically, days of therapy (DOT) is our metric for antimicrobial consumption, which is considered to be the standard for neonates. FY 14/15 Q2 highlights include:

- Antimicrobial days of therapy (DOT) per 100 patient days decreased (↓) by 36% compared to YTD last year.
- Antimicrobial costs per patient day have decreased (↓) by 36% compared to YTD last year ($2.10 to $1.34).

GENERAL INTERNAL MEDICINE: MOUNT SINAI HOSPITAL AND UNIVERSITY HEALTH NETWORK

FY 14/15 Q2 highlights include:

- Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) decreased by 17.5% compared to last year for TGH, decreased by 18% for TWH and increased by 13.8% at MSH.
- Antimicrobial costs per patient-day decreased by 59% compared to last year for TGH, decreased by 24% for TWH and increased by 53.7% at MSH.
- NB: usage data calculated for patients admitted to primary GIM units at UHN and by admission to GIM medical service at MSH.

PRINCESS MARGARET CANCER CENTRE: LEUKEMIA SERVICE (14A, 15A, 15B)

FY 14/15 Q2 highlights include:

- Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) decreased by 4.3% compared to last year.
- Antimicrobial costs per patient day decreased by 5% compared to last year.
- NB: In addition to prospective audit and feedback rounds with the leukemia service, the ASP team also started prospective audit and feedback rounds with the Allogeneic BMT team in September, 2014. Data for 14B will be reported in the Q3 report.

BEST PRACTICE GUIDELINES & ALGORITHMS:

- The High-Risk Febrile Neutropenia Protocol for Patients with Malignant Hematological Diseases was updated and an additional section on Pulmonary Infiltrate Management was included. This protocol was presented and approved at both MSH and UHN Pharmacy &Therapeutics Committees (P&T), and will be posted on the ASP website, along with an education roadshow once approval is obtained at the Medical Advisory Committee (MAC).
- The Febrile Neutropenia Protocol for Solid Tumor and Lymphoma Patients was also updated and approved by both MSH and UHN P&T. Protocol distribution and education will be provided once approval is obtained by the MAC.
- We continue to work with Dr. Sam Sabbah from ED to create an order set for febrile neutropenia management in the ED.
- Clinical summaries continue to be available on the ASP website for a series of common and important conditions. Whiteboard animation videos continue to be available on our program's YouTube channel.
- The ASP collaborated with the Emergency Department to complete the MSH Emergency Department sepsis recognition and management algorithm. The algorithm was implemented into the Emergency Department in July and was effortlessly taken on by frontline clinicians and incorporated into their daily practice. There will be a three month and six month project audit completed to further understand how the algorithm is affecting practice in the Emergency Department, as well as patient outcomes prior to considering collaborating with the Emergency Departments at Toronto General and Toronto Western.
- The ASP collaborated with multiple key stakeholders across MSH and UHN on standardizing care related to the diagnosis and management of patients with *Clostridium difficile* infection (CDI). The algorithm was launched in mid-November, and involved extensive consultation, development and revision with interdisciplinary stakeholders. An e-learning module was developed and launched in November. At present, there is collaboration with IT to develop electronic order sets to support the algorithm.
- The ASP has completed data collection for a quality improvement project to determine the indications and investigations involved prior to initiating antimicrobials in REACH and Transfusion Clinic (TFC) for leukemia/Bone Marrow Transplant (BMT) patients ("REACH/TFC Antimicrobial 'Spot Audit'" project).
- Single day spot audits continue to be conducted at two- to three-month intervals for GIM patients receiving systemic antimicrobials. Audits are conducted by an ASP clinician (physician or pharmacist) looking at appropriateness, and a consensus panel including a GIM physician and pharmacist convene within one week of each audit.

RESEARCH:

Multiple research projects continue, with many important projects nearing completion and being prepared for submission to key medical journals.

The following manuscripts have been published in peer review journals:

- Morris AM. Antimicrobial Stewardship Programs: Appropriate Measures and Metrics to Study their Impact. *Current Treatment Options in Infectious Diseases.* 2014 Jun 1:6(2):101-112.
- Steinberg M, Dresser LD, Daneman N, Smith OM, Matte A, Marinoff N, Bell CM, Morris AM. A National Survey of Critical Care Physicians' Knowledge, Attitudes, and Perceptions of Antimicrobial Stewardship Programs. *J Intensive Care Med*. 2014 Jul 8. [Epub ahead of print].
- Letter to the Editor **-** Morris AM, Ovens H. Community-acquired pneumonia. *N Engl J Med*. 2014 May 8;370(19):1862.
- Bai AD, Showler A, Burry L, Steinberg M, Ricciuto DR, Fernandes T, Chiu A, Raybardhan S, Science M, Fernando E, Bell CM, Morris AM. Comparative effectiveness of cefazolin versus cloxacillin as definitive antibiotic therapy for methicillin-susceptible Staphylococcus aureus bacteremia: results from a large multicenter cohort study. *Journal of Antimicrobial Chemotherapy* (in press).
- Jeffs L, Thampi N, Maione M, Morris AM, Bell CM. A Qualitative Analysis of Implementation of Antimicrobial Stewardship at 3 Academic Hospitals: Understanding the Key Influences to Success. *International Journal of Pharmacy* (in press).

The following abstracts were presented at conferences:

- Nelson S, Duplisea K, Morris AM, Bunce PE. *Use of Spot Audits to Measure Appropriateness of Antimicrobial Therapy on General Internal Medicine as Part of an Antimicrobial Stewardship Program.* Poster presented at AMMI Annual Conference 2014, Apr 2-5, 2014; Victoria BC.
- Duplisea K, Nelson S, Olegario S, Morris AM, Bunce PE. *A Point Prevalence Study to Measure Appropriateness of Antimicrobial Prescribing on General Internal Medicine Patients as Part of an Antimicrobial Stewardship Program.* Oral presentation at AMMI Annual Conference 2014, Apr 4, 2014; Victoria BC.
- Yang D, So M, Husain S, Bell CM, Morris AM. *Evaluation of Antimicrobial Prescribing in Hospitalized Solid Organ Transplant Patients through Serial Real-time Point Prevalence Audits.* Poster presented at AMMI Annual Conference 2014, Apr 2-5, 2014; Victoria BC. Winner: Student Poster Award.
- So M, Dresser L. Stewarding the Next Generation of Antimicrobial Stewards: Design and Implementation of an Entry-to-Practice PharmD Curriculum in Antimicrobial Stewardship. Joint Canadian Pharmacists Association and Association of Faculties of Pharmacy Conference in Saskatoon, SK, June 2014.
- Hughes J, Hurford A, Wu J, Morris AM. Constructing Syndrome-Specific Antibiograms for Catheter-Associated Bloodstream Infections Using Uncertainty Estimation and Colour. Poster presented at ICAAC -Interscience Conference on Antimicrobial Agents and Chemotherapy Annual Conference 2014, Sept 5-9, 2014; Washington DC

An additional 10 manuscripts have been either submitted or are close to submission for peer-reviewed publication.

Grants Awarded:

- Building Capacity to Improve and Sustain Antimicrobial Stewardship Programs in ICUs. Canadian Institutes of Health Research, Knowledge to Action. Principal Investigators: Lianne Jeffs L, Andrew Morris. Collaborators: Bell C, Law M, Mitchell J, Straus S. $204 400 CAD.
- CAHO ARTIC Spread Project: ARTIC CHILL - Community Hospital ICU Local Leadership. Principal Applicant: Andrew Morris. $200 000 CAD.
- Summer Studentship Award. MSH Dept of Medicine. Anthony Bai. $2 500 CAD.
- Technology Evaluation in the Elderly Network (TVN): FRAMING-LTC: Frailty and Recognizing Appropriate Medications IN Geriatrics and Long-Term Care. Principal Applicant: Andrew Morris. $596 906 CAD.

EDUCATION:

- As part of our General Internal Medicine (GIM) initiative, the ASP team has been providing ongoing education and support to GIM Pharmacists at both MSH and UHN. The ASP team has provided education to physicians and medical trainees through several means, including ASP/ID case-based noon rounds, ASP pocket cards for medical trainees, and a mobile ASP web application (m.antimicrobialstewardship.com) to provide efficient access to resources. Educational sessions are also being provided to pharmacists at all Toronto Rehab Institute (TRI) sites, and will include education sessions for physicians at TRI in Q3 /Q4.
- The ASP team now meets with all Nurse Practitioners from the Malignant Hematology programs for case rounds twice a month.
- The Leslie Dan Faculty of Pharmacy at the University of Toronto is the first institution to offer an elective in Antimicrobial Stewardship in the Entry-to-Practice Doctor of Pharmacy Curriculum. Miranda So (ASP Pharmacist) is the course coordinator, with contribution from other ASP team members. The curricular design and implementation was accepted as a poster at the Joint Canadian Pharmacists Association and Association of Faculties of Pharmacy Conference in Saskatoon, SK in June 2014.
- A Canadian Society of Hospital Pharmacists Foundation Education grant, "Developing and Evaluating an Educational Intervention to Guide the Implementation of Antimicrobial Stewardship Programs in Community Hospitals Across Ontario", was awarded to team member Linda Dresser and other ASP team members. Thirteen sites across Ontario participating in the grant. A series of lectures on stewardship principles and therapeutic topics was delivered over an 8-month period, with each site gathering and reporting baseline and ongoing antimicrobial consumption data. Impact of the program at each site will be measured by antimicrobial consumption data and a survey of participants.

PROVINCIAL ROLE:

ASP ARTIC CHILL Project:

The ASP was awarded a grant of $200,000 for their ASP ARTIC CHILL (Community Hospital ICU Local Leadership) project, which will build on the successful implementation of ASPs in academic hospitals led by the MSH-UHN ASP team during the two-year provincial CAHO ASP ICU ARTIC project (2012–2014). The ASP ARTIC CHILL project will commence in December 2014 using a HUB and SPOKE model for implementation: CAHO ASP ICU ARTIC site leaders (Hubs) will act as coaches and mentors for ASP implementation at local community sites (Spokes).

At project completion, all participating Spoke sites will have implemented an ASP in their ICU and have the ability to report on: Days of Antibacterial Therapy, Days of Antifungal Therapy, and ICU-onset *C. difficile* using CCIS's (Critical Care Information System) antimicrobial indicators – the first such provincial network of antimicrobial utilization data implemented anywhere in Canada.

Cancer Care Ontario:

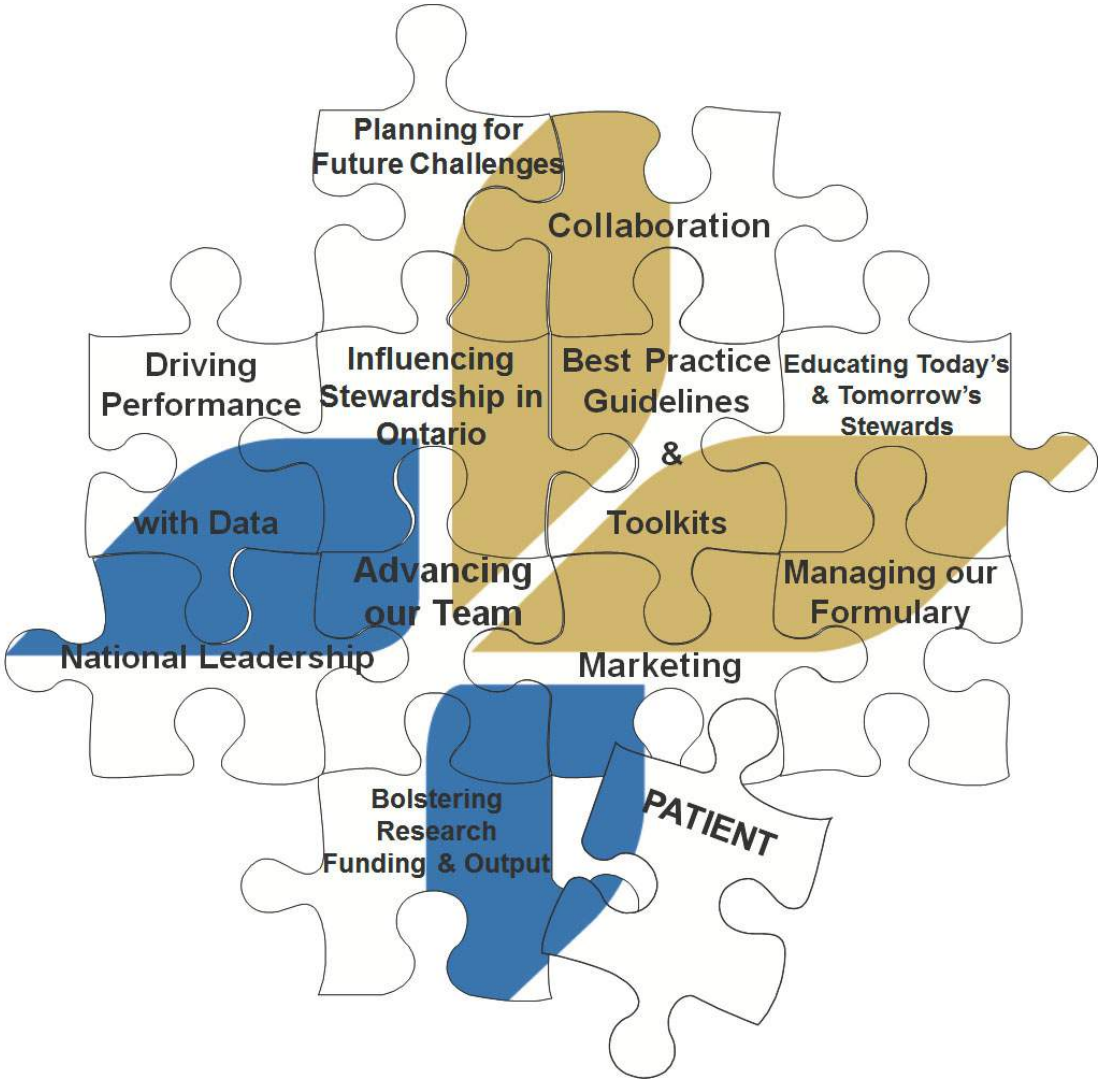
The MSH-UHN ASP team is grateful for the Senior Leadership team at Princess Margaret for the opportunity to share the *High-Risk* Protocol with other sites through Cancer Care Ontario.

NATIONAL ROLE:

Accreditation Canada:

The MSH-UHN ASP has partnered with Accreditation Canada to assist hospitals across Canada in setting up an antimicrobial stewardship program (ASP). The partnership involves the development and delivery of a series of on-line workshops and interactive group webinars. The on-line workshop series will be available January 12, 2015.

- **STRATEGIC PLANNING:**
  The ASP team developed the MSH-UHN ASP Strategic Plan 2013-2016. Please contact Yoshiko Nakamachi (Yoshiko.Nakamachi@uhn.ca) if you would like a copy.



APPENDIX

MOUNT SINAI HOSPITAL: ICU

Indicators	FY 08/09 (Pre-ASP)	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY14/15 Performance					YTD of Previous Year
							Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage & Costs												
Total Antimicrobial DDDs/100 Patient Days	177	171	144	167	170	167	139	190			164	162
Systemic Antibacterial DDDs/100 Patient Days	142	128	111	128	127	123	114	158			136	123
Systemic Antifungal DDDs/100 Patient Days	31	24	20	33	35	36	22	28			25	33
Total Antimicrobial Costs	$332,724	$285,975	$193,129	$279,859	$291,470	$422,634	$73,753	$74,842			$148,595	$192,116
Total Antimicrobial Costs/Patient Day	$69.01	$59.23	$40.95	$59.22	$62.37	$85.07	$61.87	$63.21			$62.54	$81.34
Systemic Antibacterial Costs	$174,339	$142,134	$95,773	$125,339	$134,811	$108,886	$21,472	$27,743			$49,215	$55,514
Systemic Antibacterial Costs/Patient Days	$36.16	$29.44	$20.31	$26.94	$28.85	$21.92	$18.01	$23.43			$20.71	$23.50
Systemic Antifungal Costs	$143,100	$132,519	$88,998	$141,877	$144,811	$295,163	$50,915	$45,396			$96,311	$129,775
Systemic Antifungal Costs/Patient Days	$29.68	$27.45	$18.87	$30.50	$30.99	$59.41	$42.71	$38.34			$40.53	$54.94
Patient Care Outcomes												
Hospital acquired C. difficile cases (rate per 1,000 pt days)	NA	NA	NA	5 (1.07)	8 (1.71)	4 (0.91)	2 (1.67)	2 (1.68)			4 (1.69)	1 (0.42)
ICU Average Length of Stay (days)	5.84	5.57	5.67	5.51	5.24	6.10	5.42	5.11			5.27	5.71
ICU Mortality Rate (as a %)	20.1	17.6	16.3	16.5	17.04	15.3	14.8	14.6			14.7	15.1
ICU Readmission Rate within 48 hrs (as a %)	3.2	2.9	2.7	2.7	1.86	3.2	3.5	0.8			2.2	3.9
ICU Ventilator Days	NA	3286	2934	2677	2749	11646	630	678			1308	1495
ICU Multiple Organ Dysfunction Score (MODS)	4.00	4.04	4.12	4.25	4.62	4.87	4.97	4.98			4.98	4.71
Antibacterial Days of Therapy	n/a	n/a	n/a	n/a	n/a	5123	998	1437			2435	2530
Antifungal Days of Therapy	n/a	n/a	n/a	n/a	n/a	1200	182	264			446	513

Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/)
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs + systemic antivirals; non-systemic antimicrobials are excluded
Data Sources: Antimicrobial DDD and Costs (Pharmnet), C difficile (Infection Control Dashboards), Other ICU Patient Care Indicators (Critical Care Information System).

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TORONTO WESTERN HOSPITAL: ICU

Indicators	FY 08/09 (Pre-ASP)	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY14/15 Performance					YTD of Previous Year
							Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage & Costs												
Total Antimicrobial DDDs/100 Patient Days	99	88	79	83	83	92	67	63			65	92
Systemic Antibacterial DDDs/100 Patient Days	92	78	73	77	78	86	63	57			60	84
Systemic Antifungal DDDs/100 Patient Days	6	10	6	6	5	6	4	6			5	8
Total Antimicrobial Costs	$136,758	$100,408	$101,191	$105,899	$102,978	$120,538	$27,064	$28,314			$55,378	$66,028
Total Antimicrobial Costs/Patient Day	$18.16	$13.24	$13.17	$13.60	$13.37	$13.49	$9.21	$9.77			$9.49	$16.51
Systemic Antibacterial Costs	$123,314	$87,445	$79,280	$89,784	$70,099	$85,916	$20,587	$22,878			$43,465	$43,815
Systemic Antibacterial Costs/Patient Days	$16.37	$11.53	$10.32	$11.53	$9.10	$9.61	$7.00	$7.90			$7.45	$10.96
Systemic Antifungal Costs	$13,444	$12,963	$21,911	$16,115	$32,879	$34,623	$6,477	$5,436			$11,913	$22,212
Systemic Antifungal Costs/Patient Days	$1.79	$1.71	$2.85	$2.07	$4.27	$3.87	$2.20	$1.88			$2.04	$5.55
Patient Care Outcomes												
Hospital acquired C. difficile cases (rate per 1,000 pt days)	6 (0.79)	9 (1.18)	4 (0.52)	13 (1.66)	5 (0.65)	12 (1.34)	4 (1.36)	3 (1.04)			7 (1.20)	6 (1.50)
ICU Average Length of Stay (days)	8.39	7.44	10.68	9.71	7.98	7.68	8.43	8.95			8.7	7.85
ICU Mortality Rate (as a %)	19.6	19.9	18.1	17.0	16.4	17.1	22.5	17.4			20.1	17.6
ICU Readmission Rate within 48 hrs (as a %)	3.9	4.7	4.9	3.21	3.00	3.85	3.70	2.86			3.30	4.99
ICU Ventilator Days	4617	6305	5960	5578	4947	5523	1501	1403			2904	2636
ICU Apache II Score	15.0	14.7	13.7	13.8	12.9	12.8	13.9	13.1			13.5	13.0
Antibacterial Days of Therapy	n/a	n/a	n/a	n/a	n/a	n/a	1275	1454			2729	n/a
Antifungal Days of Therapy	n/a	n/a	n/a	n/a	n/a	n/a	95	115			210	n/a

Notes:
* Q4 13/14 data consists of MSNICU patients (including 8 ICU II patients).
**Due to an error in the Centricity Pharmacy data we are unable to provide accurate DDD data and utilization cost for the TGH ICU for the 1st quarter of fiscal 12/13. Use of Centricity data resumes effective 2nd quarter of fiscal 12/13. FY 12/13 Q1 Costs and DDD are taken from the estimated Centricity cost, which is 95% of the GL cost.
***Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/)
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded
Data Sources: Antimicrobial DDD and Costs (Centricity)

An error in reporting the usage of ceftriaxone for Q1 and Q2 2012 was detected and reports have been adjusted to reflect actual usage. A dosage form of ceftriaxone (ceftriaxone 1g IV 50 mL bag) was not included in the original report. This was corrected in October 2012.

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

TORONTO GENERAL HOSPITAL: MSICU

Indicators	FY 09/10 (Pre-ASP)	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15 Performance					YTD of Previous Year
						Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage & Costs											
Total Antimicrobial DDDs/100 Patient Days	266	209	199	213	217	211	256			234	204
Systemic Antibacterial DDDs/100 Patient Days	184	155	143	159	156	156	197			177	149
Systemic Antifungal DDDs/100 Patient Days	82	55	55	54	61	55	58			57	54
Total Antimicrobial Costs	$701,451	$629,472	$567,532	$473,613	$584,018	$143,079	$154,439			$297,517	$272,190
Total Antimicrobial Costs/Patient Day	$102.52	$84.06	$76.93	$63.75	$75.71	$68.92	$74.64			$71.78	$71.27
Systemic Antibacterial Costs	$390,209	$375,436	$292,355	$231,171	$225,557	$61,329	$83,205			$144,534	$101,054
Systemic Antibacterial Costs/Patient Days	$57.03	$50.14	$39.63	$31.12	$29.24	$29.54	$40.22			$34.87	$26.46
Systemic Antifungal Costs	$311,242	$254,036	$275,176	$242,443	$358,461	$81,749	$71,234			$152,983	$171,135
Systemic Antifungal Costs/Patient Days	$45.49	$33.93	$37.30	$32.63	$46.47	$39.38	$34.43			$36.91	$44.81
Patient Care Outcomes											
Hospital acquired C. difficile cases (rate per 1,000 pt days)	10 (1.46)	10 (1.33)	11 (1.49)	11 (1.48)	12 (1.56)	4 (1.93)	3 (1.45)			7 (1.69)	4 (1.05)
ICU Average Length of Stay (days)	8.24	8.61	8.85	7.79	8.22	7.53	8.77			7.53	7.69
ICU Mortality Rate (as a %)	16.2	15.7	16.3	16.0	17.8	16.0	16.4			16.0	16.9
ICU Readmission Rate within 48 hrs (as a %)	3.8	4.4	4.4	2.8	3.5	4.5	2.5			4.5	4.6
ICU Ventilator Days	5399	6256	6507	6458	24620	1764	1847			3611	3495
Apache II score	n/a	n/a	16.1	15.775	15.9	15.2	14.4			14.8	14.8
Antibacterial Days of Therapy	n/a	n/a	n/a	n/a	n/a	2113.0	2147			4260	n/a
Antifungal Days of Therapy	n/a	n/a	n/a	n/a	n/a	682.0	669			1351	n/a

Notes: * Due to an error in the Centricity Pharmacy data, we are unable to provide accurate DDD data and utilization cost for the CVICU for the 4th quarter of fiscal 11/12 and 1st quarter of fiscal 12/13. Use of Centricity data resumes effective 2nd quarter of fiscal 12/13.
** FY 11/12 Q4 and FY 12/13 Q1 Total Antimicrobial, Total Antibacterial and Total Antifungal Costs and DDD are taken from the estimated Centricity cost/DDD, which is 95% of the General Ledger (GL) cost/DDD.
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Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded
Data Sources: Antimicrobial DDD and Costs (Centricity)

An error in reporting the usage of ceftriaxone for Q1 and Q2 2012 was detected and reports have been adjusted to reflect actual usage. A dosage form of ceftriaxone (ceftriaxone 1g IV 50 mL bag) was not included in the original report. This was corrected in October 2012.

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TORONTO GENERAL HOSPITAL: CVICU

Indicators	FY 10/11 (Pre-ASP)	FY 11/12	FY 12/13	FY 13/14	FY14/15 Performance					YTD of Previous Year
					Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage & Costs										
Total Antimicrobial DDDs/100 Patient Days	105	98	102	97	113	97			105	91
Systemic Antibacterial DDDs/100 Patient Days	95	86	89	86	102	87			95	78
Systemic Antifungal DDDs/100 Patient Days	10	12	13	11	11	9			10	12
Total Antimicrobial Costs	$108,172	$108,464	$85,916	$100,736	$41,955	$35,869			$77,824	$46,547
Total Antimicrobial Costs/Patient Day	$18.20	$19.06	$14.99	$17.00	$25.82	$23.47			$24.68	$15.94
Systemic Antibacterial Costs	$100,375	$99,261	$74,232	$80,204	$22,588	$26,402			$48,990	$37,074
Systemic Antibacterial Costs/Patient Days	$16.89	$17.44	$12.95	$13.54	$13.90	$17.28			$15.54	$12.69
Systemic Antifungal Costs	$7,797	$9,204	$11,684	$20,532	$19,367	$9,467			$28,835	$9,474
Systemic Antifungal Costs/Patient Days	$1.31	$1.62	$2.04	$3.47	$11.92	$6.20			$9.15	$3.24
Patient Care Outcomes										
Hospital acquired C. difficile cases (rate per 1,000 pt days)	2 (0.34)	5 (0.88)	6 (1.05)	7 (1.18)	1 (0.62)	0 (0.0)			1 (0.32)	6 (2.05)
ICU Average Length of Stay (days)	3.12	2.95	2.97	3.20	3.04	3.65			3.34	3.08
ICU Mortality Rate (as a %)	3.5	3.0	3.0	4.6	3.5	6.3			4.8	3.6
ICU Readmission Rate within 48 hrs (as a %)	1.6	2.2	1.8	2.2	1.3	2.3			1.8	2.4
Central Line Infection Rate (per 1000 pt days)	0.73	0.17	0.34	0.16	0.0	0.64			0.3	0.00
Ventilator Associated Pneumonia Rate (per 1000 pt days)	2.99	2.80	1.91	1.73	2.69	4.00			3.31	2.02
ICU Multiple Organ Dysfunction Score (MODS)	6.22	6.07	5.51	5.77	5.70	5.60			5.65	5.76
ICU Ventilator Days	3015	3571	3676	4049	1116	1003			2119	1981
Antibacterial Days of Therapy	n/a	n/a	n/a	n/a	2113	2147			4260	n/a
Antifungal Days of Therapy	n/a	n/a	n/a	n/a	682	669			1351	n/a

Notes: * Due to an error in the Centricity Pharmacy data, we are unable to provide accurate DDD data and utilization cost for the CVICU for the 4th quarter of fiscal 11/12 and 1st quarter of fiscal 12/13. Use of Centricity data resumes effective 2nd quarter of fiscal 12/13. ** FY 11/12 Q4 and FY 12/13 Q1 Total Antimicrobial, Total Antibacterial and Total Antifungal Costs and DDD are taken from the estimated Centricity cost/DDD, which is 95% of the General Ledger (GL) cost/DDD. Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/)

Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded.

Data Sources: Antimicrobial DDD and Costs (Centricity) **An error in reporting the usage of ceftriaxone for Q1 and Q2 2012 was detected and reports have been adjusted to reflect actual usage. A dosage form of ceftriaxone (ceftriaxone 1g IV 50 mL bag) was not included in the original report. This was corrected in October 2012.

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

MOUNT SINAI HOSPITAL: NICU

Indicators	FY 11/12	FY 12/13	FY 13/14	FY14/15 Performance					YTD of Previous Year
				Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage & Costs									
Total Antimicrobial DOTs/100 Patient Days	67.3	55.4	49.4	31.0	36.2			33.7	52.8
Systemic Antibacterial DOTs/100 Patient Days	65.1	53.5	48.7	30.8	36.0			33.5	52.2
Systemic Antifungal DOTs/100 Patient Days	2.2	1.8	0.7	0.3	0.2			0.2	0.6
Total Antimicrobial Costs	$16,415	$17,682	$26,162	$4,945	$6,038			$10,982	$11,851
Total Antimicrobial Costs/Patient Day	$1.31	$1.51	$2.17	$1.26	$1.42			$1.34	$2.10
Systemic Antibacterial Costs	$14,783	$16,505	$25,290	$4,939	$5,597			$10,536	$11,740
Systemic Antibacterial Costs/Patient Days	$1.18	$1.41	$2.10	$1.26	$1.31			$1.29	$2.08
Systemic Antifungal Costs	$1,632	$1,177	$872	$5	$441			$446	$111
Systemic Antifungal Costs/Patient Days	$0.13	$0.10	$0.07	$0.001	$0.10			$0.06	$0.02

Notes:
Effective January 15, 2014, the NICU changed to a mixed-acuity model of care. Prior to this, ASP reported Level 3 pharmacy data only. As of January 15, pharmacy data includes both level 2 and level 3 usage and cost. Patient days include both level 2 and 3 days; January level 2 days were determined by dividing the total days for the month by 2, since the change occurred midway through the month.
Days of Therapy (DOT) was used as the metric for antimicrobial consumption, which is considered to be the standard for neonates.
Patient Care Outcome data is underway.

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

TORONTO GENERAL SITE: GIM

Indicators	FY 12/13 (Q2-4)	FY 13/14	FY14/15 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage & Costs								
Total Antimicrobial DDDs/100 Patient Days	87	83	72	70			71	86
Systemic Antibacterial DDDs/100 Patient Days	77	70	66	62			64	72
Systemic Antifungal DDDs/100 Patient Days	11	13	6	8			7	14
Total Antimicrobial Costs	$279,644	$471,342	$55,318	$69,655			$124,973	$284,083
Total Antimicrobial Costs/Patient Day	$14.10	$18.05	$8.12	$10.25			$9.18	$21.99
Systemic Antibacterial Costs	$171,817	$225,491	$37,386	$54,197			$91,583	$110,290
Systemic Antibacterial Costs/Patient Days	$8.67	$8.64	$5.49	$7.97			$6.73	$8.54
Systemic Antifungal Costs	$107,827	$245,851	$17,941	$15,458			$33,398	$173,794
Systemic Antifungal Costs/Patient Days	$5.44	$9.42	$2.63	$2.27			$2.45	$13.45
Patient Care Outcomes								
Hospital acquired C. Difficile cases (rate per 1,000 patient days)	15 (0.76)	16 (0.61)	5 (0.73)	6 (0.88)			11 (1.14)	5 (0.39)

Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/).
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded.
FY 12/13 reported starting Q2 due to error in Centricity data.
Data Sources: Antimicrobial DDD and Costs (Centricity).
An error in reporting the usage of ceftriaxone for Q1 and Q2 2012 was detected and reports have been adjusted to reflect actual usage. A dosage form of ceftriaxone (ceftriaxone 1g IV 50 mL bag) was not included in the original report. This was corrected in October 2012.

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

TORONTO WESTERN SITE: GIM

Indicators	FY 12/13 (Q2-4)	FY 13/14	FY14/15 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage & Costs								
Total Antimicrobial DDDs/100 Patient Days	44	47	42	43			43	52
Systemic Antibacterial DDDs/100 Patient Days	41	44	40	40			40	49
Systemic Antifungal DDDs/100 Patient Days	3	3	2	3			2	3
Total Antimicrobial Costs	$74,737	$115,919	$26,879	$29,457			$56,335	$66,231
Total Antimicrobial Costs/Patient Day	$4.36	$5.01	$3.30	$3.45			$3.38	$5.81
Systemic Antibacterial Costs	$60,999	$93,779	$26,480	$28,490			$54,970	$51,435
Systemic Antibacterial Costs/Patient Days	$3.56	$4.05	$3.26	$3.34			$3.30	$4.51
Systemic Antifungal Costs	$13,738	$22,140	$399	$967			$1,365	$14,796
Systemic Antifungal Costs/Patient Days	$0.80	$0.96	$0.05	$0.11			$0.08	$1.30
Patient Care Outcomes								
Hospital acquired C. Difficile cases (rate per 1,000 patient days)	7 (0.41)	14 (0.6)	2 (0.25)	2 (0.23)			4 (0.24)	8 (0.7)

Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/).
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded.
FY 12/13 reported starting Q2 due to error in Centricity data.
Data Sources: Antimicrobial DDD and Costs (Centricity).
An error in reporting the usage of ceftriaxone for Q1 and Q2 2012 was detected and reports have been adjusted to reflect actual usage. A dosage form of ceftriaxone (ceftriaxone 1g IV 50 mL bag) was not included in the original report. This was corrected in October 2012.

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

MOUNT SINAI HOSPITAL: GIM

Indicators	FY 12/13 (Q2-4)	FY 13/14	FY14/15 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage & Costs								
Total Antimicrobial DDDs/100 Patient Days	58	45	50	53			51	45
Systemic Antibacterial DDDs/100 Patient Days	53	41	43	49			46	42
Systemic Antifungal DDDs/100 Patient Days	3	3	5	4			4	2
Total Antimicrobial Costs	$125,012	$123,737	$34,962	$36,096			$71,058	$64,151
Total Antimicrobial Costs/Patient Day	$5.74	$3.76	$4.10	$4.15			$4.13	$4.03
Systemic Antibacterial Costs	$105,621	$99,731	$24,251	$30,922			$55,173	$48,442
Systemic Antibacterial Costs/Patient Days	$4.85	$3.03	$2.84	$3.56			$3.20	$3.04
Systemic Antifungal Costs	$15,422	$20,153	$9,106	$4,740			$13,847	$14,588
Systemic Antifungal Costs/Patient Days	$0.71	$0.61	$1.07	$0.55			$0.80	$0.92
Patient Care Outcomes								
Hospital acquired C. Difficile cases (rate per 1,000 patient days)	16 (0.64)	8 (0.32)	4 (0.62)	1 (0.17)			5 (0.41)	5 (0.41)

Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/).
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs + systemic antivirals; non-systemic antimicrobials are excluded.
Data Sources: Antimicrobial DDD and Costs (Pharmnet), C difficile (Infection Control Dashboards).

An error in reporting the usage of ceftriaxone for Q1 and Q2 2012 was detected and reports have been adjusted to reflect actual usage. A dosage form of ceftriaxone (ceftriaxone 1g IV 50 mL bag) was not included in the original report. This was corrected in October 2012.

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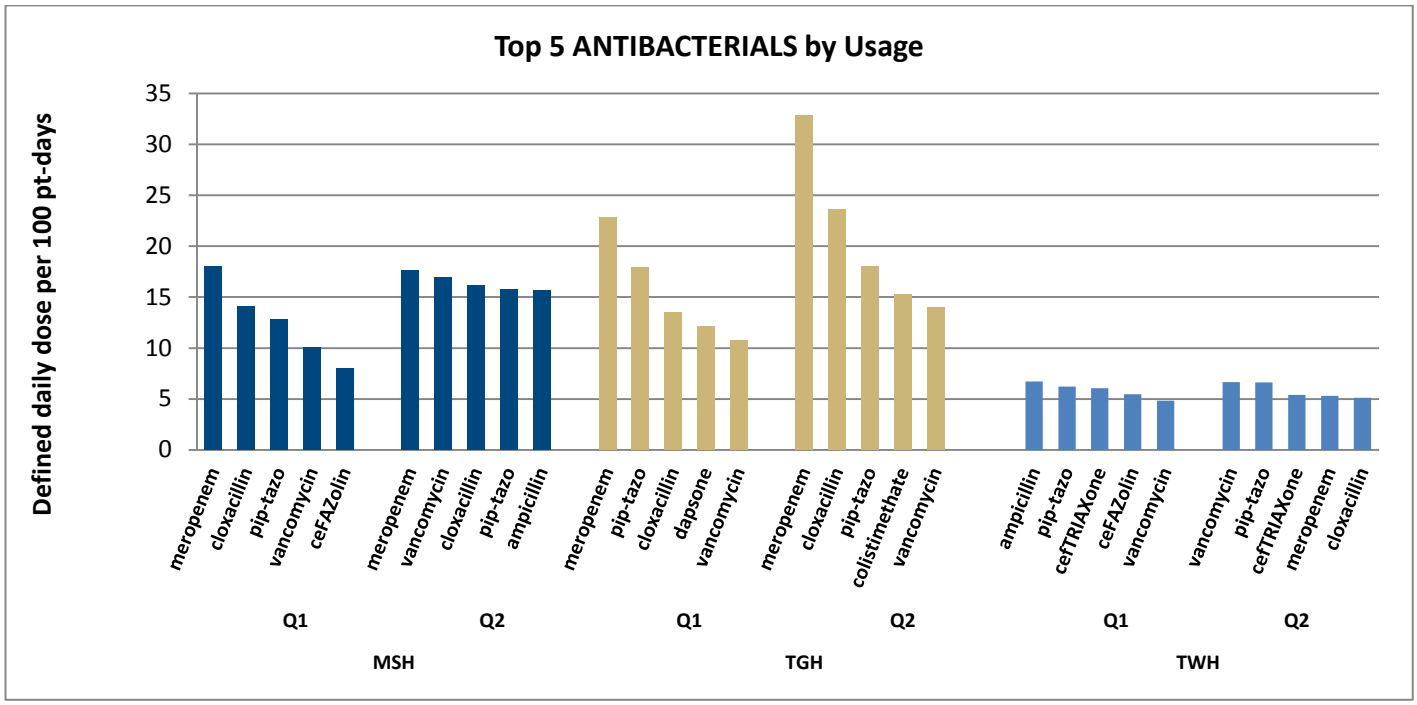
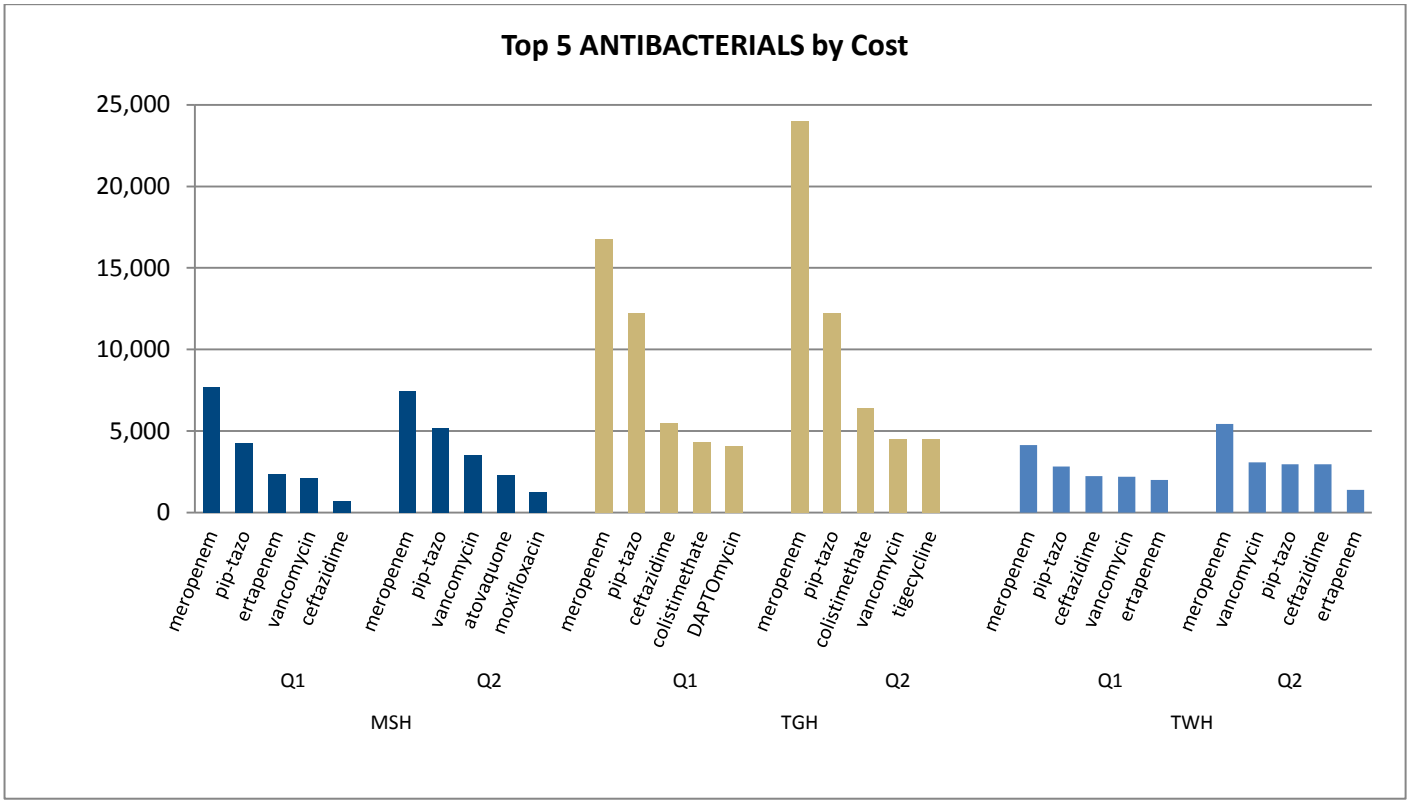
PRINCESS MARGARET CANCER CENTRE: LEUKEMIA SERVICE (14A, 15A, 15B)

Indicators	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY14/15 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage & Costs											
Total Antimicrobial DDDs/100 Patient Days	295	270	239	250	255	232	266			249	260
Systemic Antibacterial DDDs/100 Patient Days	191	163	134	146	128	132	145			139	142
Systemic Antifungal DDDs/100 Patient Days	104	107	105	104	121	100	120			110	119
Total Antimicrobial Costs	$1,768,317	$1,641,331	$1,310,857	$1,695,539	$1,534,499	$368,143	$425,519			$793,662	$754,853
Total Antimicrobial Costs/Patient Day	$167.12	$154.32	$115.13	$128.91	$117.10	$104.68	$116.14			$110.52	$116.10
Systemic Antibacterial Costs	$659,034	$609,747	$663,175	$422,438	$485,263	$107,426	$131,409			$238,835	$247,741
Systemic Antibacterial Costs/Patient Days	$62.28	$57.33	$58.24	$45.85	$38.25	$30.54	$35.86			$33.26	$38.30
Systemic Antifungal Costs	$1,109,283	$1,031,584	$647,637	$1,092,448	$1,049,236	$260,718	$294,110			$554,828	$507,111
Systemic Antifungal Costs/Patient Days	$104.84	$96.99	$56.88	$83.06	$86.54	$74.13	$80.27			$77.26	$77.99
Patient Care Outcomes											
Hospital acquired C. Difficile cases (rate per 1,000 patient days)	6 (0.56)	7 (0.65)	14 (1.17)	5 (0.51)	11 (0.84)	2 (0.57)	3 (0.82)			5 (0.70)	4 (0.62)

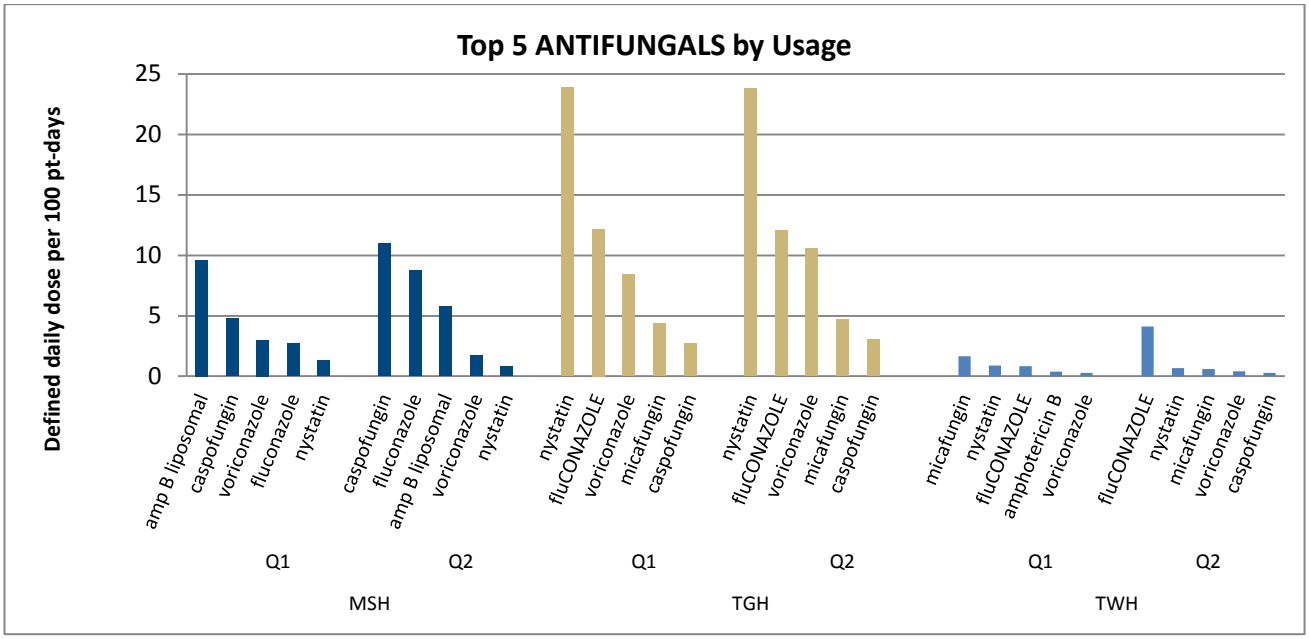
Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/).
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded.
Data Sources: Antimicrobial DDD and Costs (Centricity)

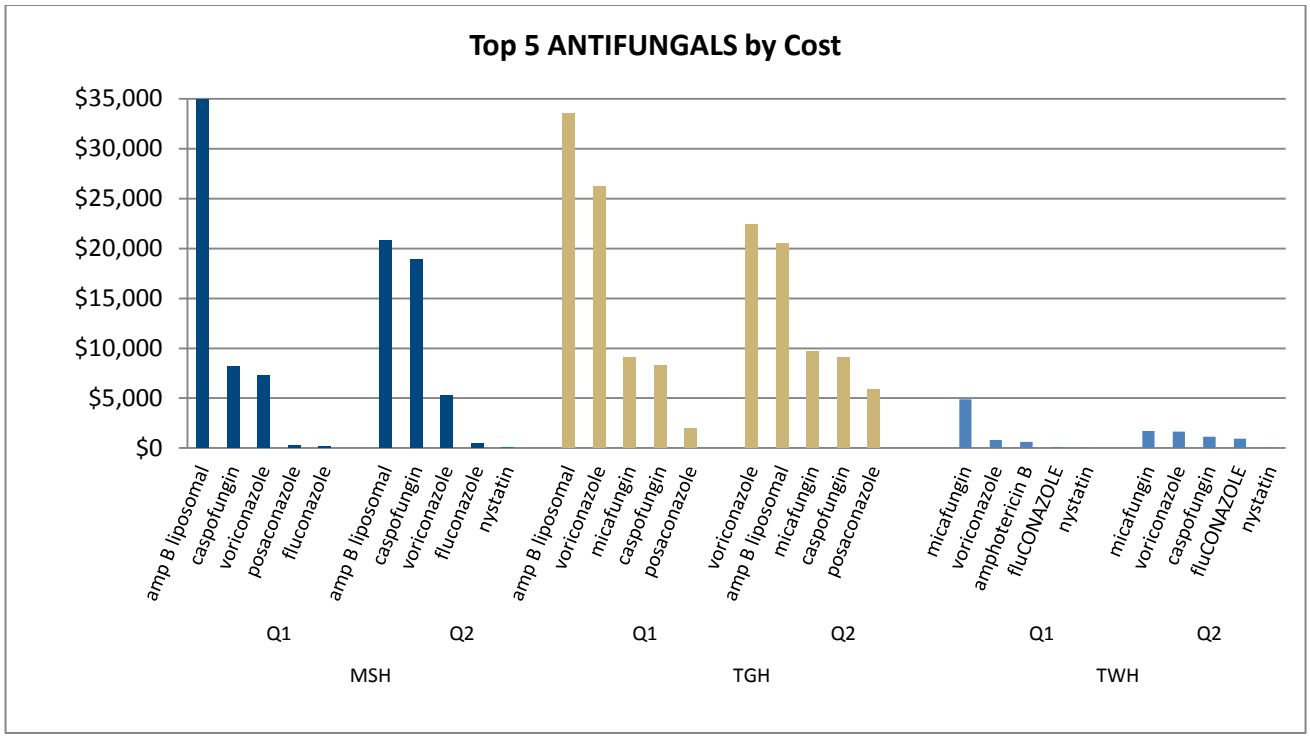
FY 14/15 Q1-Q2 Top 5 ANTIBACTERIALS by Usage (DDDs per 100 patient-days) and Expenditures by ICU Site



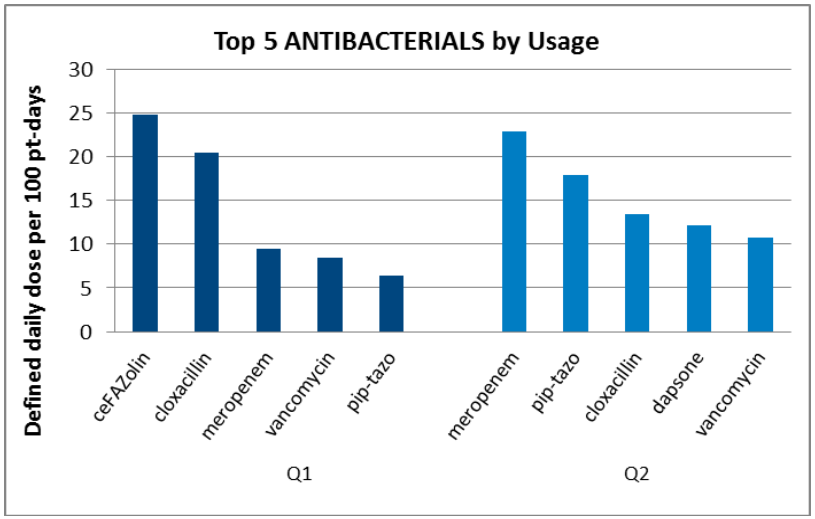


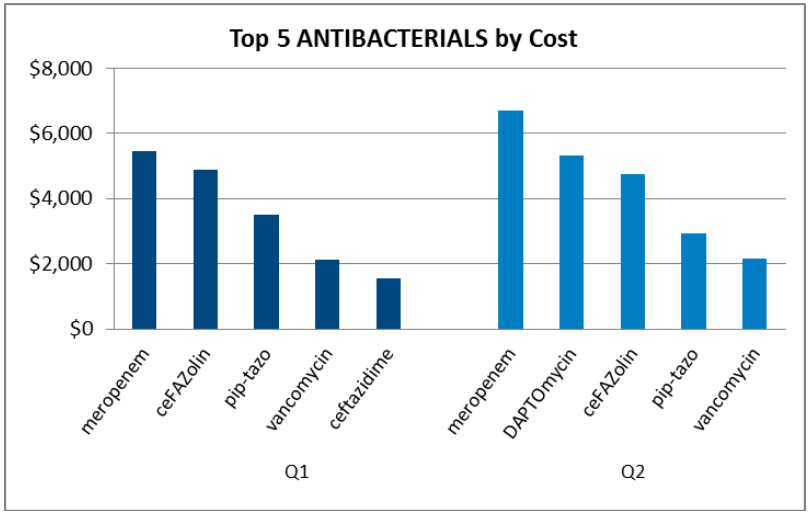
FY 14/15 Q1-Q2 Top 5 ANTIFUNGALS by Usage (DDDs per 100 patient-days) and Expenditures by ICU Site



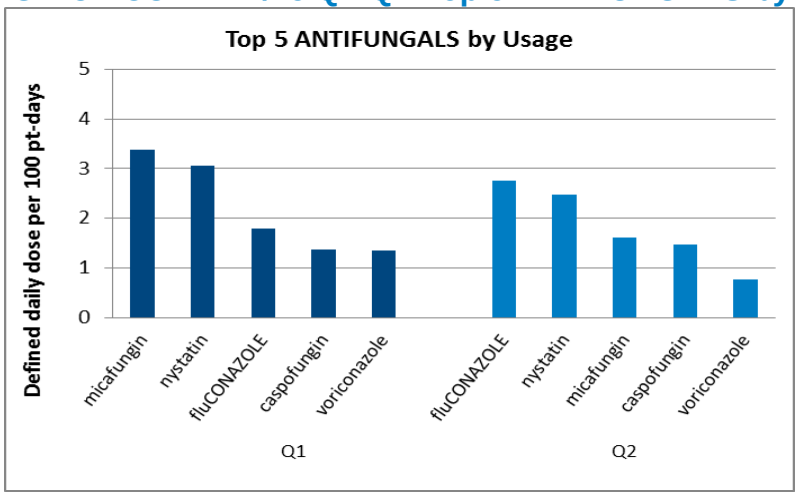


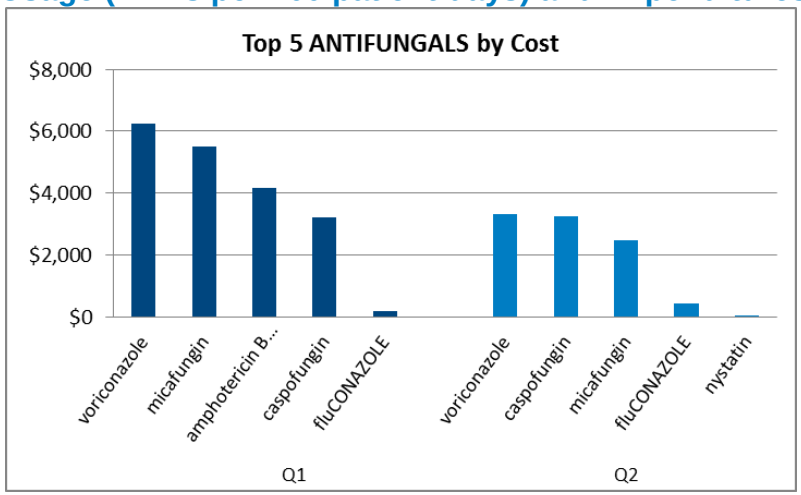
TGH CVICU FY 14/15 Q1-Q2 Top 5 ANTIBACTERIALS by Usage (DDDs per 100 patient-days) and Expenditures



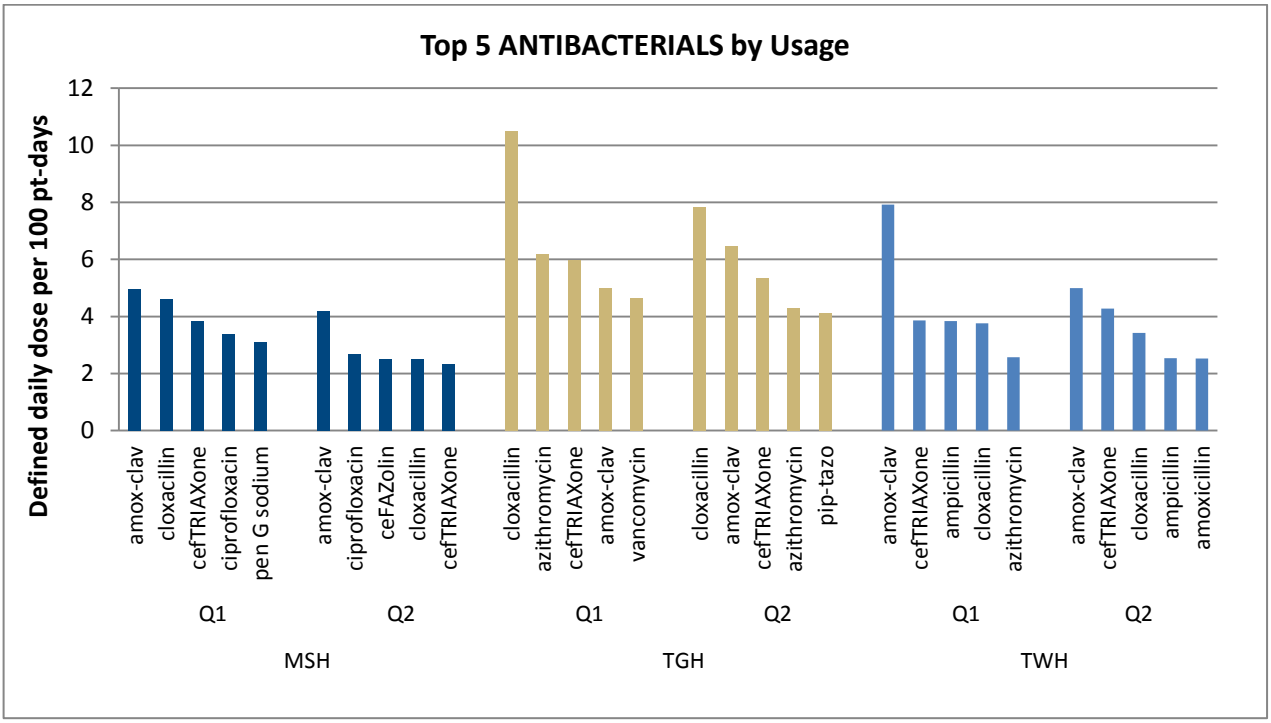


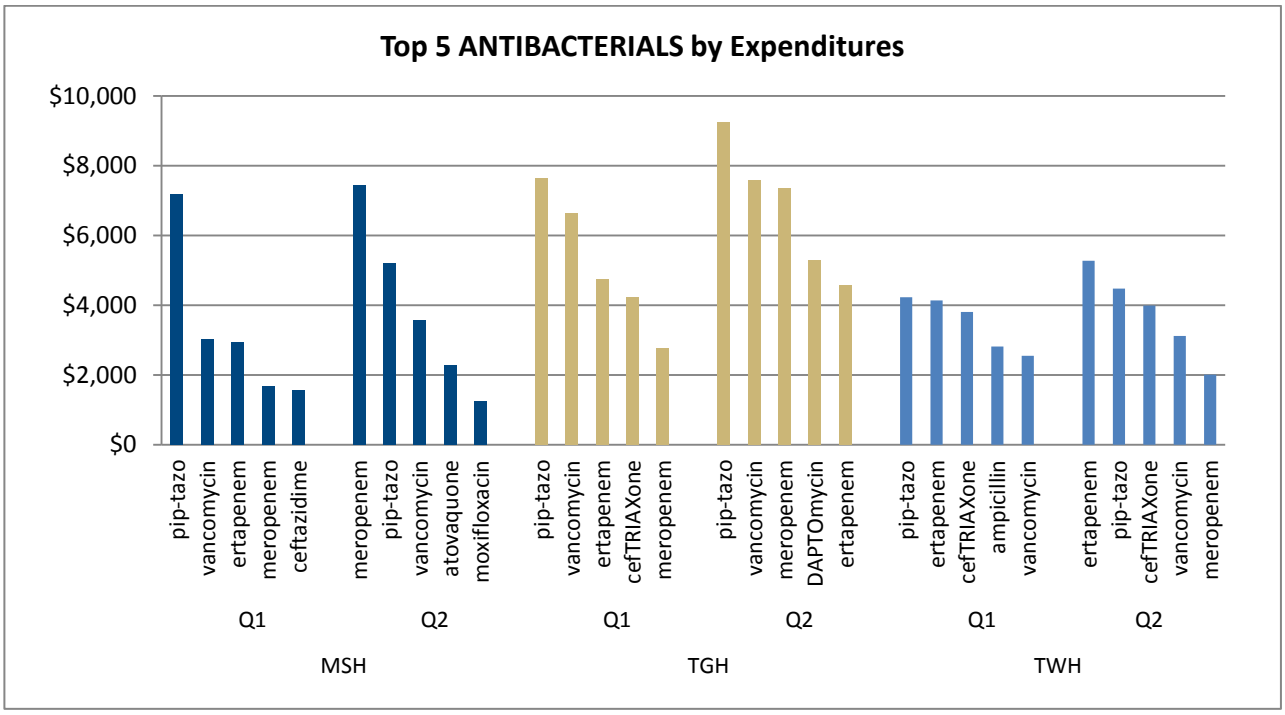
TGH CVICU FY 14/15 Q1-Q2 Top 5 ANTIFUNGALS by Usage (DDDs per 100 patient-days) and Expenditures





General Internal Medicine FY 14/15 Q1-Q2 Top 5 ANTIBACTERIALS by Usage (DDDs per 100 patient-days) and Expenditure





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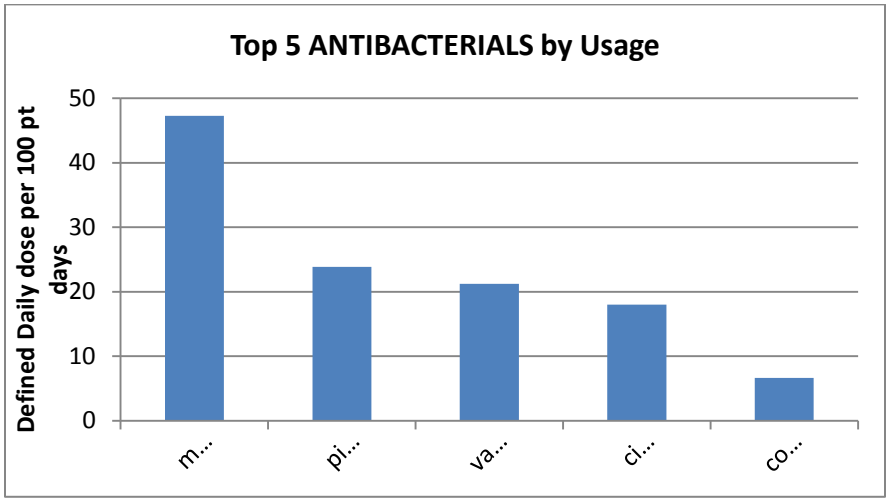
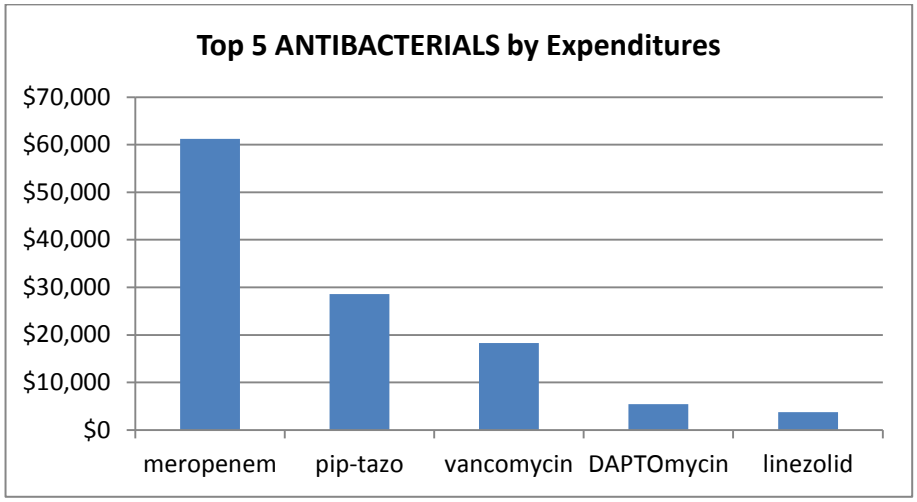
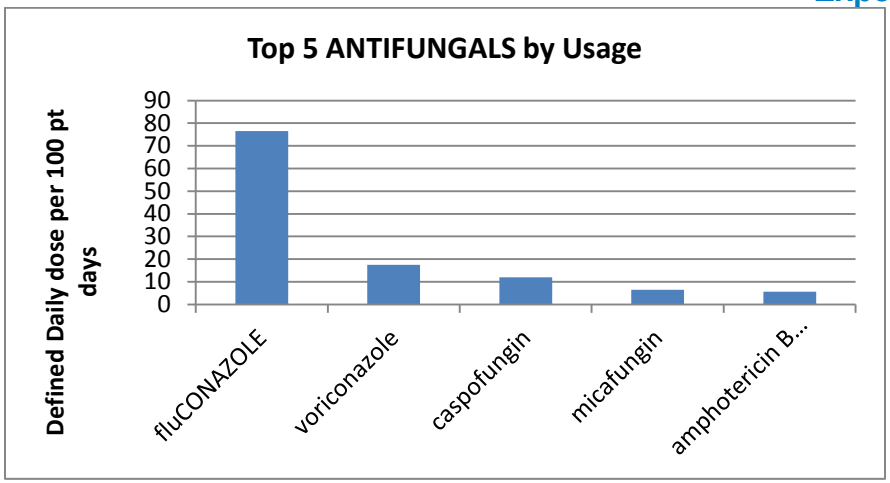
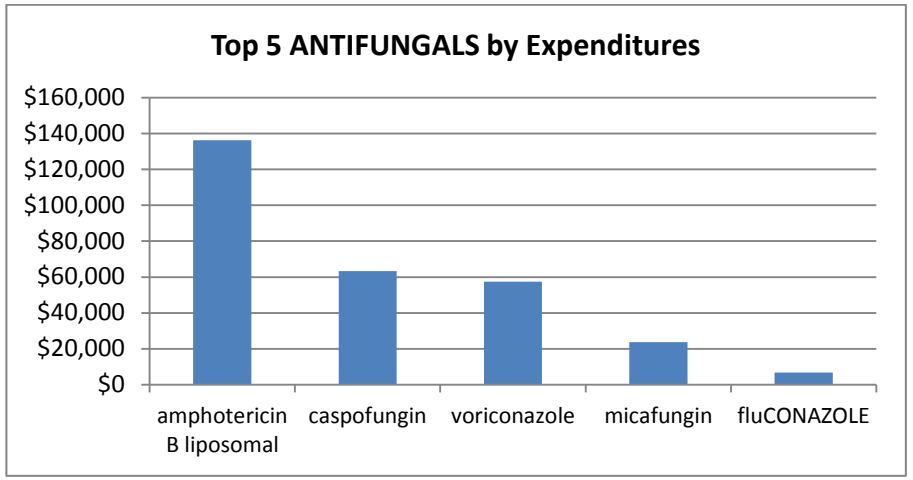
PM Leukemia FY 14/15 Q2 Top 5 ANTIBACTERIALS by Usage (DDDs per 100 patient-days) and Expenditures





PM Leukemia FY 14/15 Q2 Top 5 ANTIFUNGALS by Usage (DDDs per 100 patient-days) and Expenditures Expenditure

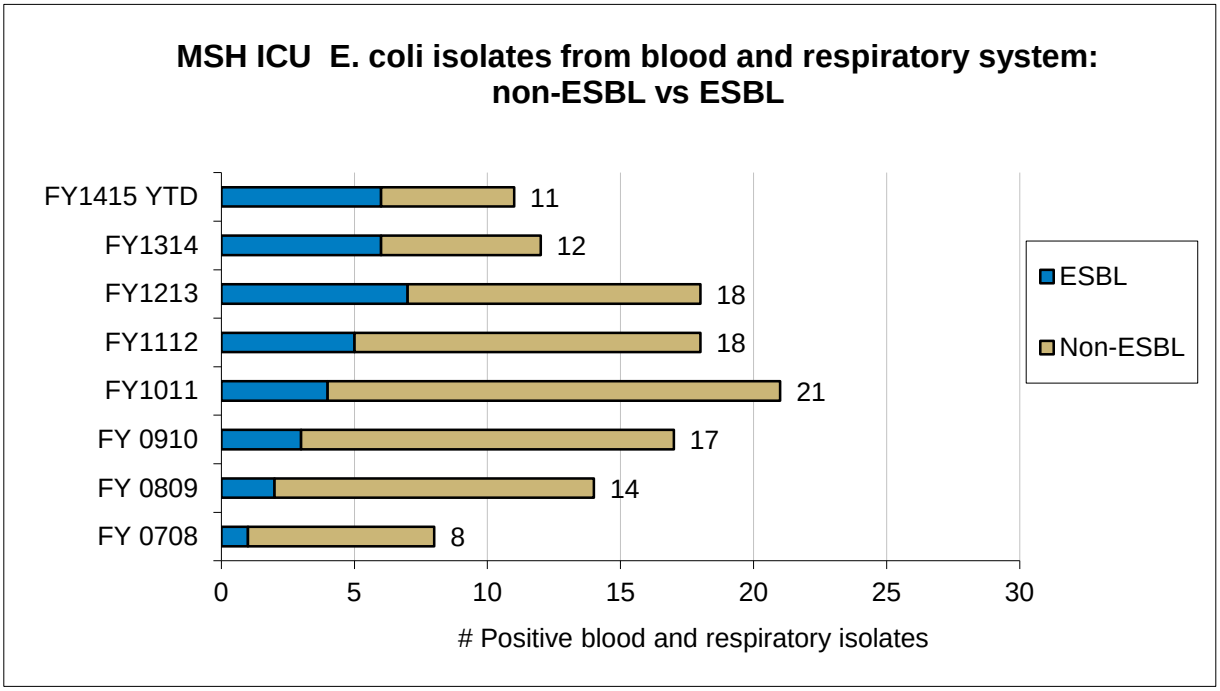




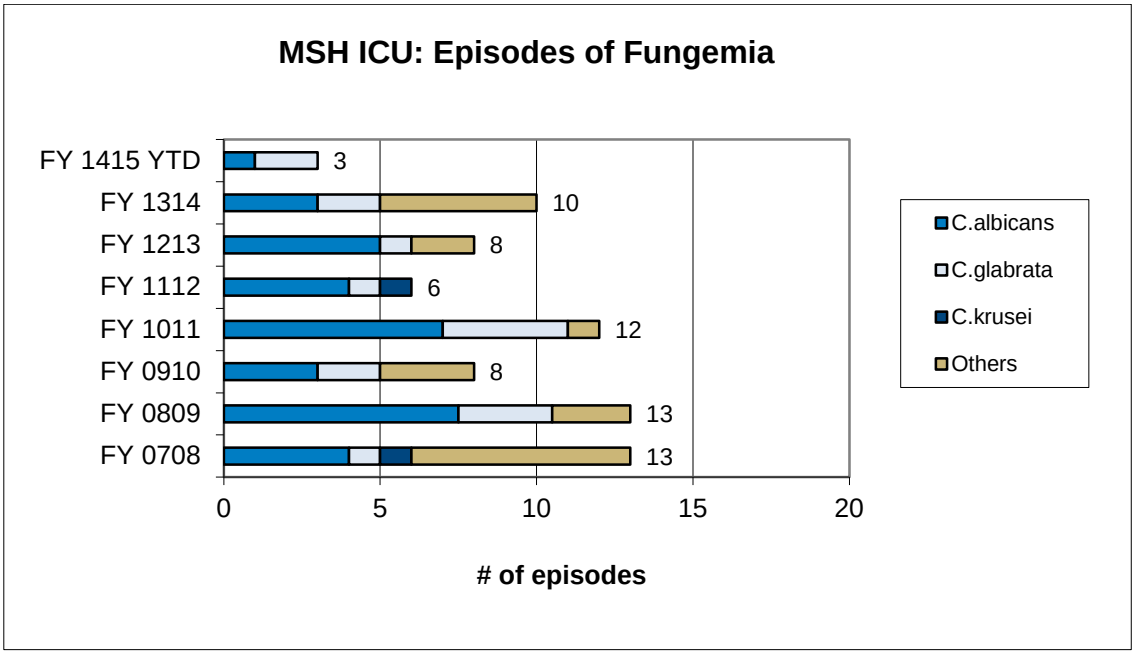
MOUNT SINAI HOSPITAL Joseph and Wolf Lebovic Health Complex

UHN Toronto General Toronto Western Princess Margaret Toronto Rehab

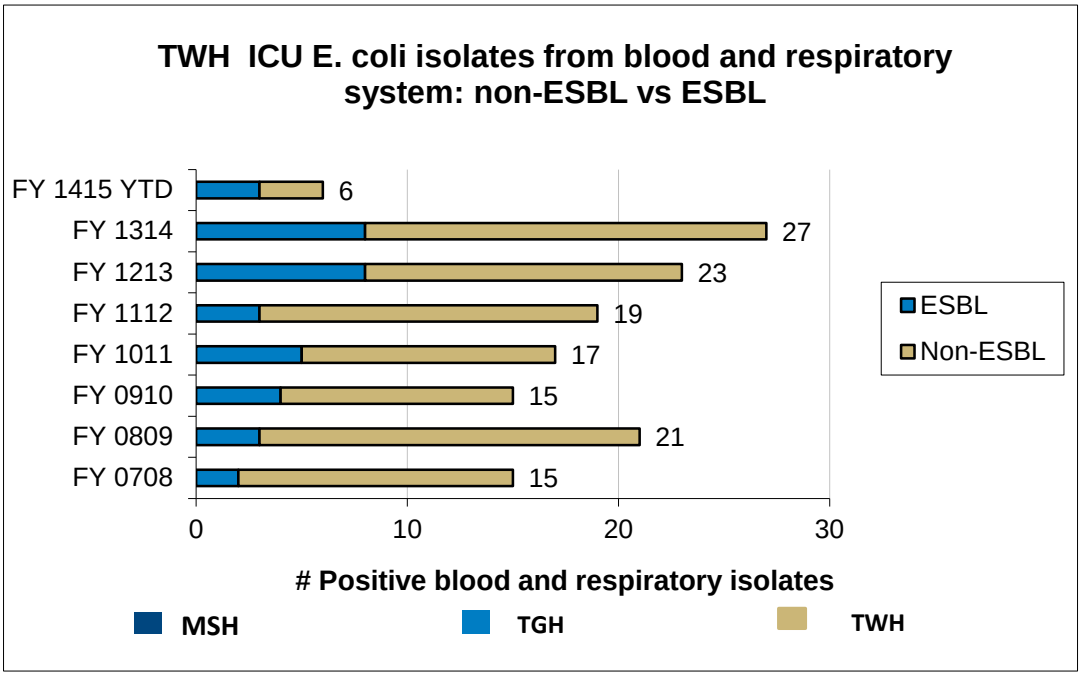
Antimicrobial Susceptibility and Pathogen Surveillance
E.Coli isolates: Blood and Respiratory



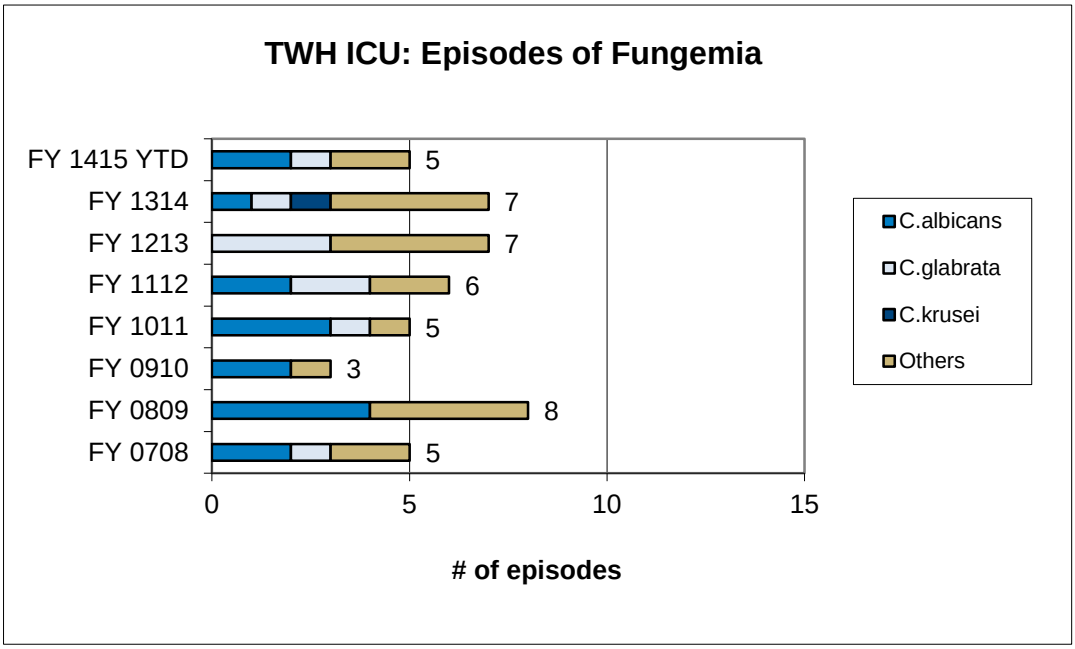
Yeast Species Isolated in Blood – MSH ICU



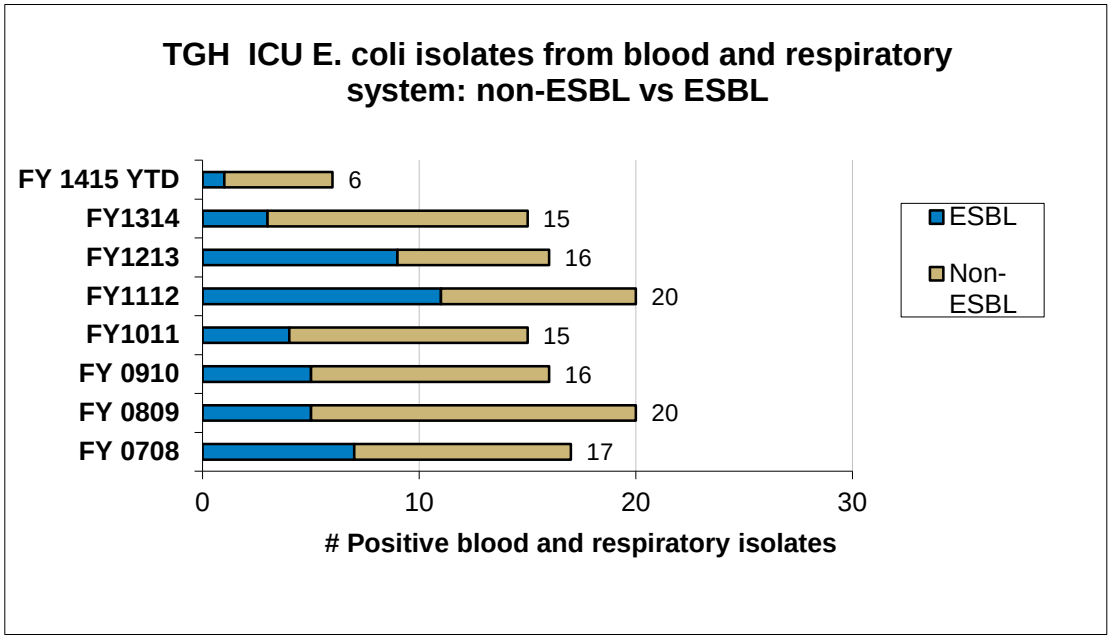
Antimicrobial Susceptibility and Pathogen Surveillance
E.Coli isolates: Blood and Respiratory



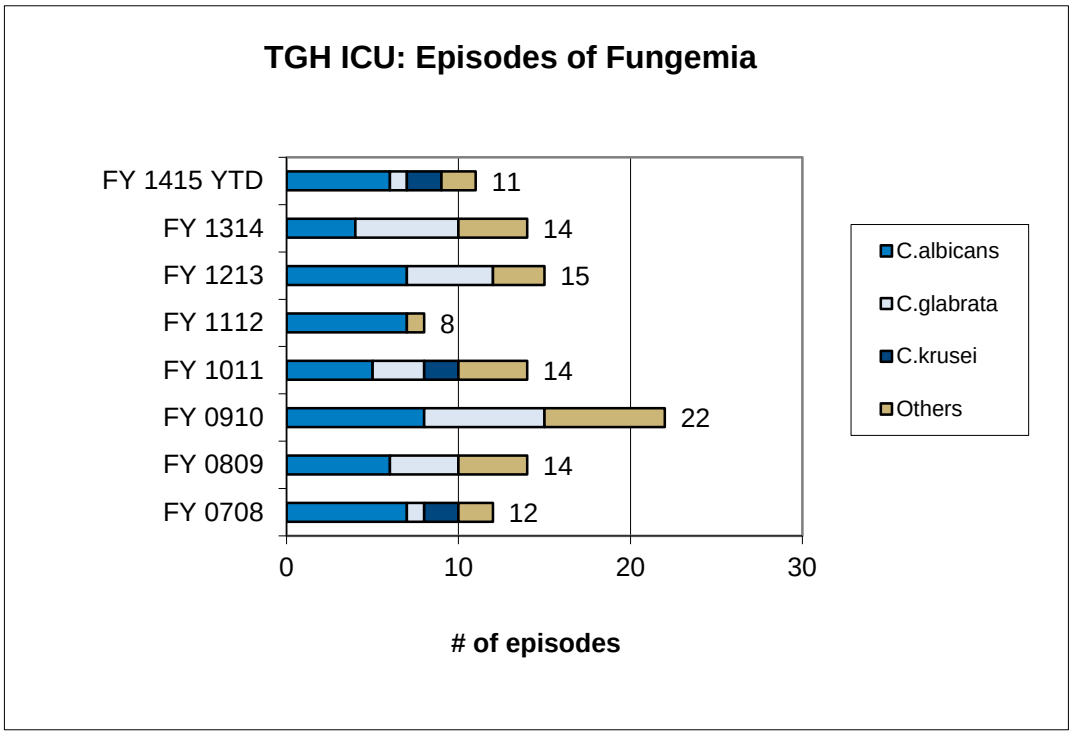
Yeast Species Isolated in Blood – TWH ICU



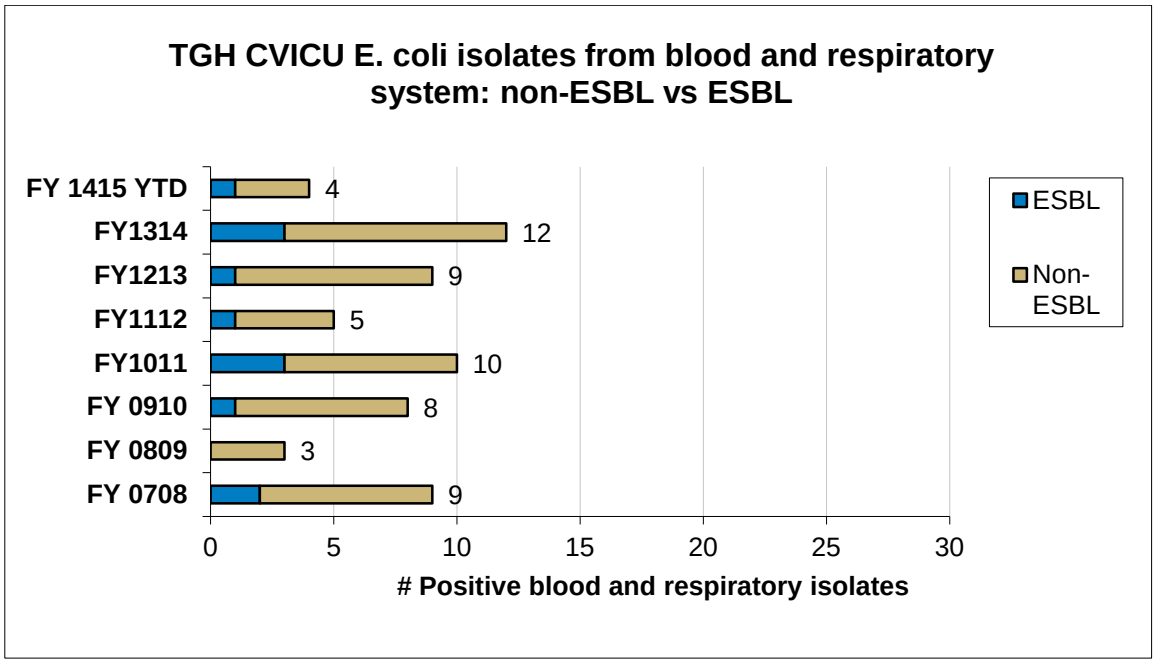
Antimicrobial Susceptibility and Pathogen Surveillance
E.Coli isolates: Blood and Respiratory



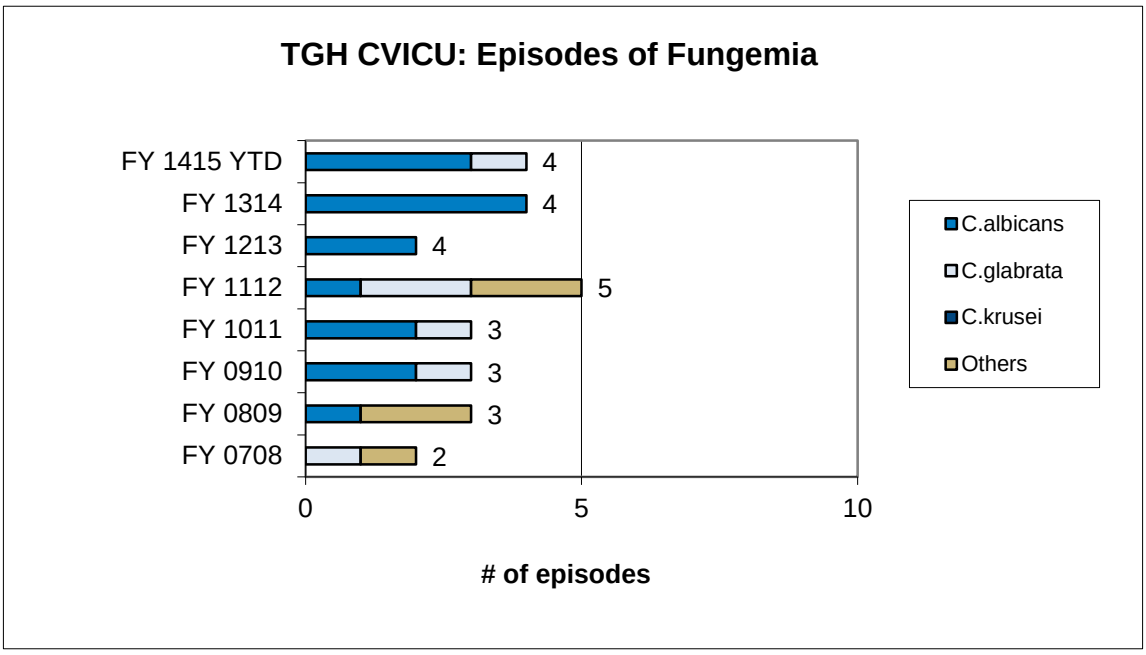
Yeast Species Isolated in Blood



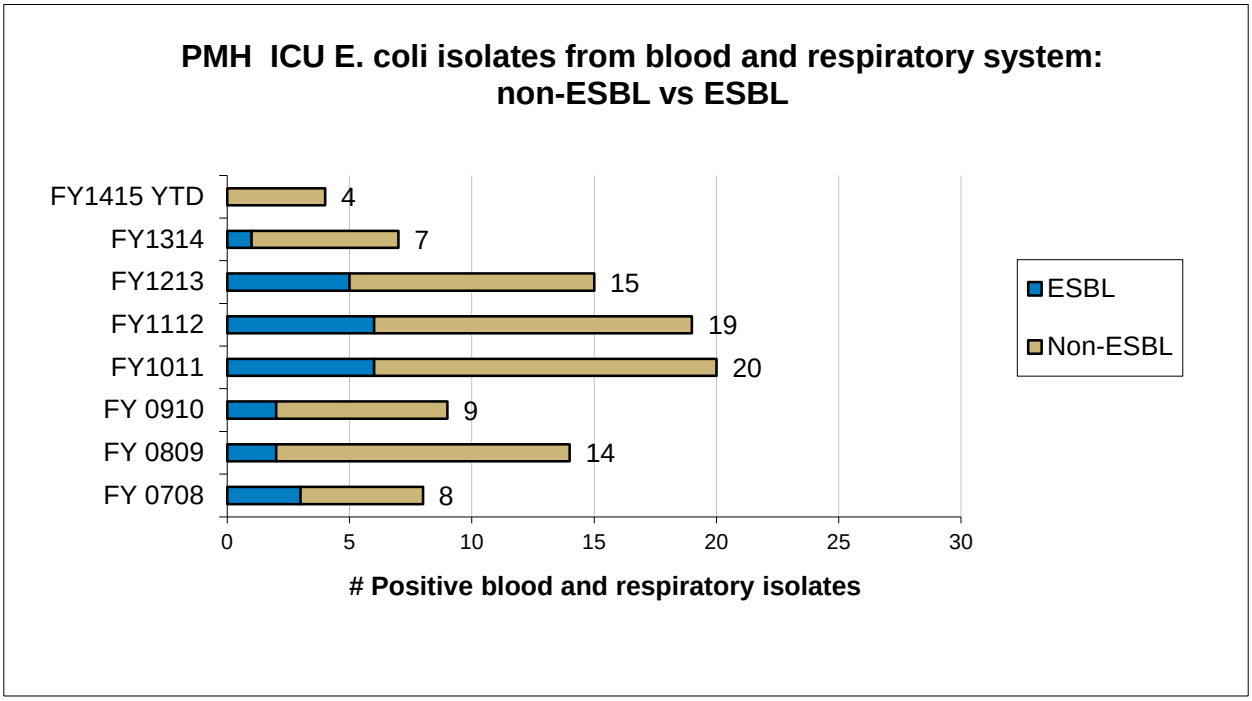
Antimicrobial Susceptibility and Pathogen Surveillance
E.Coli isolates: Blood and Respiratory



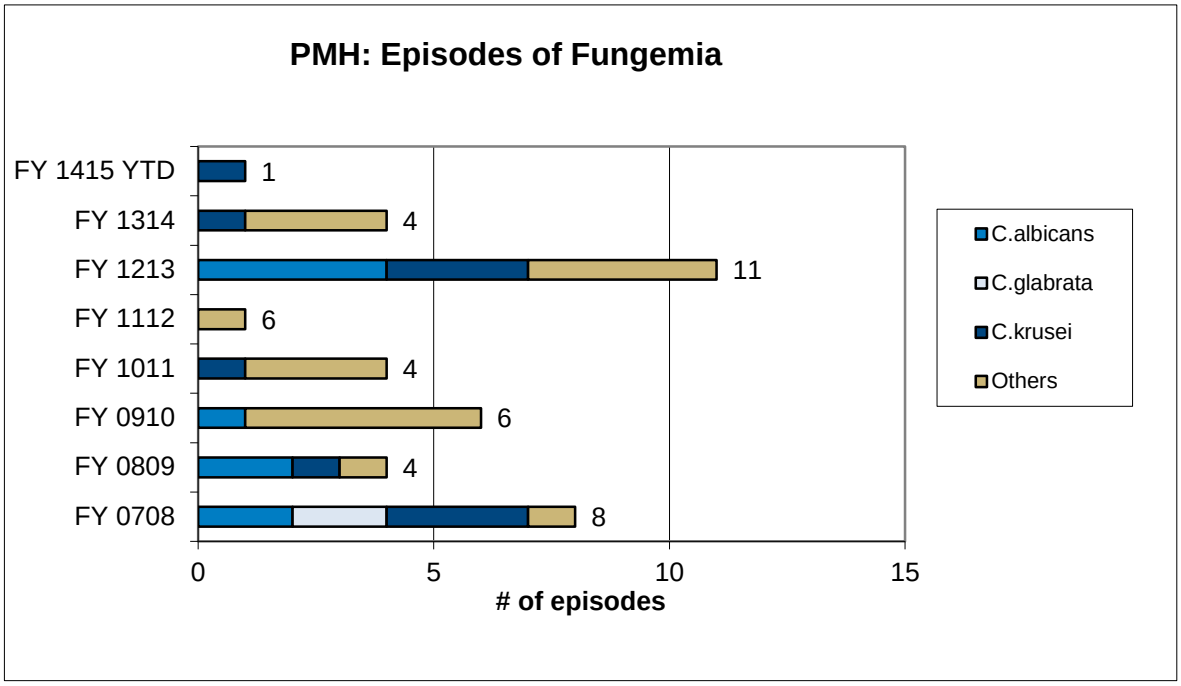
Yeast Species Isolated in Blood



Antimicrobial Susceptibility and Pathogen Surveillance
E.Coli isolates: Blood and Respiratory



Yeast Species Isolated in Blood



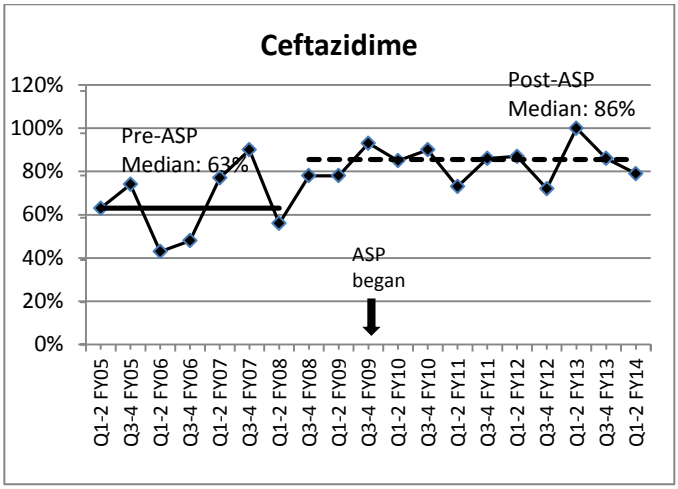
MSH ICU Total Antimicrobial Costs

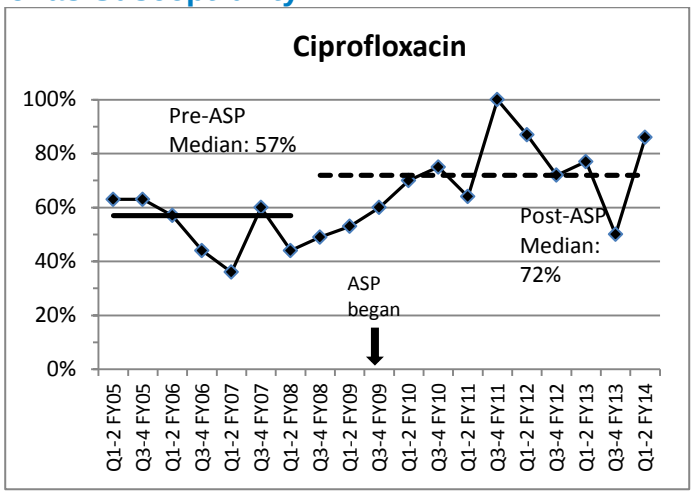
MSH ICU Total Antimicrobial Costs (Antimicrobial Costs per patient day)										
	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15 Q1	FY 14/15 Q2	FY 14/15 Q3	FY 14/15 Q4	FY 14/15 YTD	Previous YTD
Non-PMH Patients	$78,737 ($21.14)	$87,931 ($25.42)	$109,283 ($31.77)	$149,877 ($37.54)	$43,634 ($42.24)	$43,620 ($67)			$87,254 ($51.78)	$53,543 ($29.65)
PMH Patients	$114,392 ($179.02)	$191,928 ($181.58)	$182,188 ($249.91)	$272,757 ($317.16)	$29,861 ($271.46)	$31,222 ($156.89)			$61,082 ($197.68)	$138,573 ($309.31)
Total	$193,129 ($44.26)	$279,859 ($61.97)	$291,470 ($69.91)	$422,634 ($87.11)	$73,753 ($64.19)	$74,842 ($88.05)			$148,595 ($74.33)	$311,395 ($88.59)

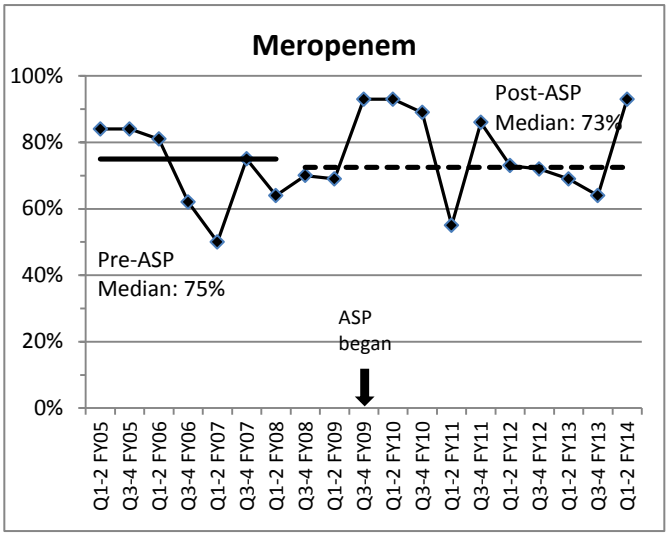
Note: 14/15 is open year data; totals and cost per day may change based on coding changes. Antimicrobial costs from PharmNet; ICU visits and patient days from CIHI DAD Database.

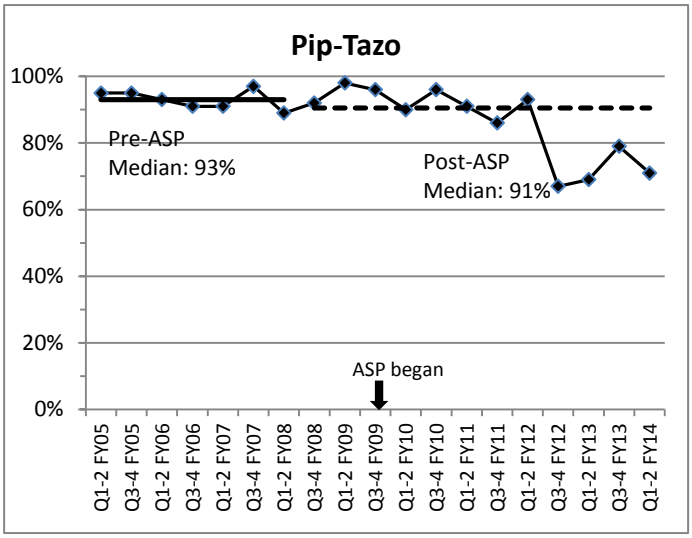
MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

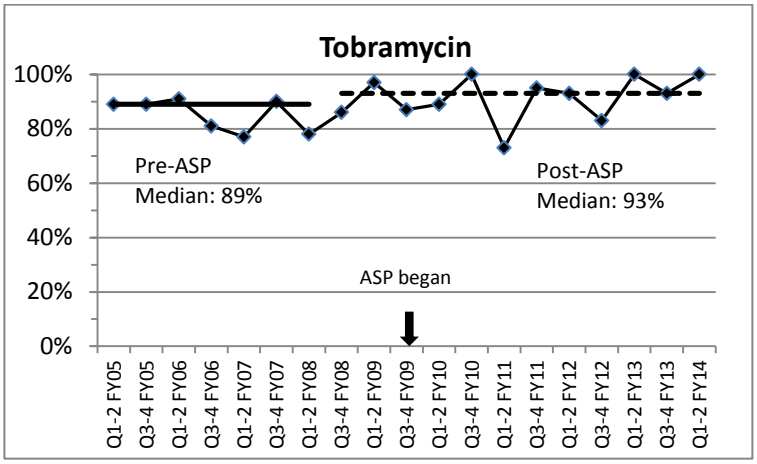
MSH ICU Pseudomonas Susceptibility







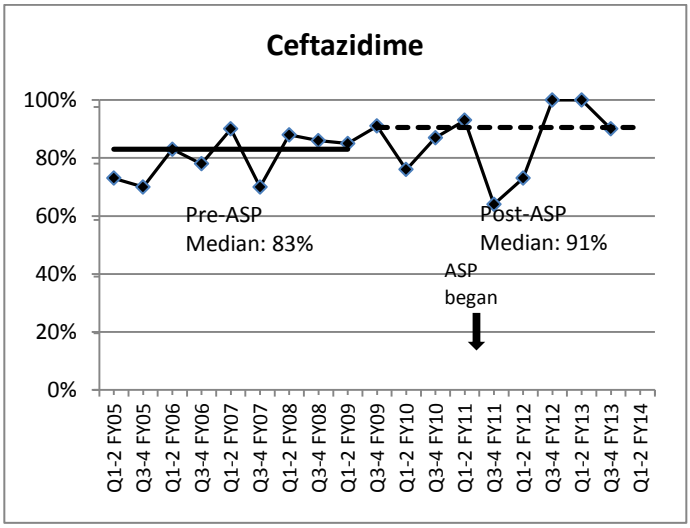


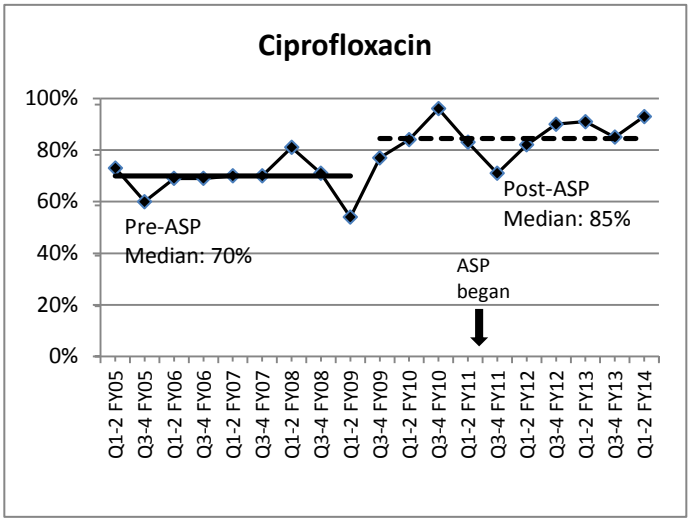


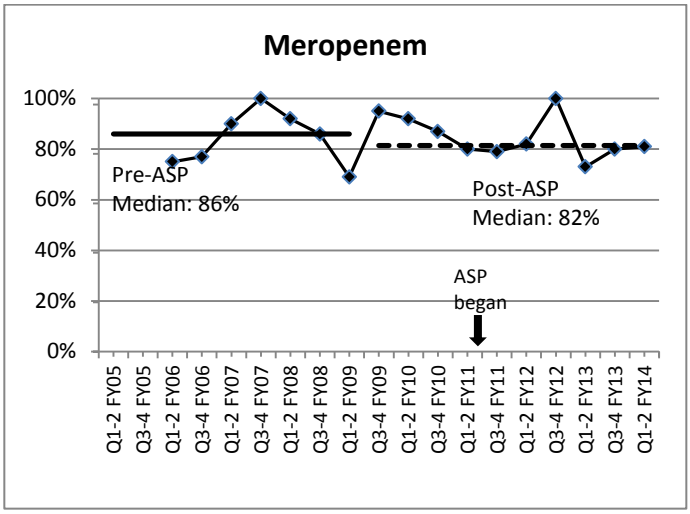
MOUNT SINAI HOSPITAL Joseph and Wolf Lebovic Health Complex

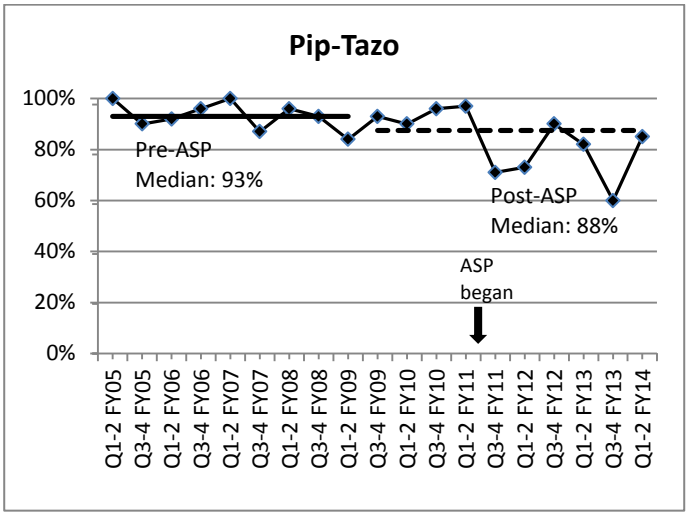
UHN Toronto General Toronto Western Princess Margaret Toronto Rehab

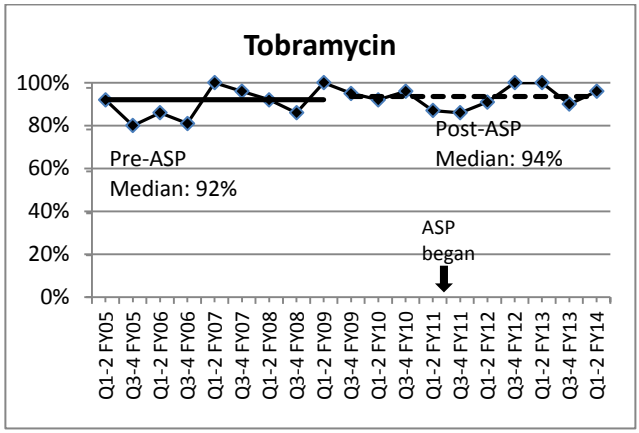
TWH ICU Pseudomonas Susceptibility





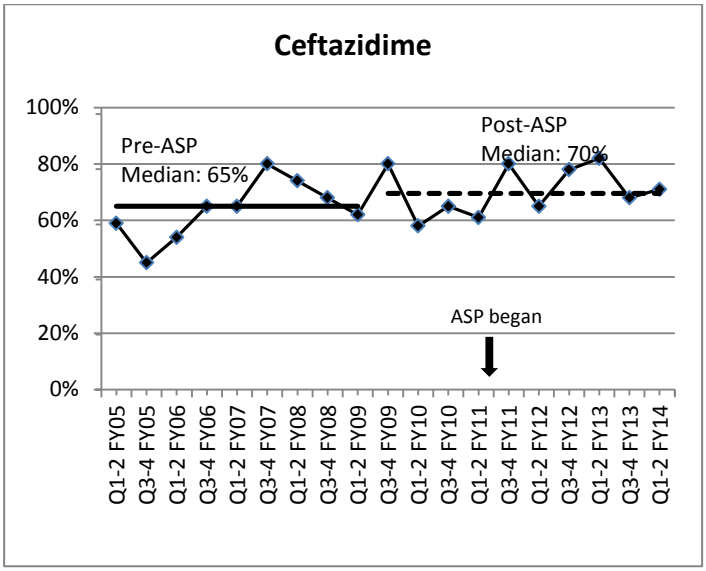




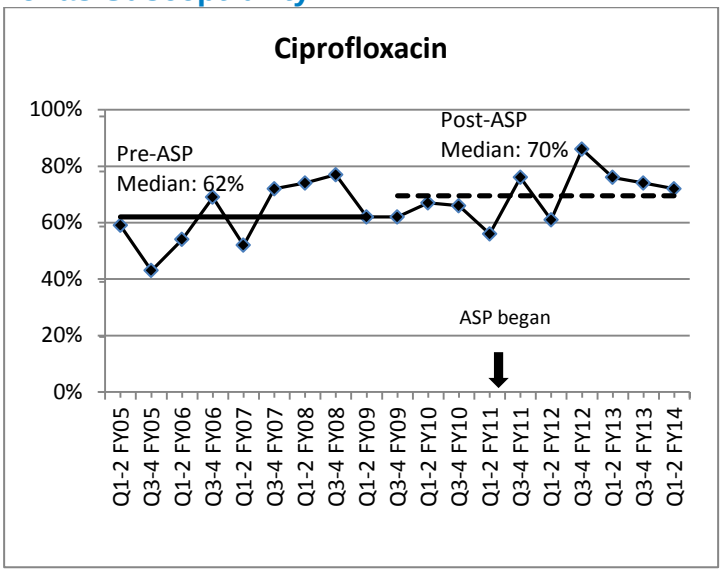


TGH MSICU Pseudomonas Susceptibility

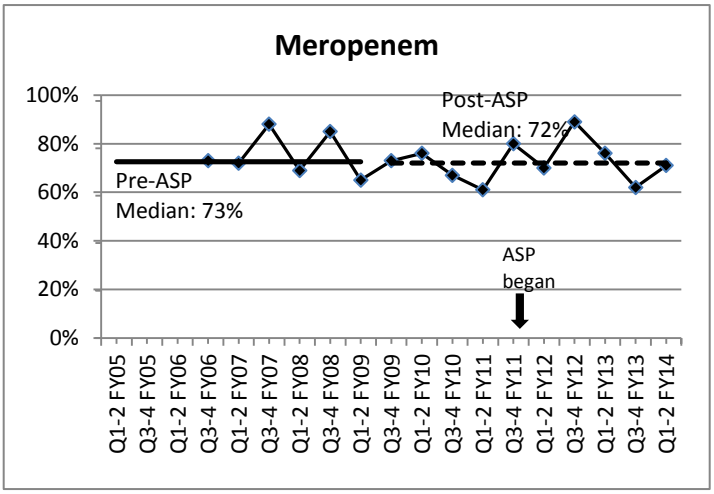
Ceftazidime



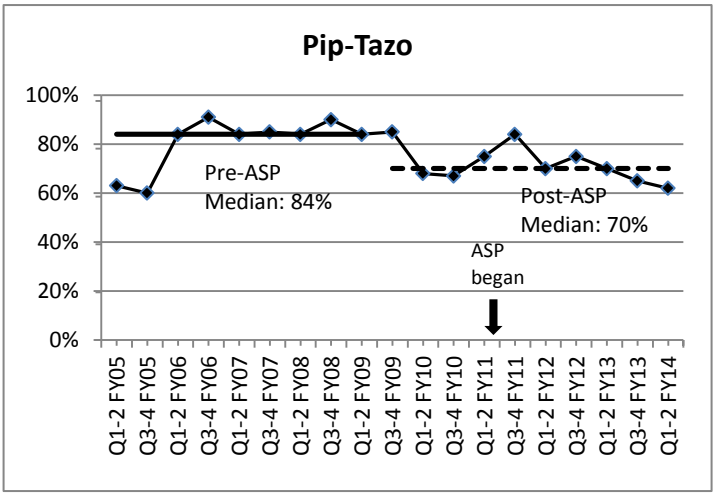
Ciprofloxacin



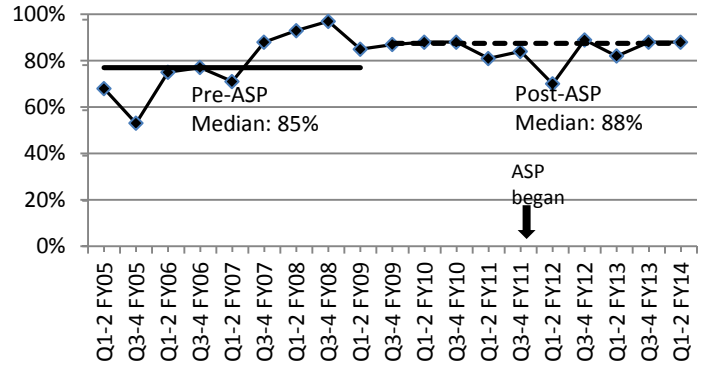
Meropenem



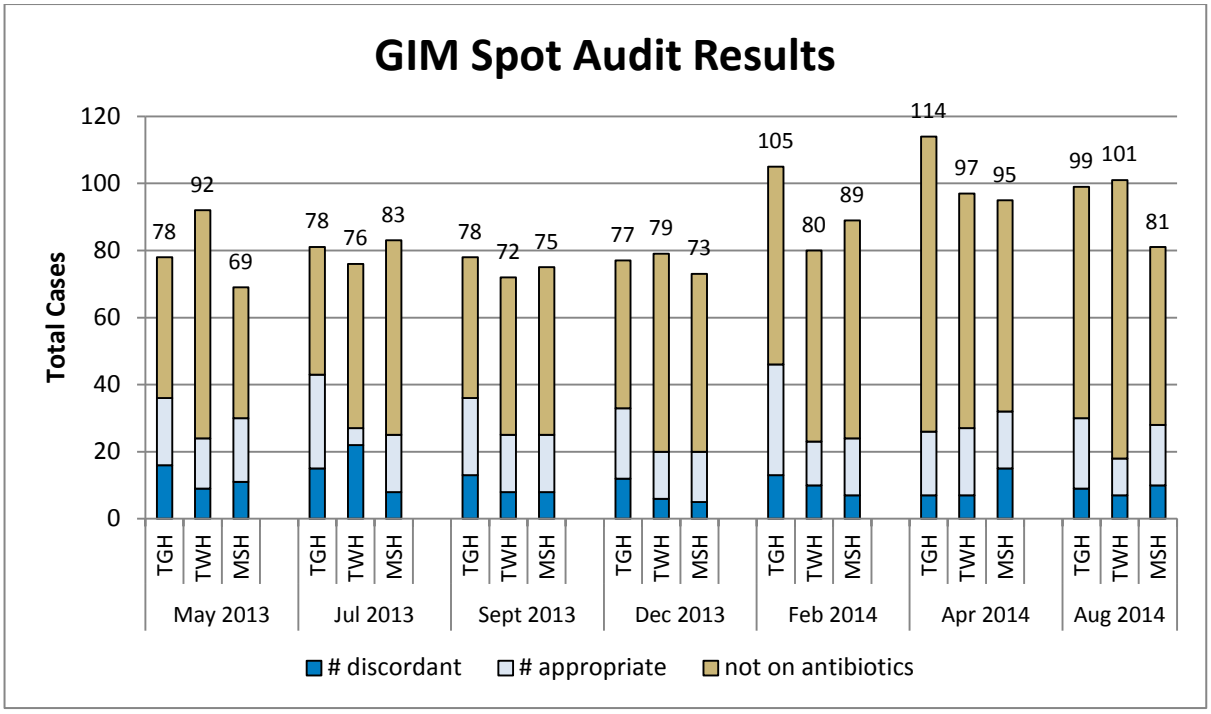
Pip-Tazo



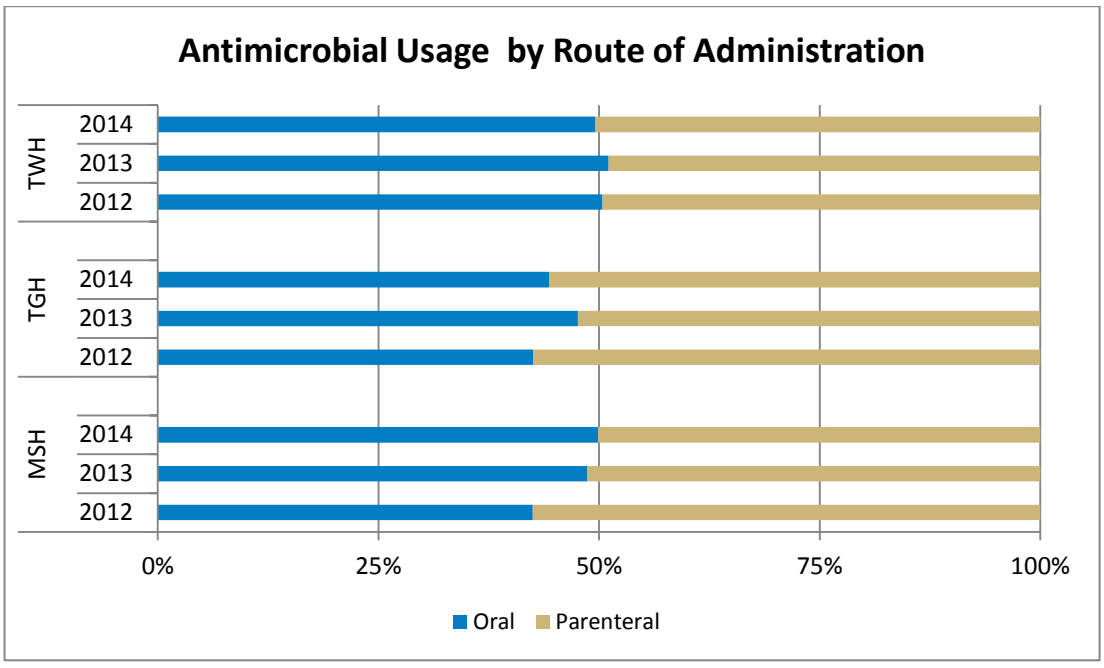
Tobramycin



GIM Spot Audit Results by Site



Antimicrobial Usage by Route of Administration (Total Antimicrobials)



Princess Margaret Cancer Centre:
Febrile Neutropenia Drugs of Select Antimicrobials in 4 Rolling Quarters