



FISCAL YEAR 2015 | 2016 Q2 REPORT



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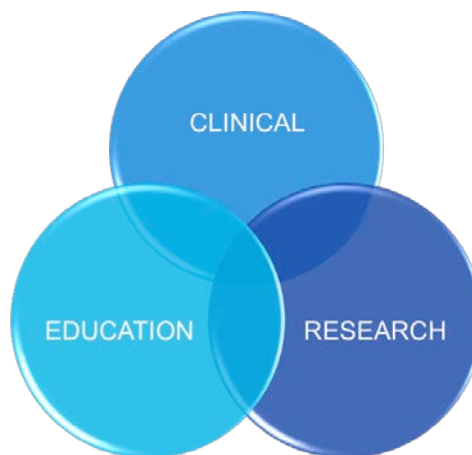
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“Getting patients the right antibiotics, when they need them”

EXECUTIVE SUMMARY

The Mount Sinai Hospital-University Health Network Antimicrobial Stewardship Program (MSH-UHN ASP) was established in 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 data-driven quality improvement methodology to pursue the best possible clinical outcomes for its patients.



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

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). We have begun working with Bridgepoint Health now that it is part of Sinai Health System.

In our last Quarterly Report, we introduced for the first time a graphic of Defined Daily Doses (DDD) together with Days of Therapy (DOT). DDD continues to be extracted from hospital pharmacy databases and electronic health record; DOT is extracted from the Provincial Critical Care Information System (CCIS). We continue to observe that these two metrics are closely related. However, as stated previously, using lower or higher doses of antimicrobials will result in a corresponding change in DDD without any change in DOT (i.e. in patients with renal dysfunction, extremes of body mass, or central nervous system infections.)

There is a general trend of decreased consumption and costs in our ICUs, with the exception of the Toronto General and Toronto Western ICUs. The inpatient General Internal Medicine (GIM) wards are showing a reduction in antimicrobial consumption and cost compared to last year's Q2 YTD. There is also a decrease in expenditures and consumption in Allogeneic Bone Marrow Transplant at Princess Margaret Cancer Centre and in the Leukemia ward.

Table 1: Summary of Antimicrobial Usage and Cost by Hospital/Unit

Hospital/Unit	Antimicrobial Usage	Antimicrobial Cost
Mount Sinai Hospital: Medical Surgical ICU	↓	↓
Mount Sinai Hospital: Neonatal ICU	↓	↓
Toronto General Hospital: Cardiovascular ICU	↓	↓
Toronto General Hospital: Medical Surgical ICU	↑	↑
Toronto Western Hospital: Medical Surgical Neurosurgical ICU	↑	↑
Mount Sinai Hospital: General Internal Medicine	↓	↓
Toronto General Hospital: General Internal Medicine	↓	↓
Toronto Western Hospital: General Internal Medicine	↑	↓
Princess Margaret Cancer Centre: Leukemia Service	↓	↓
Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant	↓	↓



Decrease compared to previous YTD



Increase of < 10% compared to previous YTD



Increase of > 10% compared to previous YTD

FISCAL YEAR 15/16 Q2 HIGHLIGHTS

Research – Published In This Quarter

In Q2, four manuscripts from our group were published in peer-reviewed medical journals.

- Thampi N, Showler A, Burry L, Bai AD, Steinberg M, Ricciuto DR, Bell CM, Morris, AM. Multicenter Study of Healthcare Costs of Patients Admitted to Hospital with *Staphylococcus aureus* Bacteremia. *Am J Infect Control*. 2015;**43**(7):739-44

- Bai AD, Burry L, Showler A, Steinberg M, Ricciuto D, Fernandes T, Chiu A, Raybardhan S, Tomlinson G, Bell CM, Morris AM. Usefulness of previous screening for methicillin-resistant *Staphylococcus aureus* in guiding empiric therapy for *S. aureus* bacteremia. *Can J Infect Dis Med Microbiol.* 2015;**26**(4):201-206
- Showler A, Burry L, Bai AD, Steinberg M, Ricciuto DR, Fernandes T, Chiu A, Raybardhan S, Science M, Fernando E, Bell CM, Morris AM. Use of transthoracic echocardiography in the management of low-risk *Staphylococcus aureus* bacteremia: results from a retrospective multicenter cohort study. *J Am Coll Cardiol Img.* 2015;**8**(8):924-931
- Jeffs L, Thampi N, Maoine M, Steinberg M, Morris AM, Bell CM. A Qualitative Analysis of Implementation of Antimicrobial Stewardship at 3 Academic Hospitals: Understanding the Key Influences to Success. *Can J Hosp Pharm.* 2015;**68**(5):395-400

Best Practices


Several algorithms have been developed, including the **First Episode *Clostridium Difficile* Infection (CDI) Management Algorithm**, which was implemented into practice across UHN and MSH, along with electronic order sets to support the use of the algorithm. TGH, TWH, and PM inpatients were audited for adherence to the CDI Management Algorithm. Education on the CDI algorithm includes in-the-moment education to primary nurses caring for patients with CDI, educational in-services to multidisciplinary clinicians, and promotion of the CDI eLearning module. During increased CDI activity and outbreaks in inpatient units, additional educational in-services on the CDI algorithm were provided, as well as monitoring and feedback of antimicrobial use. The CDI algorithm is currently being reformatted based on clinician and project stakeholders' feedback. The revised formatting is based on Human Factors Engineering and will be easier to navigate and print for frontline clinicians. The reformatted algorithm will be complete in the coming months.

ASP nurse-focused initiative aimed at reducing overtreatment of **Asymptomatic Bacteriuria**: Key deliverables of this initiative include an updated policy on urine cultures, audit, and feedback to pilot units and educational sessions and urine culture surveys to assess nurse behaviour and sentiment practices towards urine cultures. The updated policy was approved and is currently in practice. Educational sessions were provided to over 70% of nurses on pilot units, along with audit and feedback to support knowledge translation.

Provincial and National Role: In August, national health leaders were drawn to Mount Sinai Hospital and University Health Network to visit the MSH-UHN ASP to better understand antimicrobial stewardship and for a behind-the-scenes look at the program and our current ASP strategies. The visiting group consisted of Dr. Gregory Taylor, Canada's Chief Public Health Officer, Krista Outhwaite, President of the Public Health Agency of Canada, Dr. Theresa Tam, Deputy Chief Public Health Officer, Karen Michell, Executive Director, Council of Academic Hospitals of Ontario, and HealthCareCAN's CEO, Bill Tholl. They visited several key locations at MSH and UHN and met with various clinicians and senior leadership. The goal of this visit was to shine a light on best practices in antimicrobial stewardship and help facilitate their spread across the country. As a result of this meeting, the MSH-UHN ASP was featured at the G7 Health Ministers meeting in Germany and

has helped inform our national health leaders of the possibilities of a Pan-Canadian strategy on Antimicrobial Stewardship and Resistance.

The MSH-UHN ASP continues to be a leader in antimicrobial stewardship and is currently working with and providing expert guidance to over 30 hospitals, as well as to SASS (Students for

Antimicrobial Stewardship Society  STUDENTS FOR ANTIMICROBIAL STEWARDSHIP SOCIETY).

We continue to partner with **Accreditation Canada** in the development and delivery of an **online ASP course** and a series of interactive group webinars. The third cohort has completed the on-line course, and the course will continue to be offered for 2016.

FISCAL YEAR 15/16 Q2 RESULTS

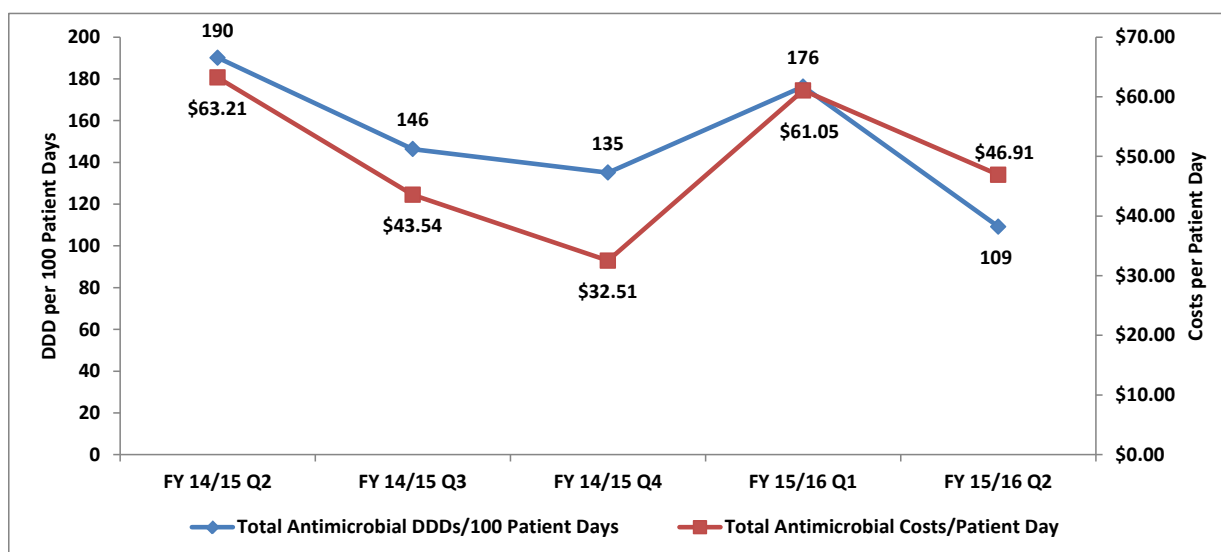
CRITICAL CARE

Mount Sinai Hospital: Medical Surgical ICU

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 20.9% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 22.1% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 23.1% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 28.0% compared to YTD last year.
- NB: Princess Margaret patients accounted for 13% of patient visits and 70% of the antimicrobial costs.

Mount Sinai Hospital: Medical Surgical ICU Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 1: FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 Patient Days) and Expenditures by ICU Site**, please click [here](#).

Mount Sinai Hospital: Medical Surgical ICU Antimicrobial Consumption as Defined Daily Dose versus Antimicrobial Consumption as Days of Therapy

- Antibacterial Days of Therapy (DOT) per 100 patient days decreased (↓) by 6.0% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days decreased (↓) by 5.7% compared to YTD last year.

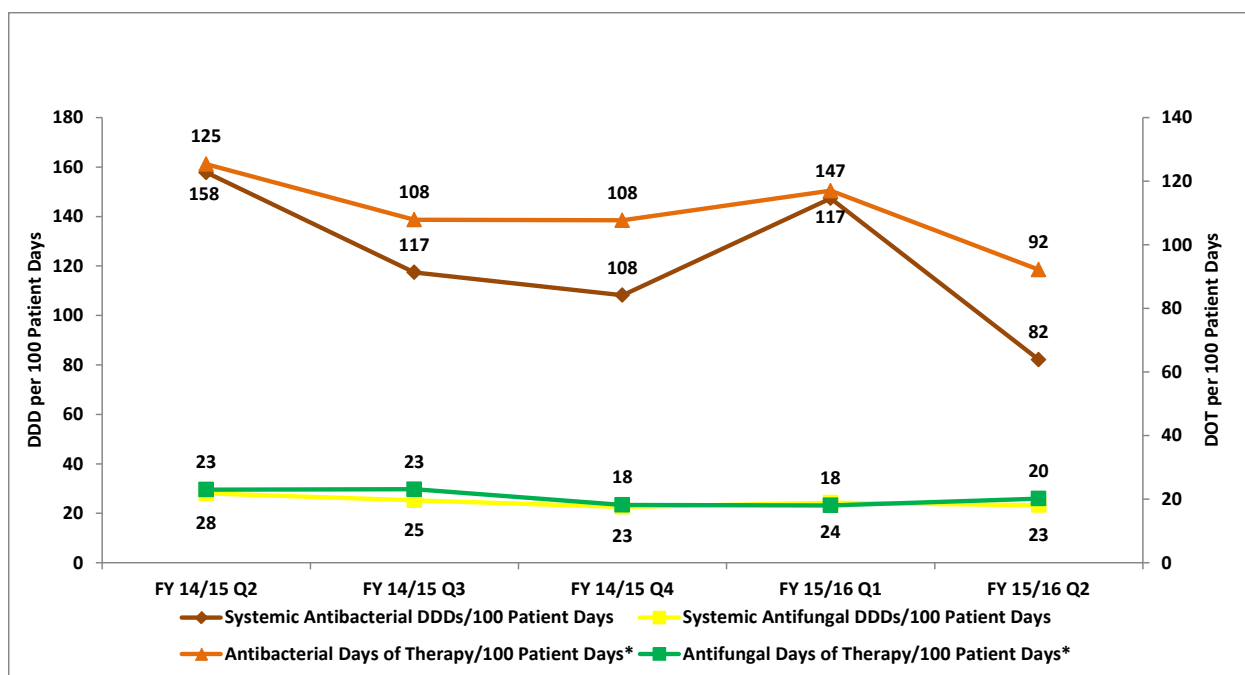


Table 2: Mount Sinai Hospital: Medical Surgical ICU

Indicators	FY 08/09 (Pre-ASP)	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
								Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs													
Total Antimicrobial DDDs/100 Patient Days	177	171	144	167	170	167	164	176	109			142	179
Systemic Antibacterial DDDs/100 Patient Days	142	128	111	128	127	123	136	147	82			114	148
Systemic Antifungal DDDs/100 Patient Days	31	24	20	33	35	36	25	24	23			24	27
Total Antimicrobial Costs	\$332,724	\$285,975	\$193,129	\$279,859	\$291,470	\$422,634	\$232,814	\$60,318	\$49,492			\$109,810	\$150,595
Total Antimicrobial Costs/Patient Day	\$69.01	\$59.23	\$40.95	\$59.22	\$62.37	\$85.07	\$62.54	\$61.05	\$46.91			\$53.75	\$69.02
Systemic Antibacterial Costs	\$174,339	\$142,134	\$95,773	\$125,339	\$134,811	\$108,886	\$92,928	\$20,746	\$14,673			\$35,419	\$49,215
Systemic Antibacterial Costs/Patient Day	\$36.16	\$29.44	\$20.31	\$26.94	\$28.85	\$21.92	\$20.71	\$21.00	\$13.91			\$17.34	\$22.55
Systemic Antifungal Costs	\$143,100	\$132,519	\$88,998	\$141,877	\$144,811	\$295,163	\$134,504	\$31,338	\$33,608			\$64,946	\$96,311
Systemic Antifungal Costs/Patient Day	\$29.68	\$27.45	\$18.87	\$30.50	\$30.99	\$59.41	\$40.53	\$31.72	\$31.86			\$31.79	\$44.14
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	111	109	117	92			104	111
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	17	21	18	20			19	20
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)	7 (1.59)	1 (1.01)	2 (1.9)			3 (1.47)	4 (1.83)
ICU Average Length of Stay (Days)	5.84	5.57	5.67	5.51	5.24	6.10	5.26	3.71	3.7			3.71	5.27
ICU Mortality Rate (as a %)	20.1	17.6	16.3	16.5	17.04	15.3	13.9	14.5	13.2			13.8	14.7
ICU Readmission Rate Within 48 Hrs (as a %)	3.2	2.9	2.7	2.7	1.86	3.2	2.6	3.1	1.7			2.4	2.3
ICU Ventilator Days	NA	3286	2934	2677	2749	3069	2597	489	536			1025	1308
ICU Multiple Organ Dysfunction Score (MODS)	4.00	4.04	4.12	4.25	4.62	4.87	4.73	4.07	4.49			4.28	4.98

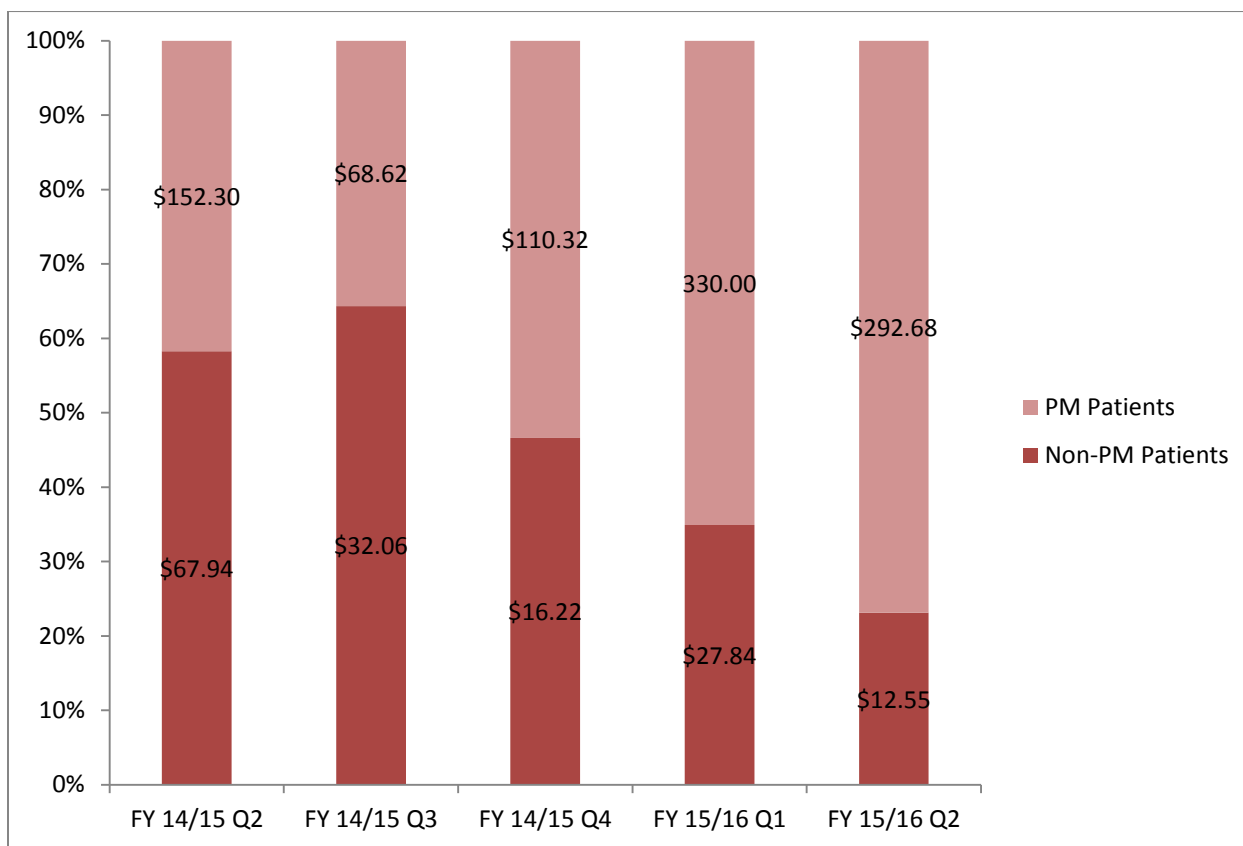
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs + systemic antivirals; non-systemic antimicrobials are excluded.
Data Sources: Antimicrobial DDD and Costs (PharmNet), C difficile (Infection Control Dashboards), Other ICU Patient Care Indicators (Critical Care Information System).

Table 3: Mount Sinai Hospital: Medical Surgical ICU Total Antimicrobial Costs

MSH ICU Total Antimicrobial Costs (Antimicrobial Cost per Patient Day)											
	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16 Q1	FY 15/16 Q2	FY 15/16 Q3	FY 15/16 Q4	FY 15/16 YTD	Previous YTD
Non-PM Patients	\$78,737 (\$21.14)	\$87,931 (\$25.42)	\$109,283 (\$31.77)	\$149,877 (\$37.54)	\$135,395 (\$36.40)	\$21,047 (\$27.84)	\$11,443 (\$12.55)			\$32,490 (\$35.56)	\$43,892 (\$40.64)
PM Patients	\$114,392 (\$179.02)	\$191,928 (\$181.58)	\$182,188 (\$249.91)	\$272,757 (\$317.16)	\$97,419 (\$135.68)	\$39,271 (\$330.01)	\$38,048 (\$292.68)			\$77,319 (\$154.63)	\$29,861 (\$339.33)
Total	\$193,129 (\$44.26)	\$279,859 (\$61.97)	\$291,470 (\$69.91)	\$422,634 (\$87.11)	\$232,814 (\$52.46)	\$60,318 (\$68.94)	\$49,492 (\$47.5)			\$109,810 (\$52.47)	\$73,753 (\$63.14)

Note: 15/16 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.

Mount Sinai Hospital: Medical Surgical ICU Antimicrobial Costs Per Patient Day (PM and Non-PM Patients)



**Table 4: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL
– Mount Sinai Hospital: Medical Surgical ICU**

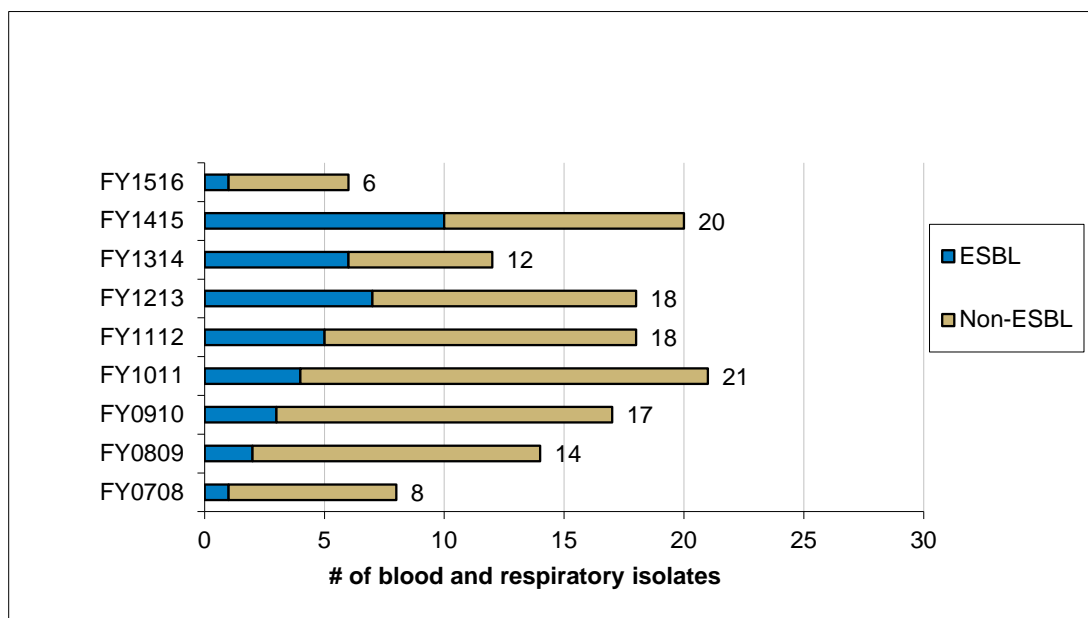
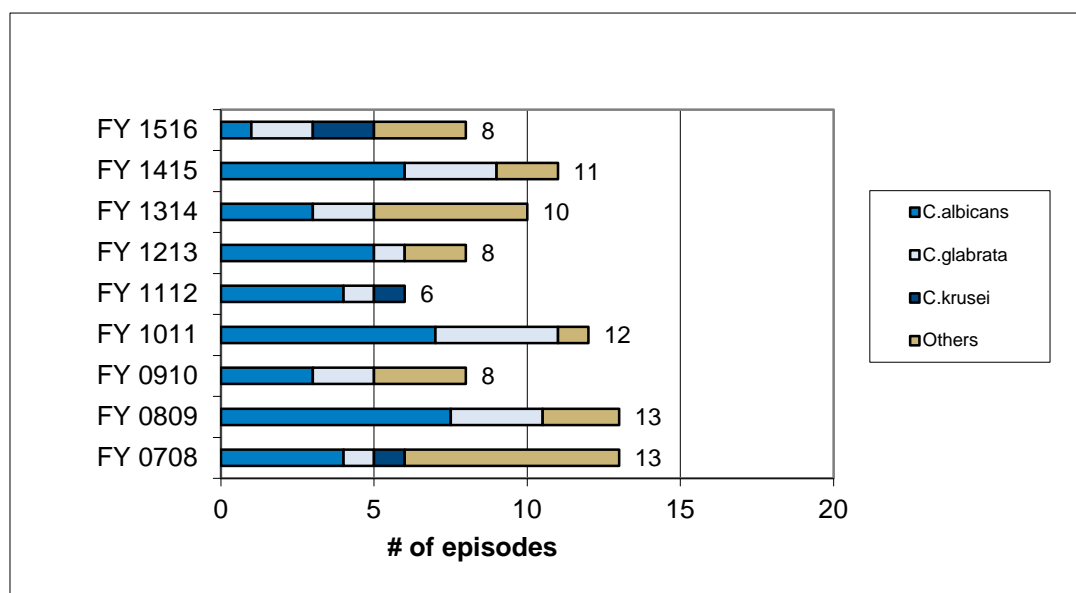
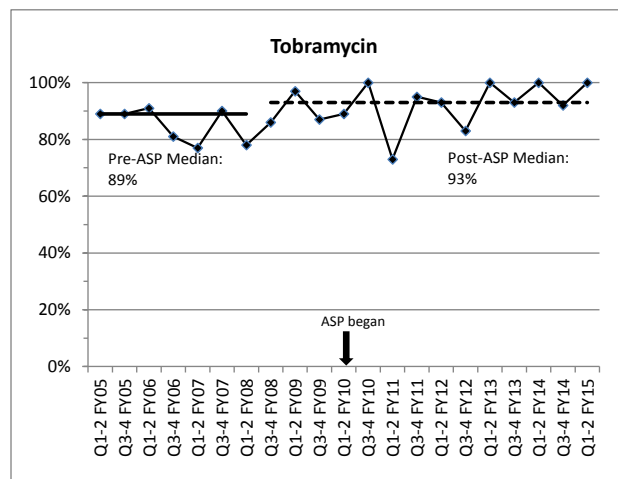
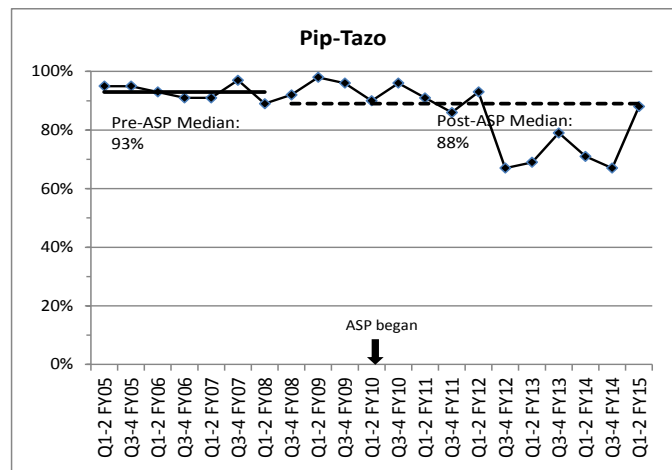
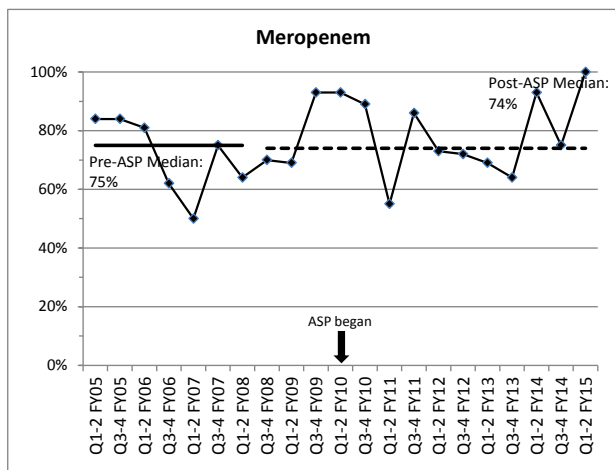
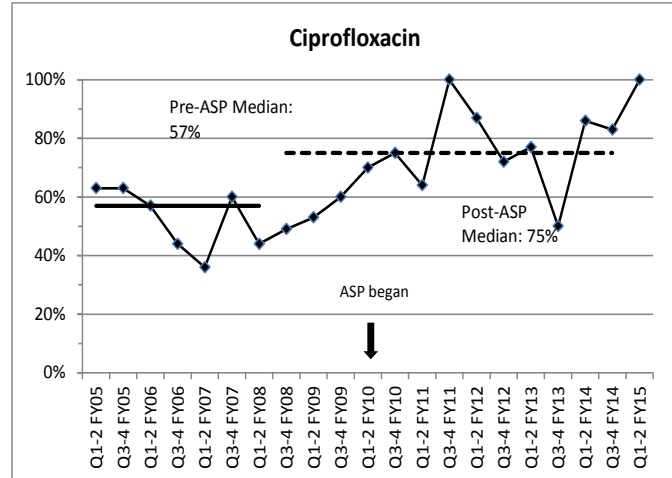
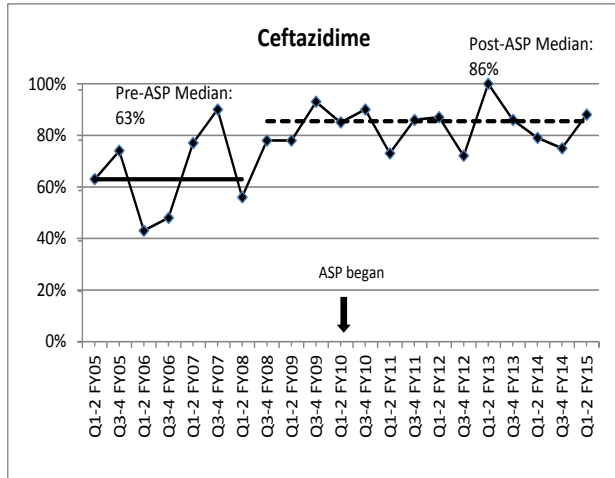


Table 5: Yeast Species Isolated in Blood – Mount Sinai Hospital: Medical Surgical ICU



MSH ICU Pseudomonas Susceptibility



Mount Sinai Hospital: Neonatal ICU

Currently there are no active ASP rounds in the NICU, 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 15/16 Q2 highlights include:

- Antimicrobial days of therapy (DOT) per 100 patient days decreased (↓) by 36.8% compared to YTD last year.
- Antimicrobial costs per patient day have decreased (↓) by 6.7% compared to YTD last year (\$1.34 to \$1.25).

Mount Sinai Hospital: Neonatal ICU Antimicrobial Consumption and Costs Per Patient Day

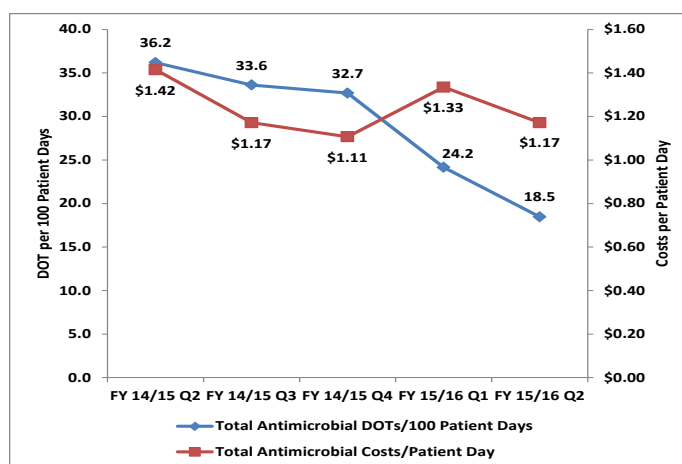


Table 6: Mount Sinai Hospital: Neonatal ICU

Indicators	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
					Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs										
Total Antimicrobial DOTs/100 Patient Days	67.3	55.4	49.4	33.5	24.2	18.5			21.3	33.8
Systemic Antibacterial DOTs/100 Patient Days	65.1	53.5	48.7	32.7	23.3	17.6			20.5	33.5
Systemic Antifungal DOTs/100 Patient Days	2.2	1.8	0.7	0.8	0.8	0.8			0.8	0.2
Total Antimicrobial Costs	\$16,415	\$17,682	\$26,162	\$21,371	\$5,858	\$5,041			\$10,899	\$10,982
Total Antimicrobial Costs/Patient Day	\$1.31	\$1.51	\$2.17	\$1.26	\$1.33	\$1.17			\$1.25	\$1.34
Systemic Antibacterial Costs	\$14,783	\$16,505	\$25,290	\$20,516	\$5,830	\$4,871			\$10,702	\$10,536
Systemic Antibacterial Costs/Patient Day	\$1.18	\$1.41	\$2.10	\$1.21	\$1.33	\$1.13			\$1.23	\$1.29
Systemic Antifungal Costs	\$1,632	\$1,177	\$872	\$855	\$27	\$170			\$198	\$446
Systemic Antifungal Costs/Patient Day	\$0.13	\$0.10	\$0.07	\$0.05	\$0.006	\$0.04			\$0.02	\$0.05

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.

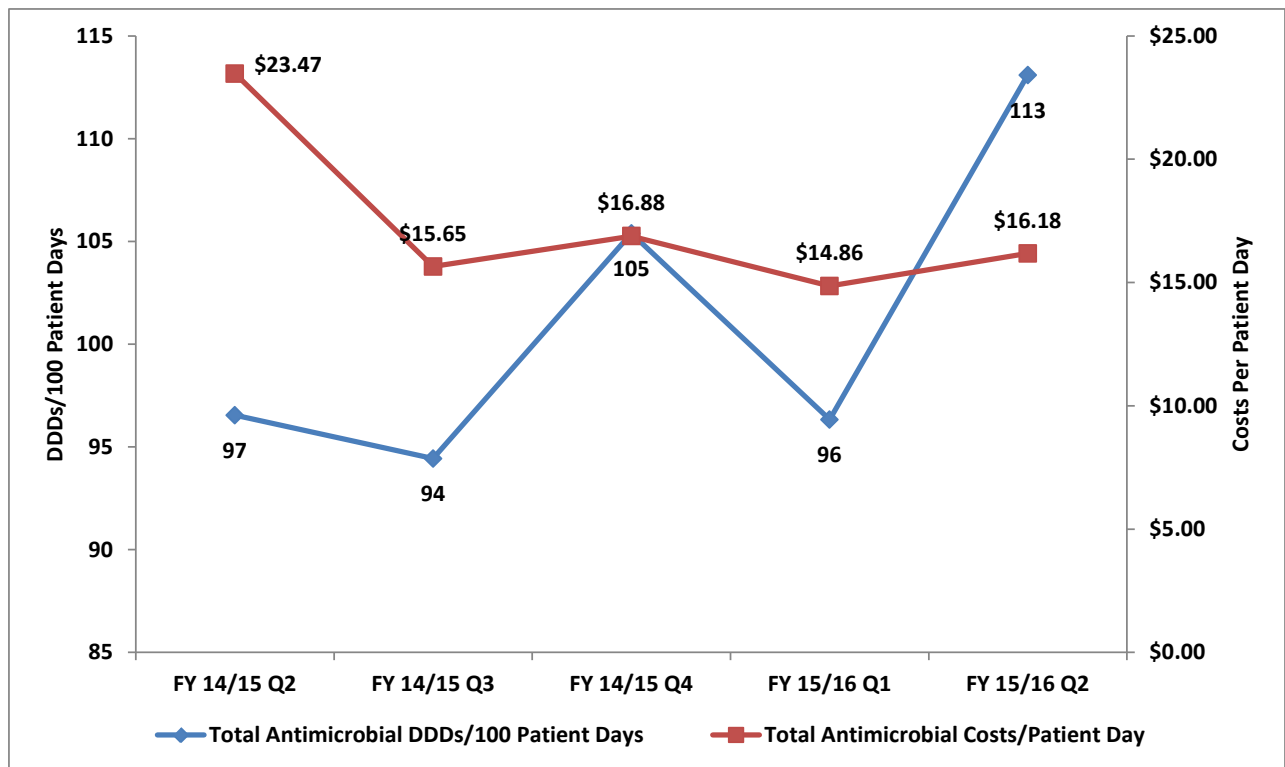
Days of Therapy (DOT) was used as the metric for antimicrobial consumption, which is considered to be the standard for neonates.

Toronto General Hospital: Cardiovascular ICU

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 0.1% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 37.1% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 14.2% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 75.9% compared to YTD last year.

Toronto General Hospital: Cardiovascular ICU Antimicrobial Consumption and Costs Per Patient Day



Toronto General Hospital: Cardiovascular ICU Antimicrobial Consumption as Defined Daily Dose Versus Antimicrobial Consumption as Days of Therapy

- Antibacterial Days of Therapy (DOT) per 100 patient days decreased (↓) by 2.8% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 5.9% compared to YTD last year.

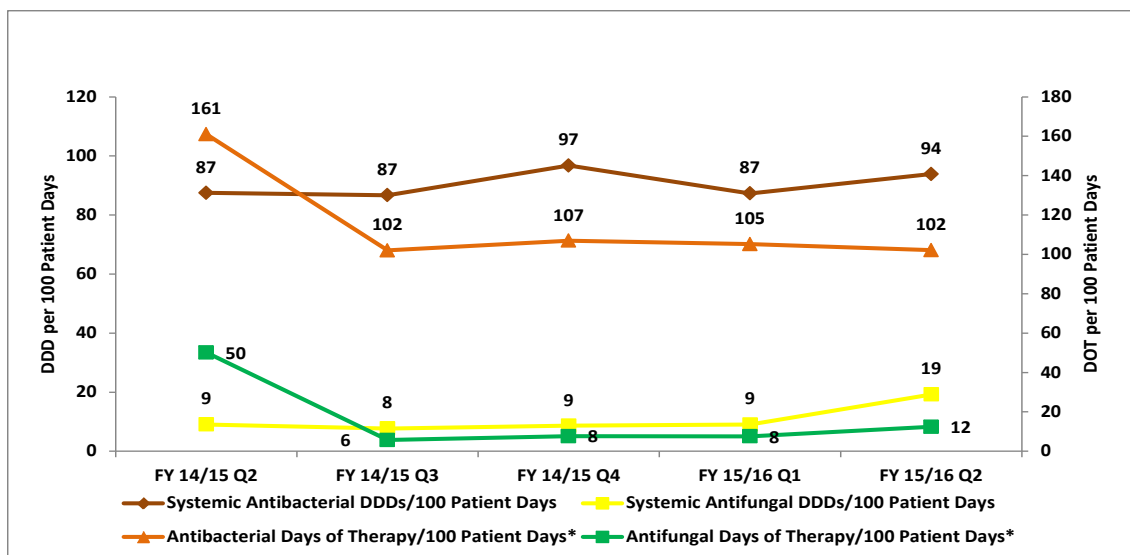


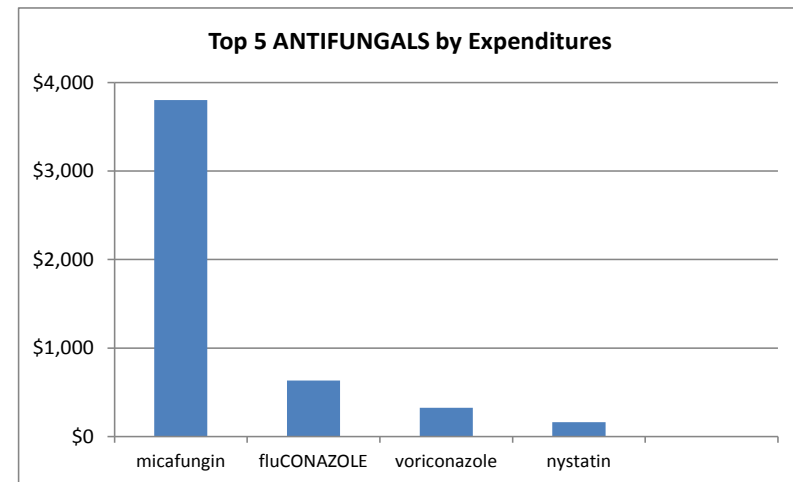
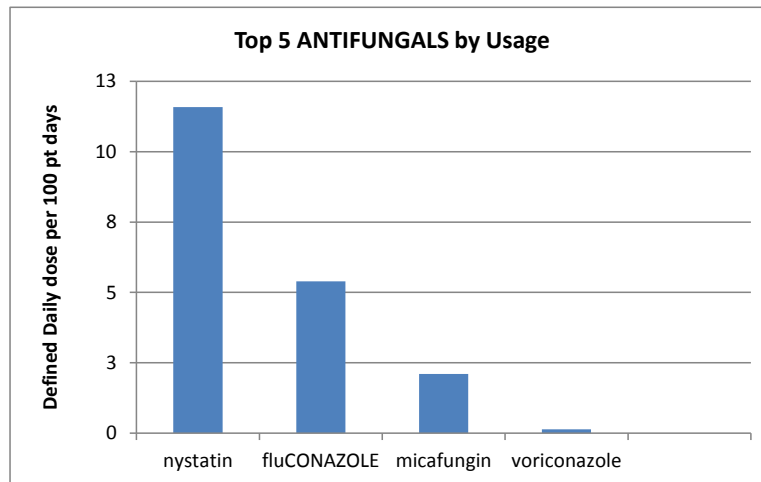
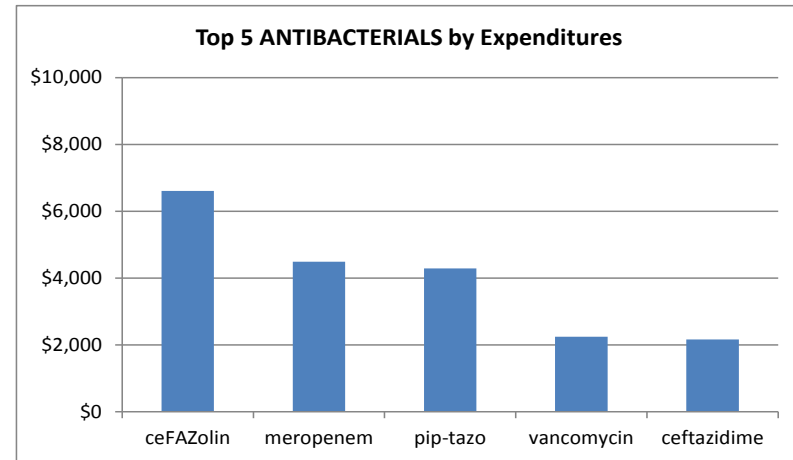
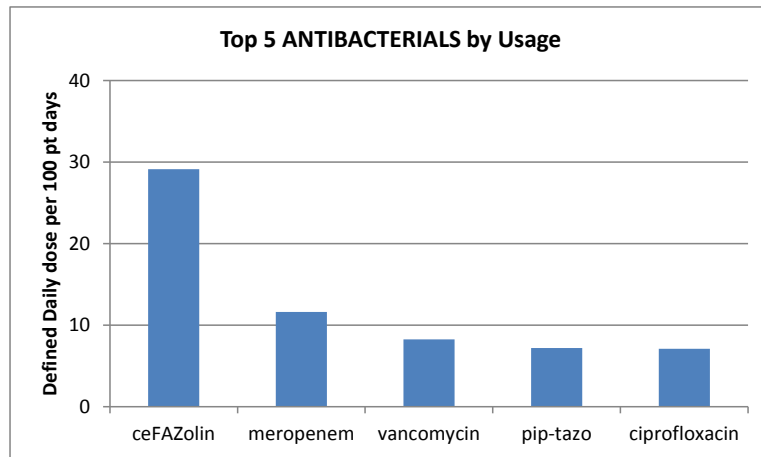
Table 7: Toronto General Hospital: Cardiovascular ICU

Indicators	FY 10/11 (Pre-ASP)	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
						Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs											
Total Antimicrobial DDDs/100 Patient Days	105	98	102	97	102	96	113			105	105
Systemic Antibacterial DDDs/100 Patient Days	95	86	89	86	93	87	94			91	95
Systemic Antifungal DDDs/100 Patient Days	10	12	13	11	9	9	19			14	10
Total Antimicrobial Costs	\$108,172	\$108,464	\$85,916	\$100,736	\$129,314	\$25,464	\$29,230			\$54,694	\$77,824
Total Antimicrobial Costs/Patient Day	\$18.20	\$19.06	\$14.99	\$17.00	\$20.46	\$14.86	\$16.18			\$15.53	\$24.68
Systemic Antibacterial Costs	\$100,375	\$99,261	\$74,232	\$80,204	\$91,366	\$22,633	\$24,310			\$46,942	\$48,990
Systemic Antibacterial Costs/Patient Day	\$16.89	\$17.44	\$12.95	\$13.54	\$14.45	\$13.20	\$13.45			\$13.33	\$15.54
Systemic Antifungal Costs	\$7,797	\$9,204	\$11,684	\$20,532	\$37,948	\$2,832	\$4,921			\$7,752	\$28,835
Systemic Antifungal Costs/Patient Day	\$1.31	\$1.62	\$2.04	\$3.47	\$6.00	\$1.65	\$2.72			\$2.20	\$9.15
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	129.0	105.2	102.16			103.69	106.67
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	27.7	7.55	12.41			10.02	9.46
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)	7 (1.11)	1 (0.58)	4 (2.21)			5 (1.42)	1 (0.32)
ICU Average Length of Stay (days)	3.12	2.95	2.97	3.20	3.46	3.27	3.8			3.5	3.3
ICU Mortality Rate (as a %)	3.5	3.0	3.0	4.6	4.6	3.6	4.5			4.0	4.8
ICU Readmission Rate Within 48 Hrs (as a %)	1.6	2.2	1.8	2.2	2.4	1.2	0.3			0.8	1.8
Central Line Infection Rate (per 1000 pt days)	0.73	0.17	0.34	0.16	0.15	0.5	0.00			0.3	0.31
Ventilator-Associated Pneumonia Rate (per 1,000 pt days)	2.99	2.80	1.91	1.73	2.81	1.05	0.86			0.94	3.30
ICU Multiple Organ Dysfunction Score (MODS)	6.22	6.07	5.51	5.77	5.60	5.41	6.06			5.74	5.65
ICU Ventilator Days	3015	3571	3676	4049	3925	952	1168			2120	2119

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 DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Table 8: TGH CVICU FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient-days) and Expenditures



**Table 9: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL
– Toronto General Hospital Cardiovascular ICU**

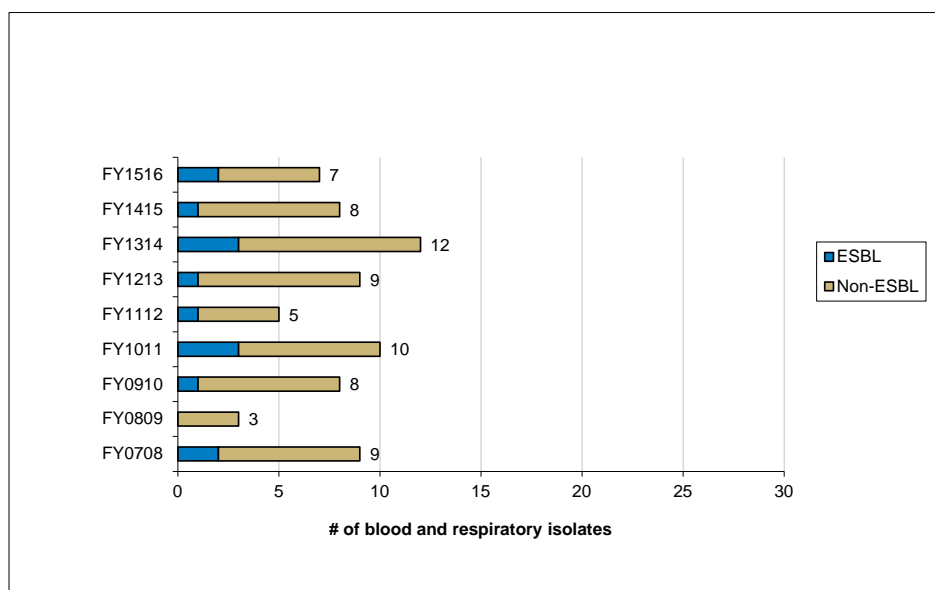
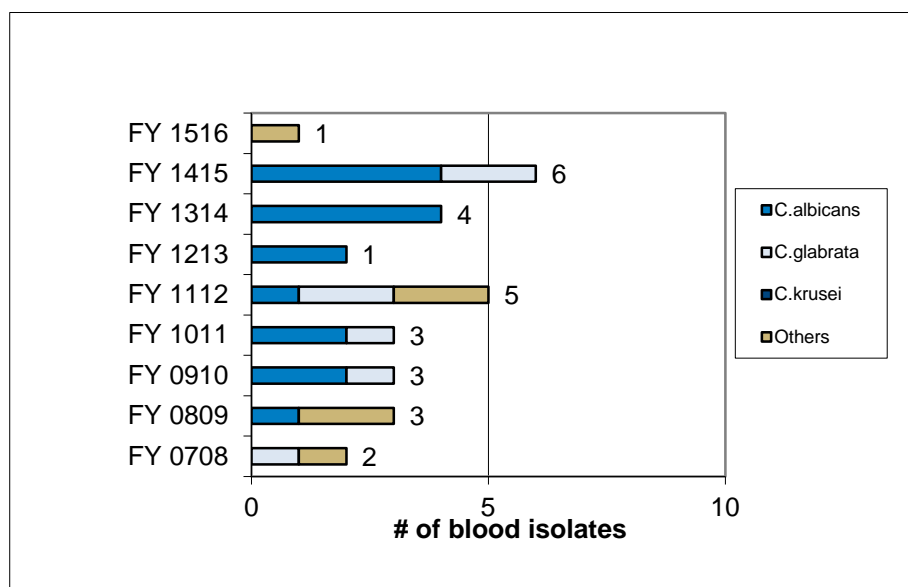


Table 10: Yeast Species Isolated in Blood – Toronto General Hospital Cardiovascular ICU

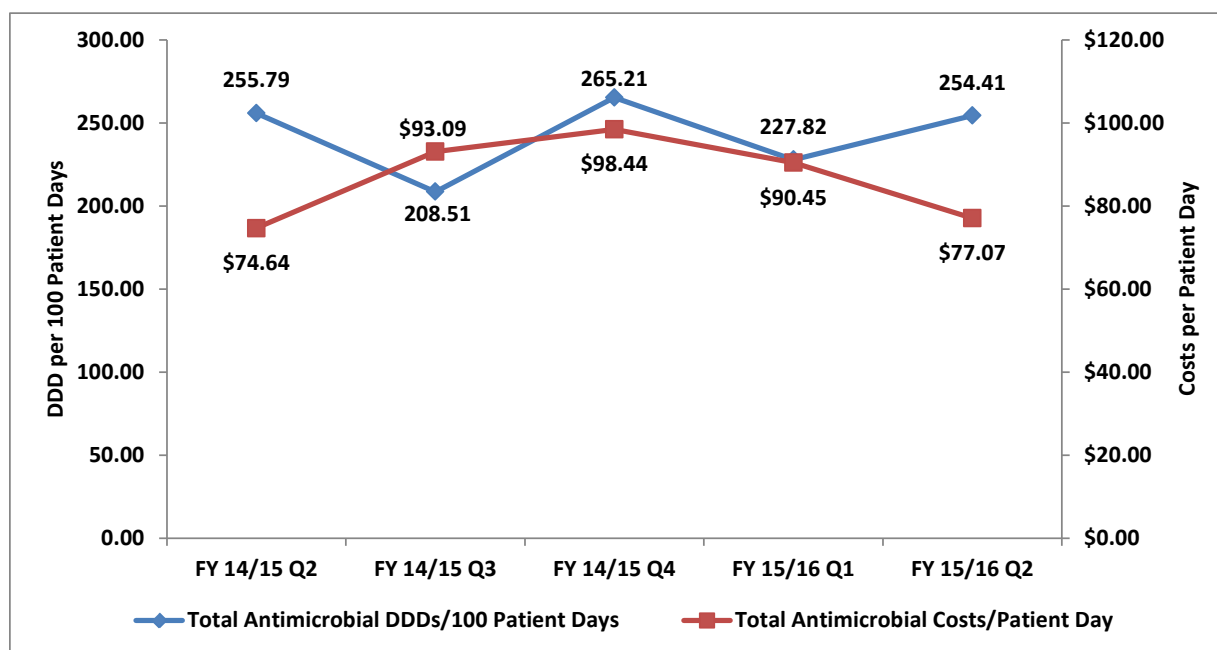


Toronto General Hospital: Medical Surgical ICU

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 3.5% compared to YTD last year.
- Antimicrobial costs per patient day increased (↑) by 16.2% compared to YTD last year.
- Antibacterial costs per patient day increased (↑) by 0.1% compared to YTD last year.
- Antifungal costs per patient day increased (↑) by 31.3% compared to YTD last year.

Toronto General Hospital: Medical Surgical ICU Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 1: FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 Patient Days) and Expenditures by ICU Site**, please click [here](#).

Toronto General Hospital: Medical Surgical ICU Antimicrobial Consumption as Defined Daily Dose Versus Antimicrobial Consumption as Days of Therapy

- Antibacterial Days of Therapy (DOT) per 100 patient days increased (↑) by 13.0 % compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 11.2% compared to YTD last year.

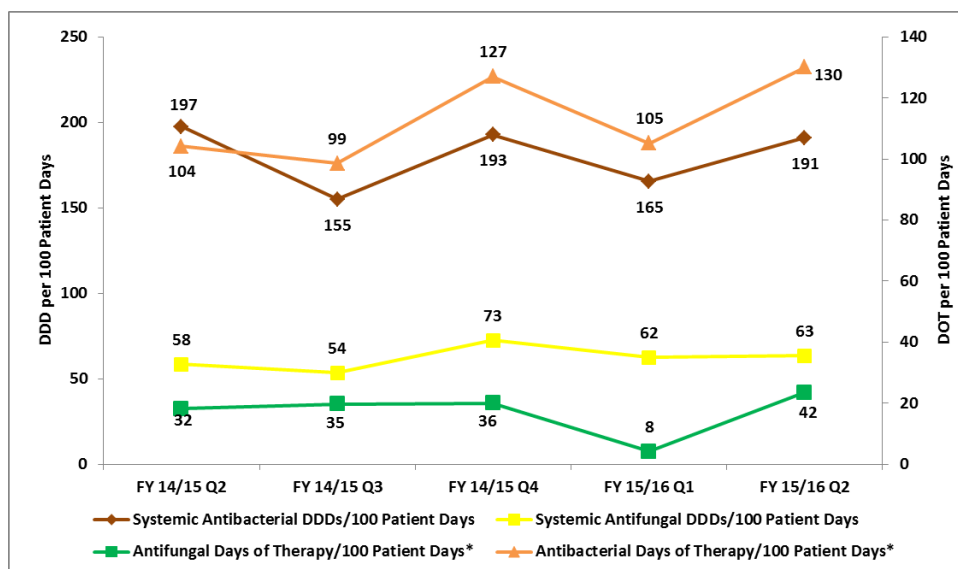


Table 11: Toronto General Hospital: Medical Surgical ICU

Indicators	FY 09/10 (Pre-ASP)	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16 Performance					YTD of Previous Year
							Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs												
Total Antimicrobial DDDs/100 Patient Days	266	209	199	213	217	235	228	254			242	234
Systemic Antibacterial DDDs/100 Patient Days	184	155	143	159	156	175	165	191			179	177
Systemic Antifungal DDDs/100 Patient Days	82	55	55	54	61	60	62	63			63	57
Total Antimicrobial Costs	\$701,451	\$629,472	\$567,532	\$473,613	\$584,018	\$686,577	\$175,744	\$167,702			\$343,445	\$297,517
Total Antimicrobial Costs/Patient Day	\$102.52	\$84.06	\$76.93	\$63.75	\$75.71	\$83.65	\$90.45	\$77.07			\$83.38	\$71.78
Systemic Antibacterial Costs	\$390,209	\$375,436	\$292,355	\$231,171	\$225,557	\$293,126	\$67,443	\$76,357			\$143,800	\$144,534
Systemic Antibacterial Costs/Patient Day	\$57.03	\$50.14	\$39.63	\$31.12	\$29.24	\$35.71	\$34.71	\$35.09			\$34.91	\$34.87
Systemic Antifungal Costs	\$311,242	\$254,036	\$275,176	\$242,443	\$358,461	\$393,451	\$108,301	\$91,344			\$199,646	\$152,983
Systemic Antifungal Costs/Patient Day	\$45.49	\$33.93	\$37.30	\$32.63	\$46.47	\$47.94	\$55.74	\$41.98			\$48.47	\$36.91
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	107.9	101.7	130.03			116.6	103.1
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	34.1	30.3	41.84			36.4	32.7
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)	10 (1.22)	4 (2.06)	2 (0.92)			6 (1.46)	7 (1.69)
ICU Average Length of Stay (days)	8.24	8.61	8.85	7.79	8.22	8.08	7.32	7.31			7.31	8.11
ICU Mortality Rate (as a %)	16.2	15.7	16.3	16.0	17.8	17.2	19.3	15.4			17.4	16.2
ICU Readmission Rate Within 48 Hrs (as a %)	3.8	4.4	4.4	2.8	3.5	3.0	3.5	3.5			3.5	3.6
ICU Ventilator Days	5399	6256	6507	6458	24620	7330	1679	1910			3589	3611
Apache II Score	n/a	n/a	16.1	15.775	15.9	15.1	15.3	15.2			15.3	15.2

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 DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Table 12: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL – Toronto General Hospital: Medical Surgical ICU

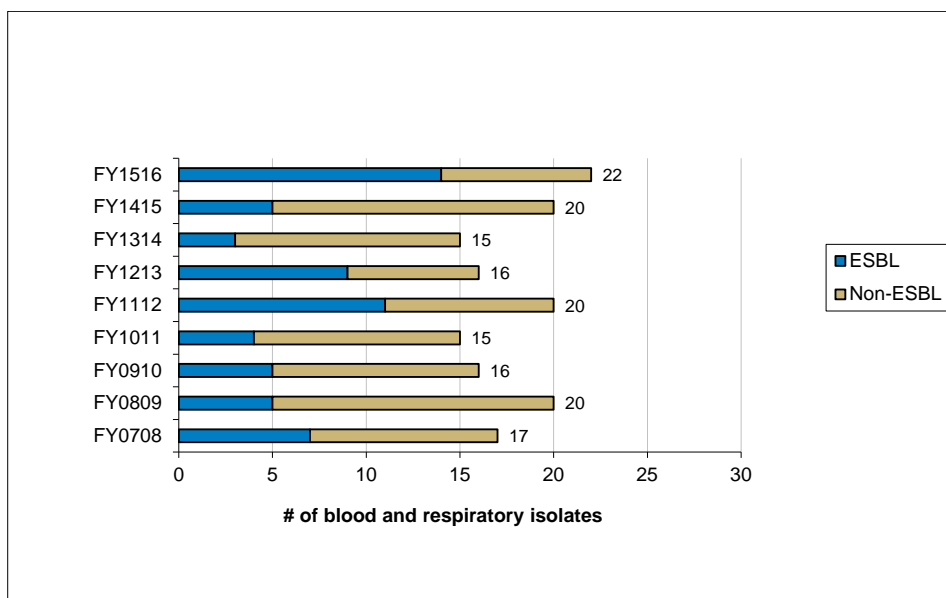
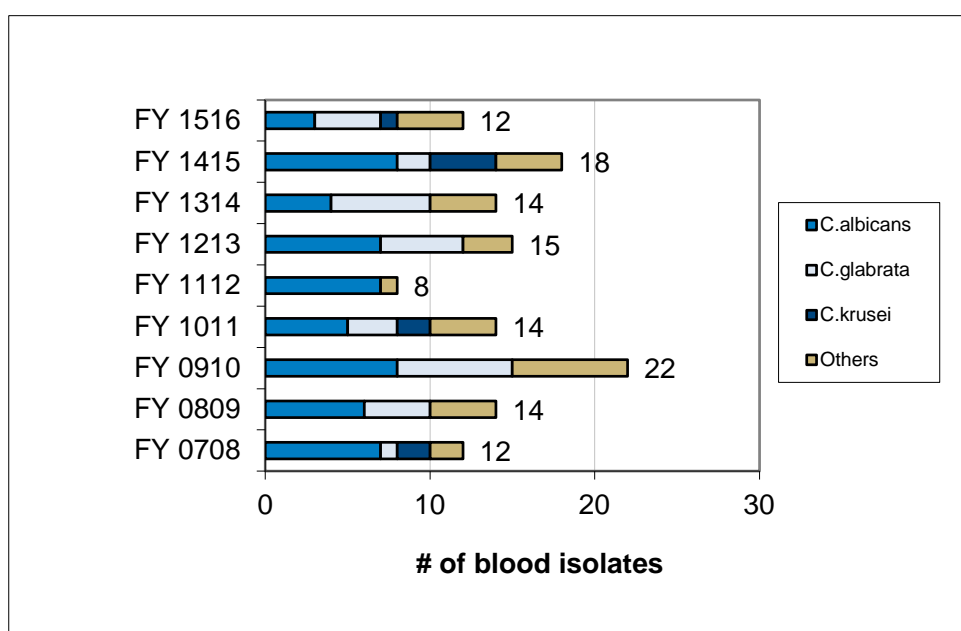
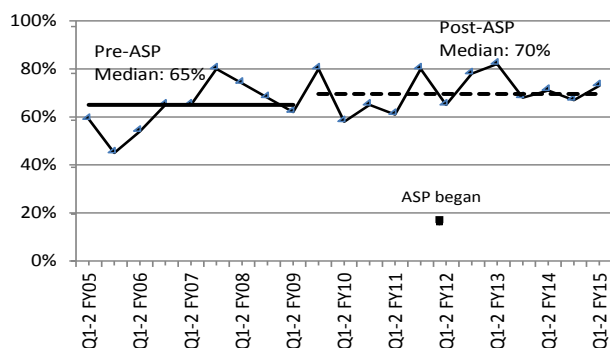


Table 13: Yeast Species Isolated in Blood – Toronto General Hospital: Medical Surgical ICU

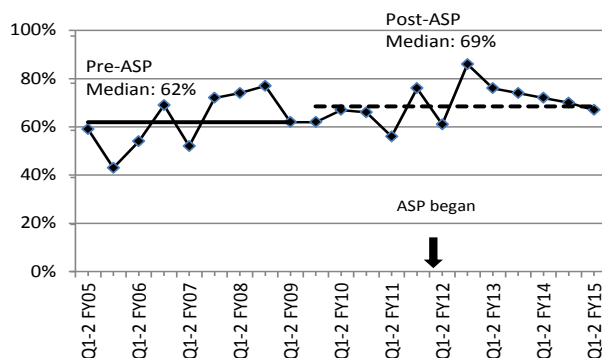


TGH MSICU Pseudomonas Susceptibility

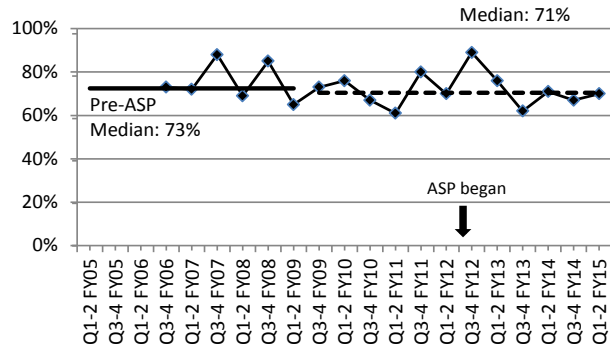
Ceftazidime



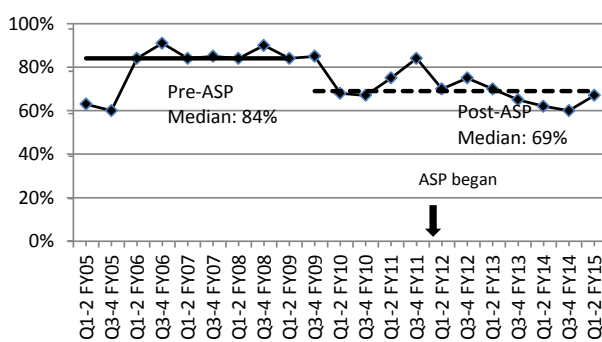
Ciprofloxacin



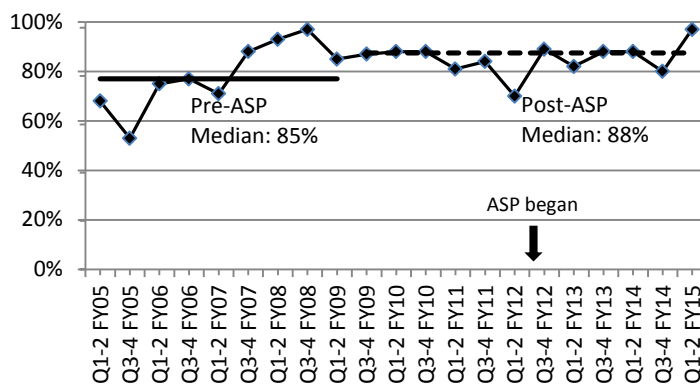
Meropenem



Pip-Tazo



Tobramycin

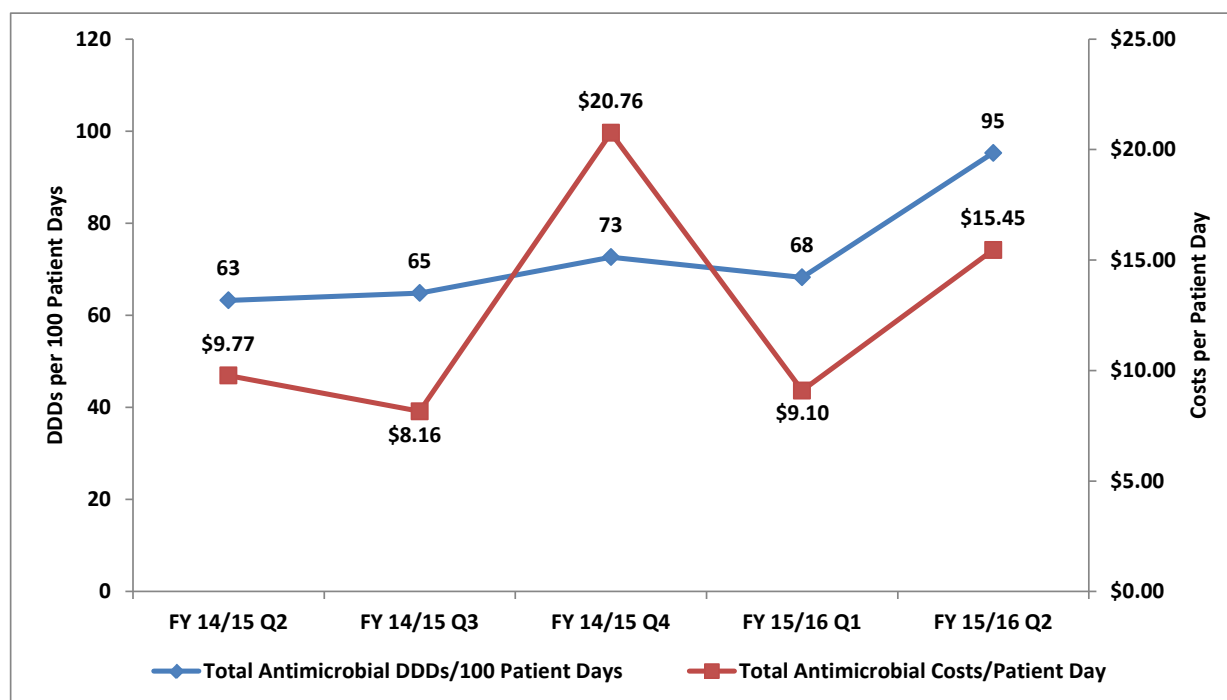


Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDD) per 100 patient days) increased (↑) by 26.1% compared to YTD last year.
- Antimicrobial costs per patient day increased (↑) by 30.7% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 5.3% compared to YTD last year.
- Antifungal costs per patient day increased (↑) by 162.3% compared to YTD last year.

Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 1: FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDD per 100 Patient Days) and Expenditures by ICU Site**, please click [here](#).

Toronto Western Hospital: Medical, Surgical, Neurosurgical ICU Antimicrobial Consumption as Defined Daily Dose Versus Antimicrobial Consumption as Days of Therapy

- Antibacterial Days of Therapy (DOT) per 100 patient days increased (↑) by 2.5% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 29.0% compared to YTD last year.

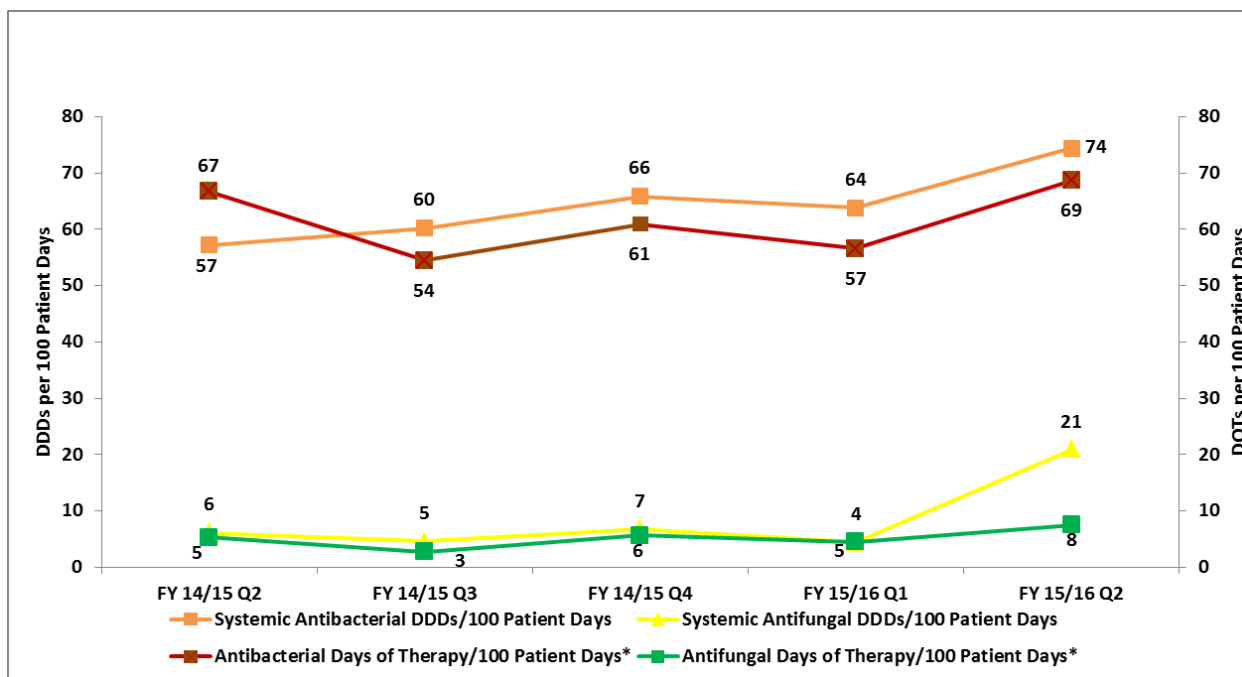


Table 14: Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU

Indicators	FY 08/09 (Pre-ASP)	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
								Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs													
Total Antimicrobial DDDs/100 Patient Days	99	88	79	83	83	92	67	68	95			82	65
Systemic Antibacterial DDDs/100 Patient Days	92	78	73	77	78	86	62	64	74			69	60
Systemic Antifungal DDDs/100 Patient Days	6	10	6	6	5	6	5	4	21			13	5
Total Antimicrobial Costs	\$136,758	\$100,408	\$101,191	\$105,899	\$102,978	\$120,538	\$138,014	\$25,558	\$47,105			\$72,663	\$55,378
Total Antimicrobial Costs/Patient Day	\$18.16	\$13.24	\$13.17	\$13.60	\$13.37	\$13.49	\$11.97	\$9.10	\$15.45			\$12.40	\$9.49
Systemic Antibacterial Costs	\$123,314	\$87,445	\$79,280	\$89,784	\$70,099	\$85,916	\$89,382	\$17,708	\$23,589			\$41,297	\$43,465
Systemic Antibacterial Costs/Patient Day	\$16.37	\$11.53	\$10.32	\$11.53	\$9.10	\$9.61	\$7.75	\$6.30	\$7.74			\$7.05	\$7.45
Systemic Antifungal Costs	\$13,444	\$12,963	\$21,911	\$16,115	\$32,879	\$34,623	\$48,631	\$7,850	\$23,516			\$31,366	\$11,913
Systemic Antifungal Costs/Patient Day	\$1.79	\$1.71	\$2.85	\$2.07	\$4.27	\$3.87	\$4.22	\$2.79	\$7.72			\$5.35	\$2.04
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	n/a	59.6	56.6	68.64			62.98	61.4
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	n/a	4.5	4.5	7.53			6.1	4.7
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)	10 (1.16)	1 (0.36)	4 (1.31)			5 (0.85)	7 (1.2)
ICU Average Length of Stay (days)	8.39	7.44	10.68	9.71	7.98	7.68	8.7	8.2	6.8			7.0	8.7
ICU Mortality Rate (as a %)	19.6	19.9	18.1	17.0	16.4	17.1	19.0	15.7	15.5			15.6	20.1
ICU Readmission Rate Within 48 Hrs (as a %)	3.9	4.7	4.9	3.21	3.00	3.85	3.40	1.14	3.72			2.48	3.30
ICU Ventilator Days	4617	6305	5960	5578	4947	5523	5180	1132	1578			2710	2904
ICU Apache II Score	15.0	14.7	13.7	13.8	12.9	12.8	13.2	12.0	13.0			12.0	13.9

Notes: Q4 13/14 data consists of MSNICU patients (including eight ICU II patients).

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 DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Table 15: E. coli Isolates: Blood and Respiratory System: Non-ESBL vs. ESBL – Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU

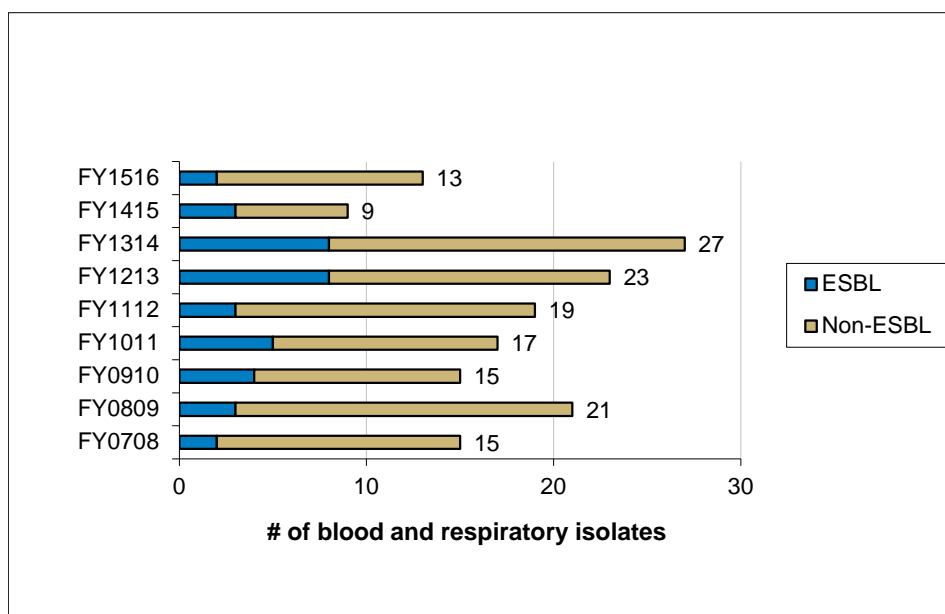
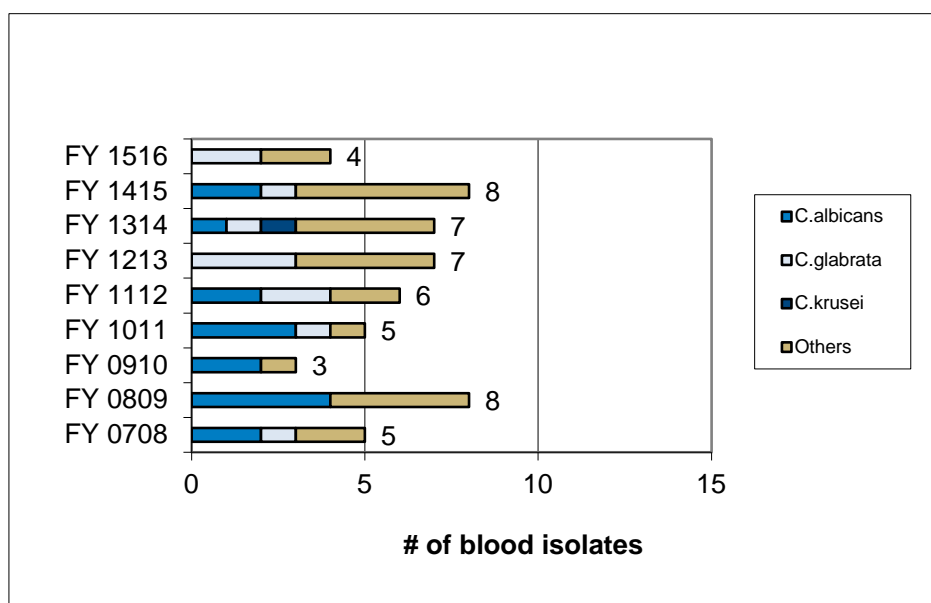
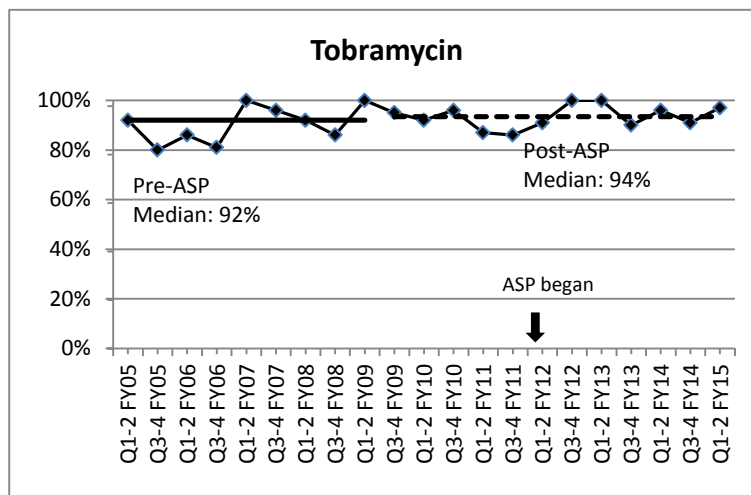
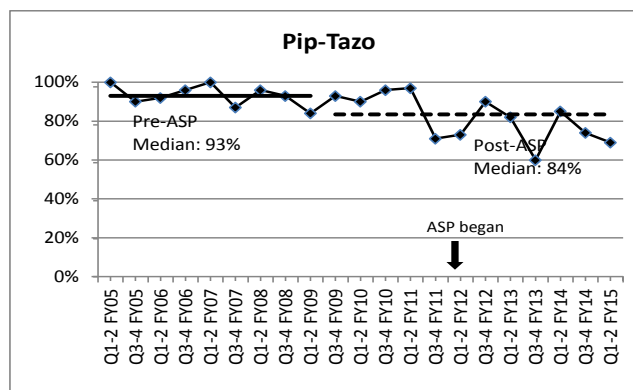
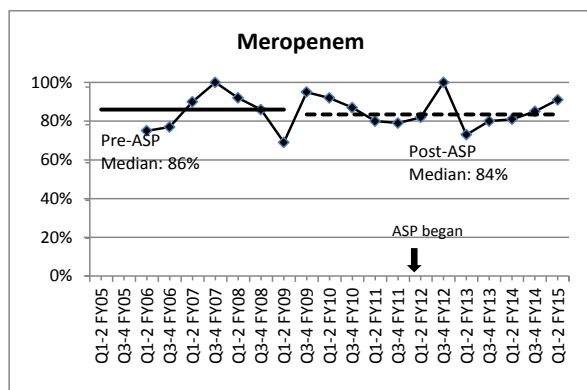
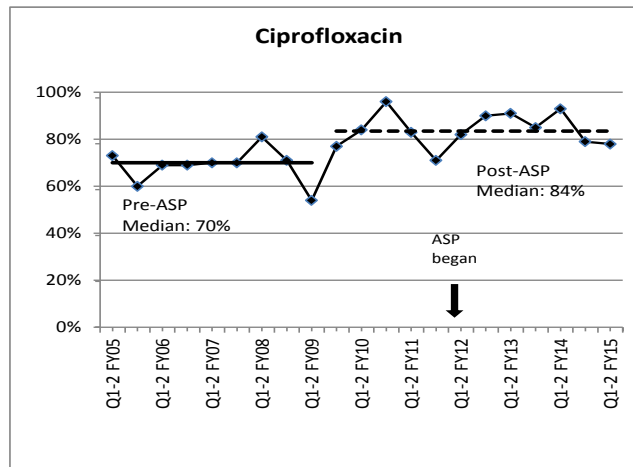
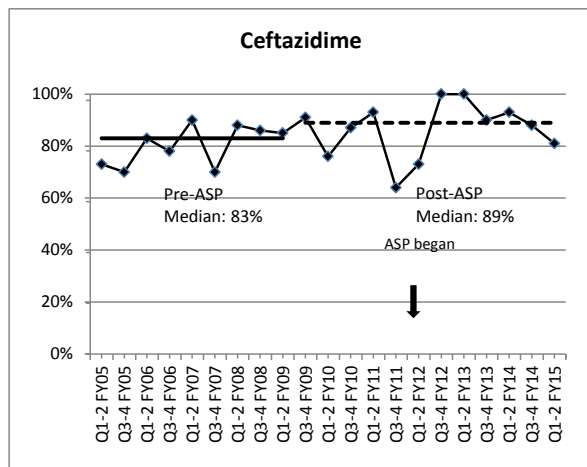


Table 16: Yeast Species Isolated in Blood – Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU



TWH ICU Pseudomonas Susceptibility



EMERGENCY DEPARTMENT

Mount Sinai Hospital: Emergency Department

FY 15/16 Q2 highlights include:

Sepsis Project

SNAP (Sepsis Now A Priority) Project: The SNAP algorithm continues to be effectively utilized in the Mount Sinai Emergency Department. Algorithm-related interventional times continue to be monitored and reported back to frontline staff via monthly SNAP scorecards. Reporting of the SNAP scorecard is successfully being managed by the Emergency Department.

Most recently, Dr. Christine McDonald has been collecting and analyzing pre- and post-algorithm data on patients from the SNAP protocol. A manuscript detailing the results will be submitted for publication in the coming months.

Toronto General Hospital/Toronto Western Hospital: Emergency Department and Princess Margaret REACH

FY 15/16 Q2 highlights include:

With support from Princess Margaret's senior leadership, the ASP team continues to work with Dr. Sam Sabbah, Assistant Director, Emergency Department, UHN, to create an order set of the febrile neutropenia protocol. Our goal is to reduce the variability in the management of neutropenic fever across all entry points into the UHN system.

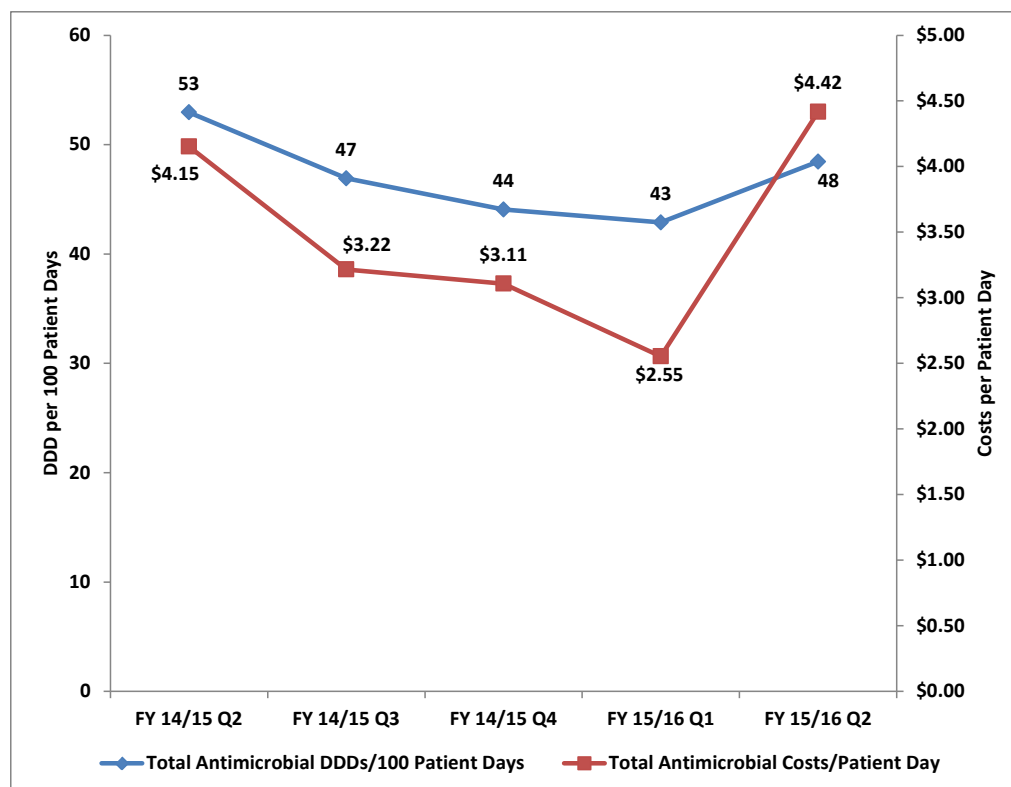
GENERAL INTERNAL MEDICINE

Mount Sinai Hospital: General Internal Medicine

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 11.4% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 16.4% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 9.9% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 49.2% compared to YTD last year.
- Note: Usage data calculated for patients admitted by admission to GIM medical service at MSH.

Mount Sinai Hospital: General Internal Medicine Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 2: General Internal Medicine FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures**, please click [here](#).

To view **Appendix 3: Antimicrobial Usage by Route of Administration (Total Antimicrobials) – General Internal Medicine**, please click [here](#).

Table 17: Mount Sinai Hospital: General Internal Medicine

Indicators	FY 12/13 (Q2-4)	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
				Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs									
Total Antimicrobial DDDs/100 Patient Days	58	45	48	43	48			46	51
Systemic Antibacterial DDDs/100 Patient Days	53	41	43	39	43			41	46
Systemic Antifungal DDDs/100 Patient Days	3	3	3	3	4			3	4
Total Antimicrobial Costs	\$125,012	\$123,737	\$128,661	\$24,453	\$39,014			\$63,467	\$71,058
Total Antimicrobial Costs/Patient Day	\$5.74	\$3.76	\$3.63	\$2.55	\$4.42			\$3.45	\$4.13
Systemic Antibacterial Costs	\$105,621	\$99,731	\$104,822	\$22,675	\$30,481			\$53,157	\$55,173
Systemic Antibacterial Costs/Patient Day	\$4.85	\$3.03	\$2.96	\$2.37	\$3.45			\$2.89	\$3.20
Systemic Antifungal Costs	\$15,422	\$20,153	\$16,352	\$1,132	\$6,390			\$7,522	\$13,847
Systemic Antifungal Costs/Patient Day	\$0.71	\$0.61	\$0.46	\$0.12	\$0.72			\$0.41	\$0.80
Patient Care Outcomes									
Hospital-Acquired C. difficile Cases (rate per 1,000 patient days)	16 (0.64)	8 (0.32)	7 (0.27)	2 (0.31)	1 (0.16)			3 (0.23)	5 (0.38)

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

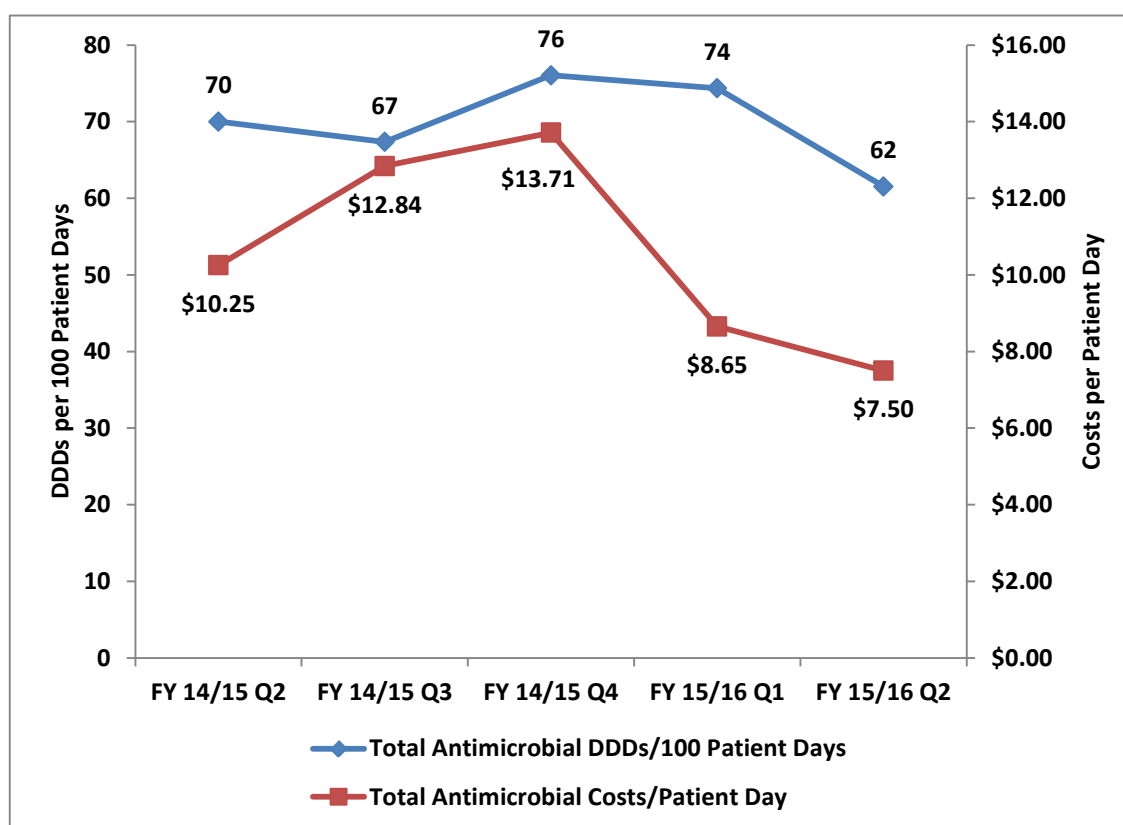
Data Sources: Antimicrobial DDD and Costs (PharmNet), C difficile (Infection Control Dashboards).

Toronto General Hospital: General Internal Medicine

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 4.2% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 12.1% compared to YTD last year for TGH.
- Antibacterial costs per patient day decreased (↓) by 13.7% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 7.8% compared to YTD last year.
- Note: Usage data calculated for patients admitted to primary GIM units at TGH.

Toronto General Hospital: General Internal Medicine Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 2: General Internal Medicine FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures**, please click [here](#).

To view **Appendix 3: Antimicrobial Usage by Route of Administration (Total Antimicrobials) – General Internal Medicine**, please click [here](#).

Table 18: Toronto General Hospital: General Internal Medicine

Indicators	FY 12/13 (Q2-4)	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
	Q1	Q2	Q3	Q4	YTD				
Antimicrobial Usage and Costs									
Total Antimicrobial DDDs/100 Patient Days	87	83	83	74	62			68	71
Systemic Antibacterial DDDs/100 Patient Days	77	70	73	66	54			60	64
Systemic Antifungal DDDs/100 Patient Days	11	13	10	9	8			8	7
Total Antimicrobial Costs	\$279,644	\$471,342	\$352,036	\$79,814	\$69,837			\$149,650	\$124,973
Total Antimicrobial Costs/Patient Day	\$14.10	\$18.05	\$13.30	\$8.65	\$7.50			\$8.07	\$9.18
Systemic Antibacterial Costs	\$171,817	\$225,491	\$221,389	\$56,660	\$51,035			\$107,695	\$91,574
Systemic Antibacterial Costs/Patient Day	\$8.67	\$8.64	\$8.36	\$6.14	\$5.48			\$5.81	\$6.73
Systemic Antifungal Costs	\$107,827	\$245,851	\$130,647	\$23,154	\$18,802			\$41,955	\$33,398
Systemic Antifungal Costs/Patient Day	\$5.44	\$9.42	\$4.93	\$2.51	\$2.02			\$2.26	\$2.45
Patient Care Outcomes									
Hospital-Acquired C. difficile Cases (rate per 1,000 patient days)	15 (0.76)	16 (0.61)	15 (0.68)	2 (0.22)	3 (0.32)			5 (0.4)	11 (0.81)

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

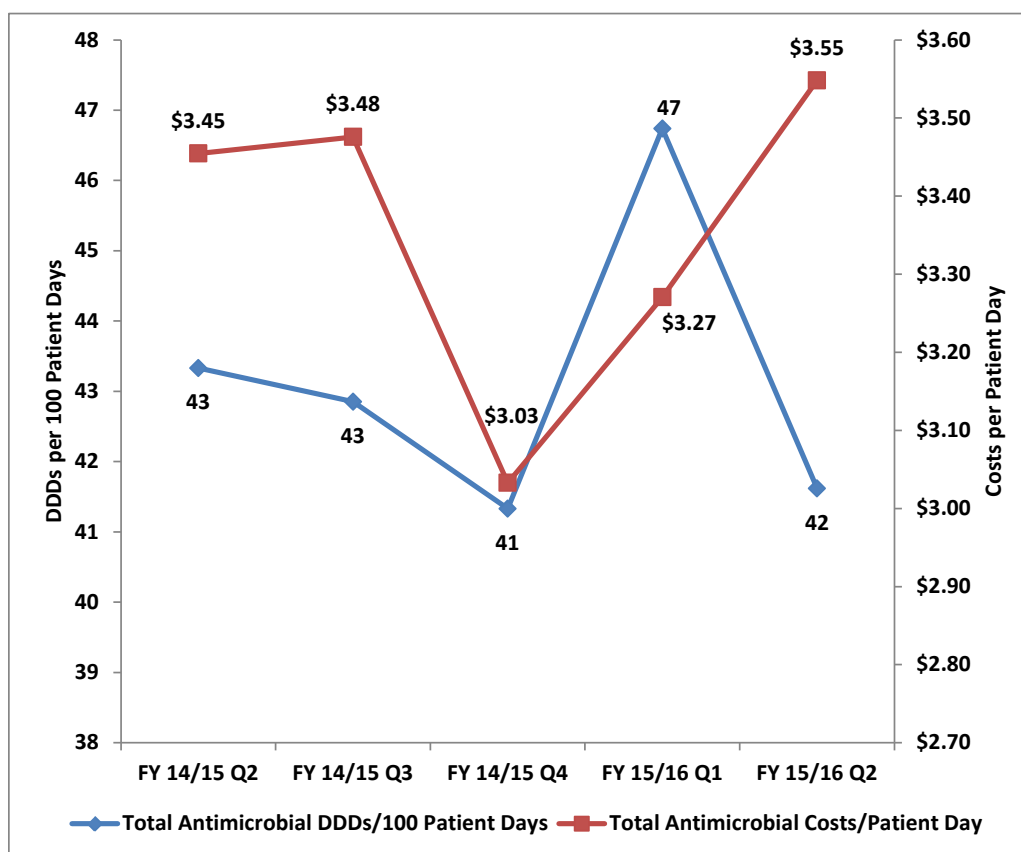
Data Sources: Antimicrobial DDD and Costs (Centricity). *An error in DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Toronto Western Hospital: General Internal Medicine

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 3.2% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 0.9% compared to YTD last year.
- Antibacterial costs per patient day increased (↑) by 2.3% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 55.8% compared to YTD last year.
- Note: Usage data calculated for patients admitted to primary GIM units at TWH.

Toronto Western Hospital: General Internal Medicine Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 2: General Internal Medicine FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures**, please click [here](#).

To view **Appendix 3: Antimicrobial Usage by Route of Administration (Total Antimicrobials) – General Internal Medicine**, please click [here](#).

Table 19: Toronto Western Hospital: General Internal Medicine

Indicators	FY 12/13 (Q2-4)	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
				Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs									
Total Antimicrobial DDDs/100 Patient Days	44	47	42	47	42			44	43
Systemic Antibacterial DDDs/100 Patient Days	41	44	40	44	39			42	40
Systemic Antifungal DDDs/100 Patient Days	3	3	3	2	2			2	2
Total Antimicrobial Costs	\$74,737	\$115,919	\$110,889	\$26,397	\$29,042			\$55,439	\$56,335
Total Antimicrobial Costs/Patient Day	\$4.36	\$5.01	\$3.32	\$3.27	\$3.55			\$3.41	\$3.38
Systemic Antibacterial Costs	\$60,999	\$93,779	\$103,080	\$26,180	\$28,670			\$54,850	\$54,970
Systemic Antibacterial Costs/Patient Day	\$3.56	\$4.05	\$3.09	\$3.24	\$3.50			\$3.37	\$3.30
Systemic Antifungal Costs	\$13,738	\$22,140	\$7,810	\$217	\$372			\$589	\$1,365
Systemic Antifungal Costs/Patient Day	\$0.80	\$0.96	\$0.23	\$0.03	\$0.05			\$0.04	\$0.08
Patient Care Outcomes									
Hospital-Acquired C. difficile Cases (rate per 1,000 patient days)	7 (0.41)	14 (0.6)	11 (0.33)	1 (0.12)	4 (0.49)			5 (0.31)	4 (0.24)

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 DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

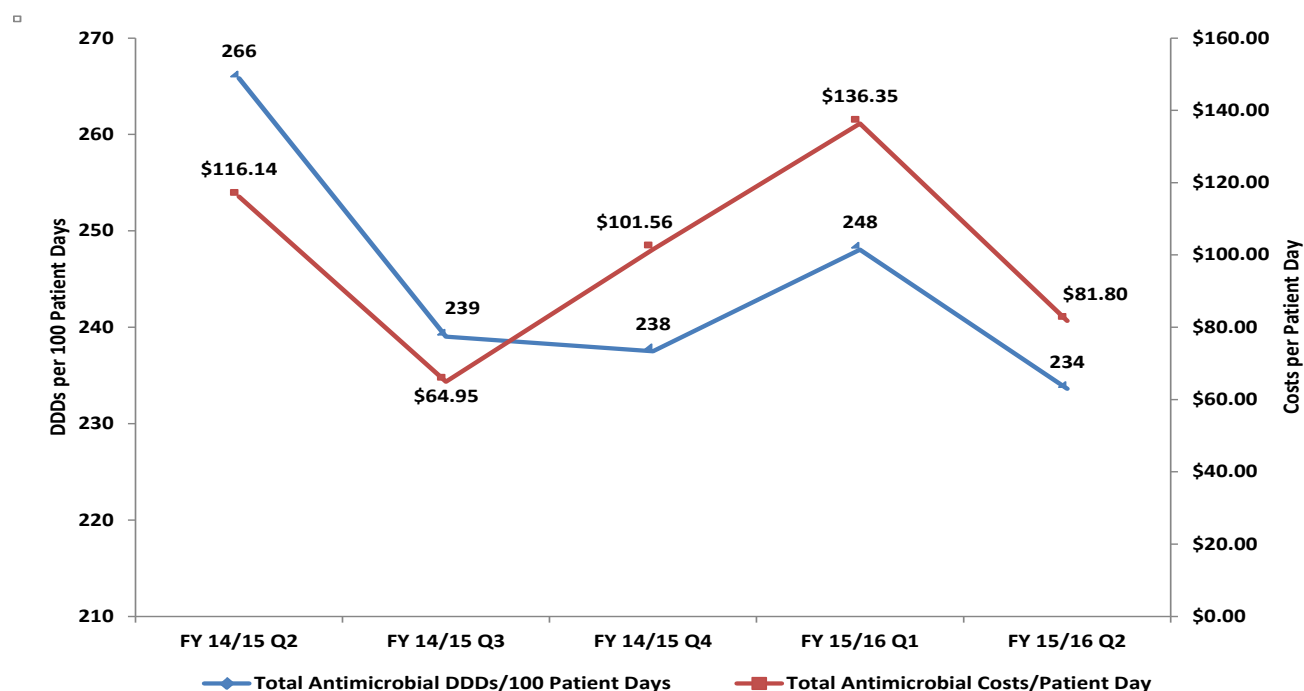
IMMUNOCOMPROMISED HOST

Princess Margaret Cancer Centre: Leukemia Service

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 3.4% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 1.4% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 5.9% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 0.5% compared to YTD last year.

Princess Margaret Cancer Centre: Leukemia Service Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 3: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL – Princess Margaret Cancer Centre Leukemia and Allogeneic Bone Marrow Transplant**, please click [here](#).

Table 20: Princess Margaret Cancer Centre: Leukemia Service

Indicators	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY15/16 Performance				YTD	YTD of Previous Year
							Q1	Q2	Q3	Q4		
Antimicrobial Usage and Costs												
Total Antimicrobial DDDs/100 Patient Days	295	270	239	250	255	244	248	234			241	249
Systemic Antibacterial DDDs/100 Patient Days	191	163	134	146	138	136	141	139			140	139
Systemic Antifungal DDDs/100 Patient Days	104	107	105	104	117	108	107	94			101	110
Total Antimicrobial Costs	\$1,768,317	\$1,641,331	\$1,310,857	\$1,695,539	\$1,534,499	\$1,412,805	\$499,995	\$302,479			\$802,474	\$793,662
Total Antimicrobial Costs/Patient Day	\$167.12	\$154.32	\$115.13	\$128.91	\$117.10	\$96.46	\$136.35	\$81.80			\$108.96	\$110.52
Systemic Antibacterial Costs	\$659,034	\$609,747	\$663,175	\$422,438	\$485,263	\$471,597	\$129,491	\$101,119			\$230,610	\$238,835
Systemic Antibacterial Costs/Patient Day	\$62.28	\$57.33	\$58.24	\$45.85	\$37.03	\$32.20	\$35.31	\$27.34			\$31.31	\$33.26
Systemic Antifungal Costs	\$1,109,283	\$1,031,584	\$647,637	\$1,092,448	\$1,049,236	\$941,208	\$370,504	\$201,360			\$571,864	\$554,828
Systemic Antifungal Costs/Patient Day	\$104.84	\$96.99	\$56.88	\$83.06	\$80.07	\$64.26	\$101.04	\$54.45			\$77.65	\$77.26
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)	13 (0.89)	4 (1.09)	4 (1.08)			8 (1.09)	5 (0.7)

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 DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Table 21: Yeast Species Isolated in Blood – Princess Margaret Cancer Centre: Leukemia Service

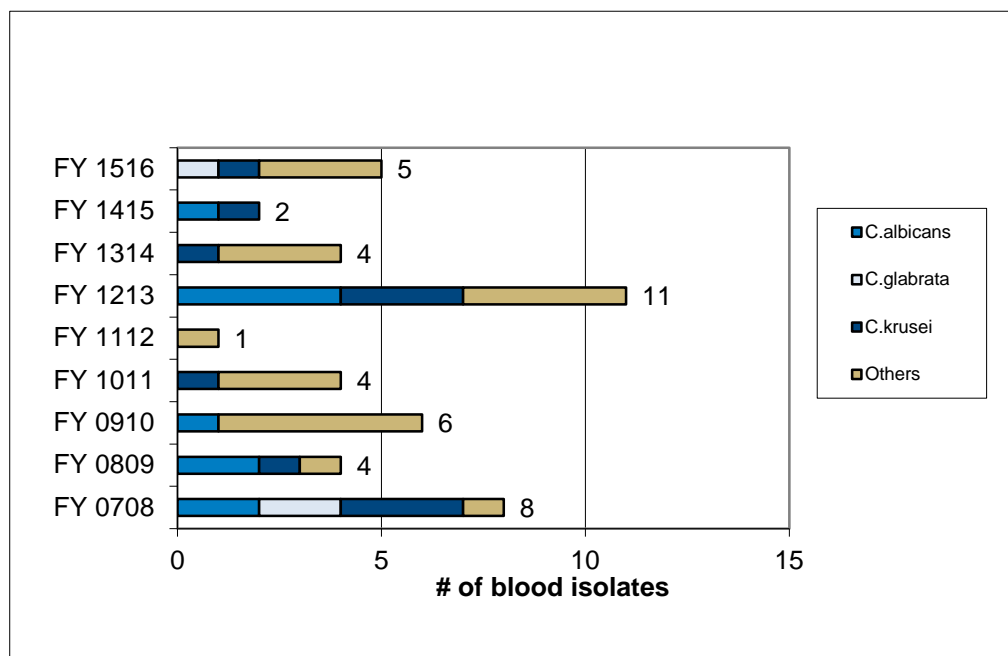
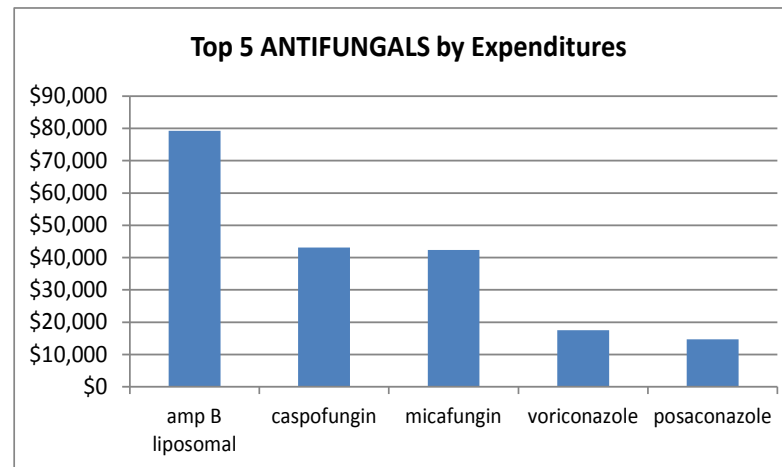
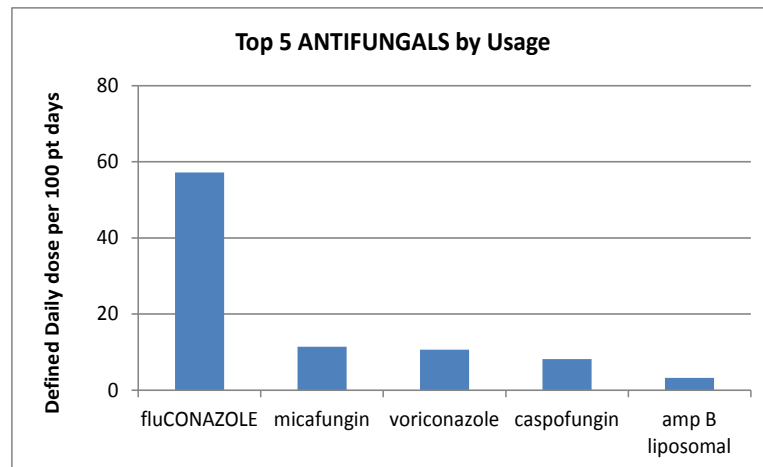
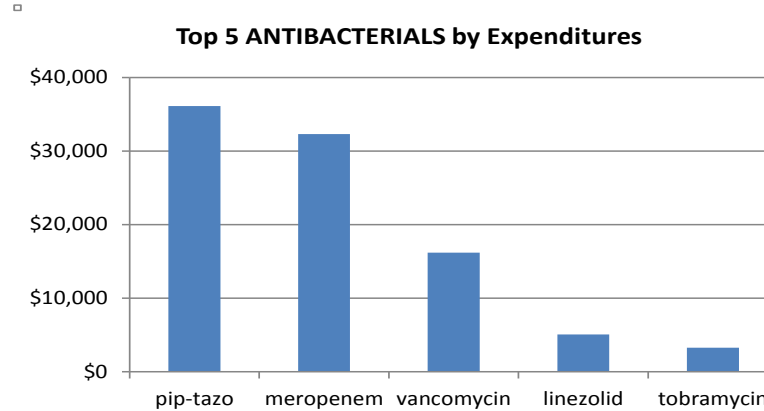
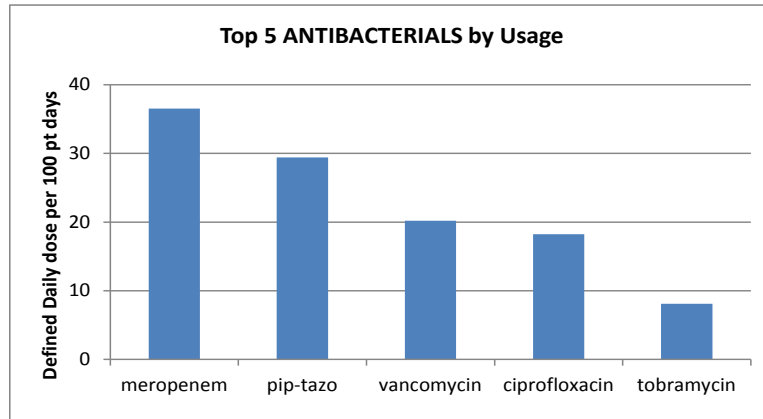


Table 22: Princess Margaret Cancer Centre: Leukemia FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures

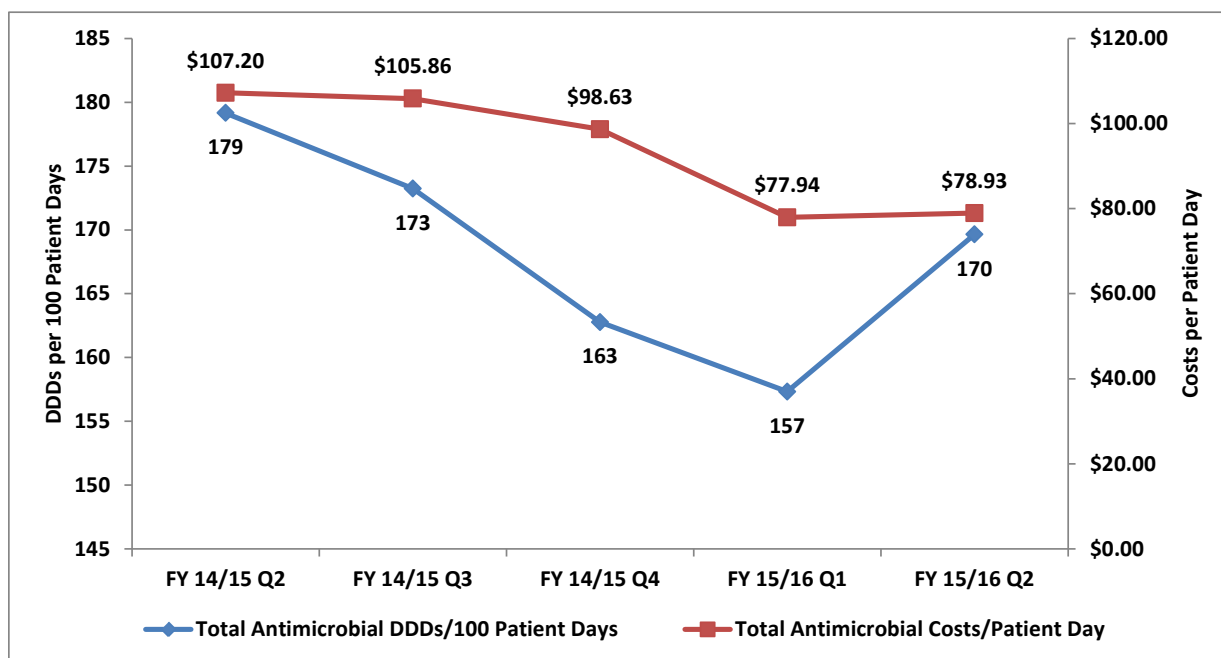


Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant

FY 15/16 Q2 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 6.1% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 28.7% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 29.0% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 28.6% compared to YTD last year.
- Note: The ASP team started prospective audit and feedback rounds with the Allogeneic BMT team in September 2014 (Q2).

Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant Antimicrobial Consumption and Costs Per Patient Day



To view **Appendix 3: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL – Princess Margaret Cancer Centre Leukemia and Allogeneic Bone Marrow Transplant**, please click [here](#).

***No candidemia cases were identified in Allogeneic Bone Marrow Transplant in 2013/14 or 2014/15.**

Table 23: Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant

Indicators	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
			Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs								
Total Antimicrobial DDDs/100 Patient Days	172	171	157	170			164	174
Systemic Antibacterial DDDs/100 Patient Days	114	104	102	113			108	111
Systemic Antifungal DDDs/100 Patient Days	59	67	55	57			56	63
Total Antimicrobial Costs	\$416,614	\$512,300	\$93,217	\$99,133			\$192,350	\$265,062
Total Antimicrobial Costs/Patient Day	\$85.65	\$106.13	\$77.94	\$78.93			\$78.45	\$109.98
Systemic Antibacterial Costs	\$75,219	\$78,038	\$12,487	\$16,325			\$28,812	\$39,858
Systemic Antibacterial Costs/Patient Day	\$15.46	\$16.17	\$10.44	\$13.00			\$11.75	\$16.54
Systemic Antifungal Costs	\$341,395	\$434,261	\$80,730	\$82,809			\$163,539	\$225,204
Systemic Antifungal Costs/Patient Day	\$70.19	\$89.97	\$67.50	\$65.93			\$66.70	\$93.45
Patient Care Outcomes								
Hospital-Acquired C. difficile Cases (rate per 1,000 patient days)	4 (0.82)	12 (2.49)	0 (0)	4 (3.18)			4 (1.63)	7 (2.61)

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 DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Table 24: Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures

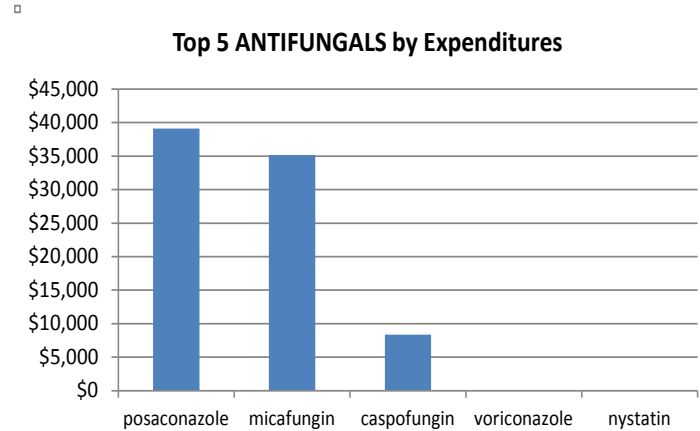
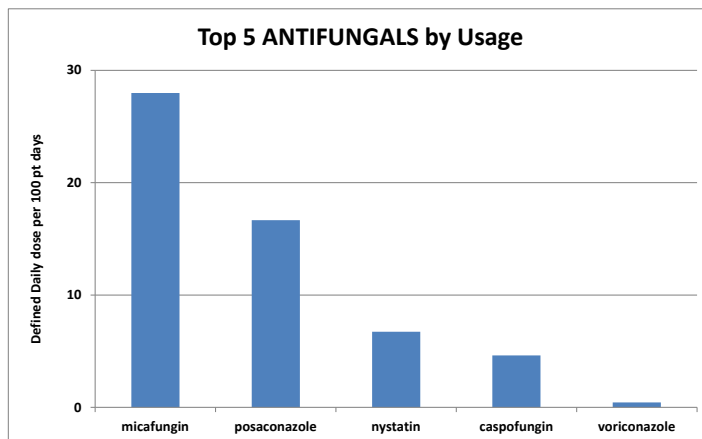
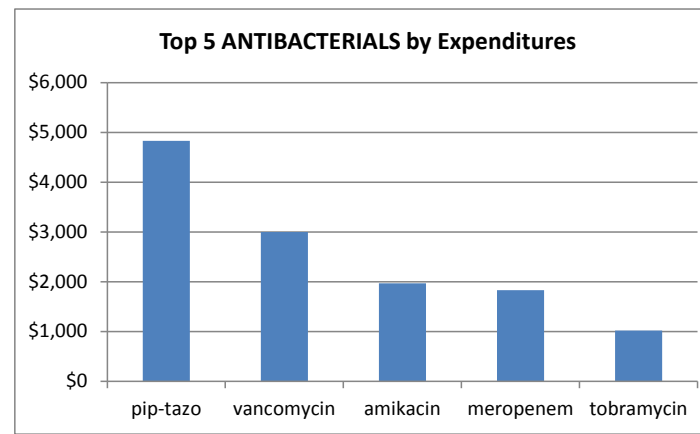
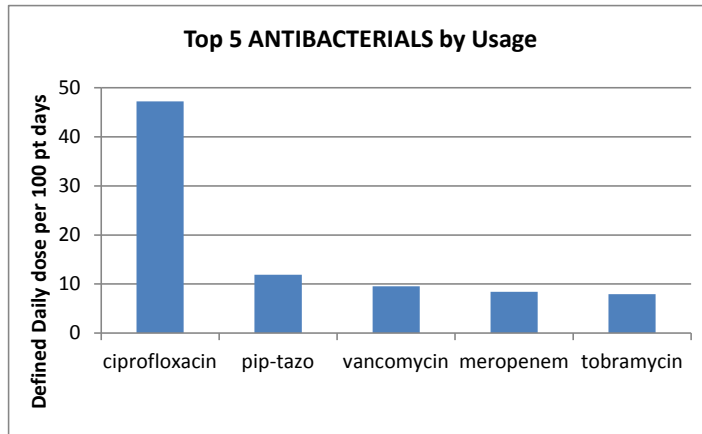
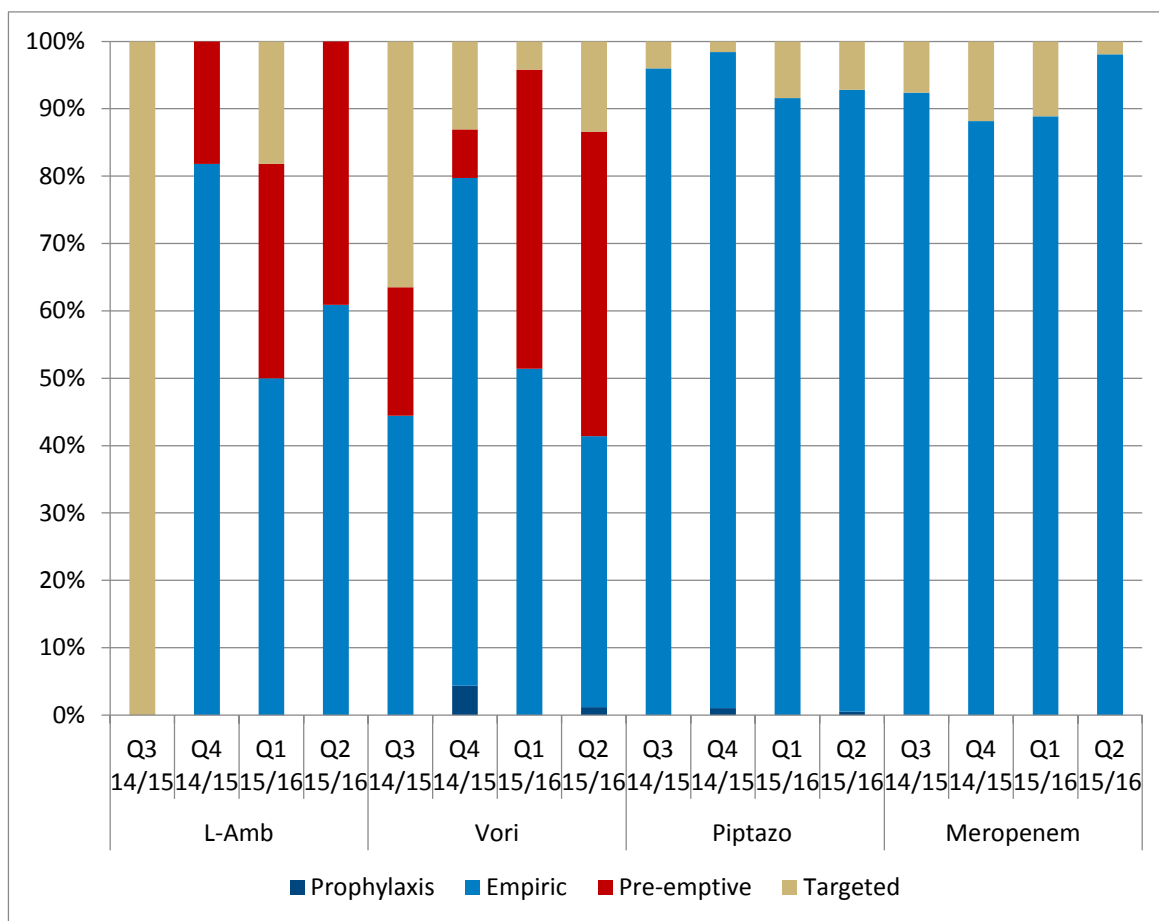
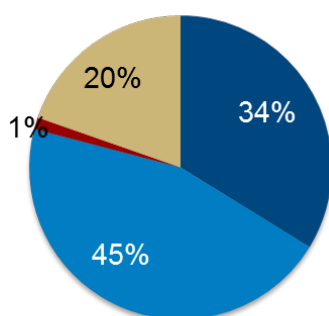


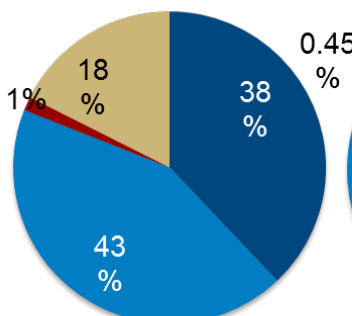
Table 25: Princess Margaret Cancer Centre: Febrile Neutropenia Drugs of Select Antimicrobials in Four Rolling Quarters: 14/15 Q3-4 and 15/16 Q1-2



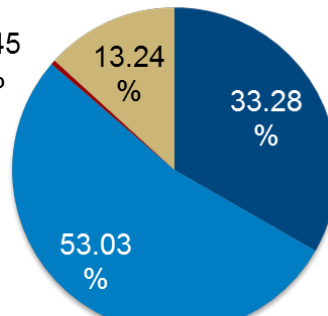
Prophylaxis
 Pre-emptive
 Empiric
 Targeted



Q2

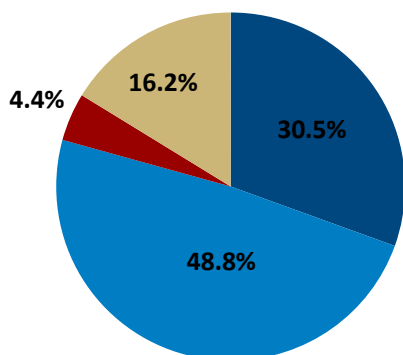


Q3

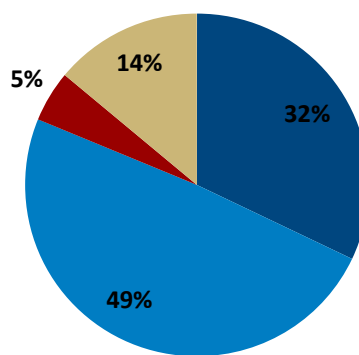


Q4

14/15



Q1 15/16



Q2 15/16

Toronto General Hospital: Multi-Organ Transplant Program (MOTP)

FY 15/16 Q2 highlights include:

- An inter-disciplinary ASP-MOTP working group has been meeting quarterly to review antimicrobial costs/ consumption and identify some deliverables for antimicrobial stewardship. Members of the working group include ASP team members (Dr. Husain and Miranda So) and representatives from Pharmacy, Nursing, the Quality of Care Committee, and Infection Prevention and Control, as well as the Clinical Director of MOTP.
- M. So (ASP Pharmacist) presented at the MOT Fellows' Orientation Day on July 17. This session provided some background information to new MOT fellows and also alerted them to the resources available for antimicrobial prescribing.
- The ASP team is actively engaging stakeholders as they plan to roll out antimicrobial stewardship interventions in the MOT units.

BEST PRACTICE GUIDELINES AND 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 approved and has been posted on the [ASP website](#). A series of education sessions has been undertaken targeting various clinical end-user groups at all sites. We will continue to audit compliance to the High-Risk Protocol. Dr. Husain and Miranda So have been working with the Autologous Bone Marrow Transplant Team to align our approach to the management and prevention of neutropenic fever for their patients in the ambulatory setting (day hospital).
- The Febrile Neutropenia Protocol for Solid Tumor and Lymphoma Patients was also updated and approved. Similar to the High-Risk Protocol, it has been posted on the [ASP website](#), while a series of education sessions has either been planned or completed with various clinical end-user groups.
- The ASP has completed baseline data collection for a quality improvement project to determine the indications and investigations involved prior to initiating antimicrobials in the Reducing Emergency and Acute Care Hospitalization (REACH) and Transfusion Clinic (TFC) for leukemia/Bone Marrow Transplant (BMT) patients ("REACH/TFC Antimicrobial 'Spot Audit'" project). Miranda So and Dr. Husain are working closely with the nurse practitioners to determine the project plan moving forward.
- Clinical summaries continue to be available on the [ASP website](#) and on [mobile device web browsers](#) 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 and was effortlessly taken on by frontline clinicians and incorporated into their daily practice.
- 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 initially launched in mid-November and involved extensive consultation, development, and revision with interdisciplinary stakeholders. An e-learning module was developed, as well as electronic order sets to support the algorithm. The CDI algorithm is currently being reformatted based on clinician and project stakeholders' feedback. The revised formatting is based on Human Factors Engineering and will be easier to navigate and print for frontline clinicians. The reformatted algorithm will be complete in the coming months.

RESEARCH

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

Publications

The following manuscripts have been published, or are accepted for publication and are currently 'in press', in peer-reviewed medical journals:

- Thampi N, Showler A, Burry L, Bai AD, Steinberg M, Ricciuto DR, Bell CM, Morris, AM. Multicenter Study of Healthcare Costs of Patients Admitted to Hospital with *Staphylococcus aureus* Bacteremia. *Am J Infect Control*. 2015;**43**(7):739-44
- Bai AD, Burry L, Showler A, Steinberg M, Ricciuto D, Fernandes T, Chiu A, Raybardhan S, Tomlinson G, Bell CM, Morris AM. Usefulness of previous screening for methicillin-resistant *Staphylococcus aureus* in guiding empiric therapy for *S. aureus* bacteremia. *Can J Infect Dis Med Microbiol*. 2015;**26**(4):201-206
- Showler A, Burry L, Bai AD, Steinberg M, Ricciuto DR, Fernandes T, Chiu A, Raybardhan S, Science M, Fernando E, Bell CM, Morris AM. Use of transthoracic echocardiography in the management of low-risk *Staphylococcus aureus* bacteremia: results from a retrospective multicenter cohort study. *J Am Coll Cardiol Img*. 2015;**8**(8):924-931
- Jeffs L, Thampi N, Maoine M, Steinberg M, Morris AM, Bell CM. A Qualitative Analysis of Implementation of Antimicrobial Stewardship at 3 Academic Hospitals: Understanding the Key Influences to Success. *Can J Hosp Pharm*. 2015;**68**(5):395-400

An additional three manuscripts have been submitted to medical journals and are currently undergoing peer review.

Abstracts

The following abstracts were presented at international Meetings by ASP team members:

- So M, Mamdani M, Deotare U, Schimmer A, Kim D, Bell C, Morris A. Evaluating the Long-Term Safety and Effectiveness of an Antimicrobial Stewardship Program in Leukemia Patients. Oral presentation at ICAAC Annual Conference 2015, Sept. 17-21, 2015; San Diego, CA, USA.
- So M, Yeats B, Lu S, Bell C, Morris A, Husain S. Compliance to a Febrile Neutropenia Protocol for Leukemia Patients Developed Based on Antimicrobial Stewardship Principles and Human Factors Engineering. Poster presentation at ICAAC Annual Conference 2015, Sept. 17-21, 2015; San Diego, CA, USA.

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.

- Twice a month the ASP team meets with all Nurse Practitioners from the Malignant Hematology programs for case rounds.
- 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.
- 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 are participating in the grant. A series of lectures on stewardship principles and therapeutic topics was delivered over an eight-month period, with each site gathering and reporting baseline and ongoing antimicrobial consumption data. The 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 for its 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 goal of the ASP ARTIC CHILL project is to establish fully functional Antimicrobial Stewardship Programs (ASPs) within community hospital ICUs using a Hub/Spoke model to allow for a provincial ASP Community of Practice. The site leaders (Hubs) will act as coaches and mentors for ASP implementation at local community sites (Spokes). The aim is to optimize the use of antimicrobials in ICUs, specifically supporting the establishment of an ASP, ensuring each Spoke is able to report results on antimicrobial use and *C. difficile* infection rates and meet Accreditation Canada's requirements. Project work has involved securing four Council of Academic Hospitals of Ontario (CAHO) ASP Hub site leads – London Health Sciences Centre, Hamilton Health Sciences, Lakeridge Health, and Children's Hospital of Eastern Ontario – who in turn will guide eight hospitals with ASP implementation within their ICUs.

The CAHO/HQO ASP project team hosted an in-person meeting that was well-attended by the Hub and Spoke site leads and has helped to establish a community of practice by hosting regular project teleconferences. Over the last several months, the Hub leads have been working with the Spoke sites to collect pre-ASP implementation baseline data related to antimicrobial use and *C. difficile* infection rates specific to their ICUs. The Spoke sites have selected their chosen ASP interventions based on their local context and have completed implementation over July and August. The MSH-UHN ASP team will be conducting on site-visits post-implementation to evaluate the interventions.

Expert Consultation

The ASP continues to provide expert advice and consultation to various hospitals throughout the province. We are currently assisting Sault Area Hospital, Guelph General Hospital, Huron Perth Healthcare Alliance (Clinton Public Hospital, St. Mary's Memorial Hospital, Seaforth Community Hospital, and Stratford General Hospital), and Alexandra Marine and General Hospital.

The ASP team has also been providing expert guidance to SASS (Students for Antimicrobial Stewardship Society) to create awareness and promote antimicrobial stewardship principles to the next generation of prescribers.



Cancer Care Ontario

The MSH-UHN ASP team is grateful to 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 ASP. The partnership involves the development and delivery of an on-line course and a series of interactive group webinars. The third cohort of this on-line course has already commenced, and the course will continue to be offered for 2016.

Public Health Agency of Canada

In August, national health leaders were drawn to Mount Sinai Hospital and University Health Network to visit the MSH-UHN ASP to better understand antimicrobial stewardship and for a behind-the-scenes look at the program and our current ASP strategies. The visiting group consisted of Dr. Gregory Taylor, Canada's Chief Public Health Officer, Krista Outhwaite, President of the Public Health Agency of Canada, Dr. Theresa Tam, Deputy Chief Public Health Officer, Karen Michell, Executive Director, Council of Academic Hospitals of Ontario, and HealthCareCAN's CEO, Bill Tholl. They visited several key locations at MSH and UHN and met with various clinicians and senior leadership. The goal of this visit was to shine a light on best practices in antimicrobial stewardship and help facilitate their spread across the country. As a result of this meeting, the MSH-UHN ASP was featured at the G7 Health Ministers meeting in Germany and has helped inform our national health leaders of the possibilities of a Pan-Canadian strategy on Antimicrobial Stewardship and Resistance.

Dr. Andrew Morris is an invited member of EAGAR (Expert Advisory Group on Antimicrobial Resistance) chaired by the Federal Chief Medical Officer of Health, Dr. Gregory Taylor.

Association of Medical Microbiology and Infectious Diseases Canada

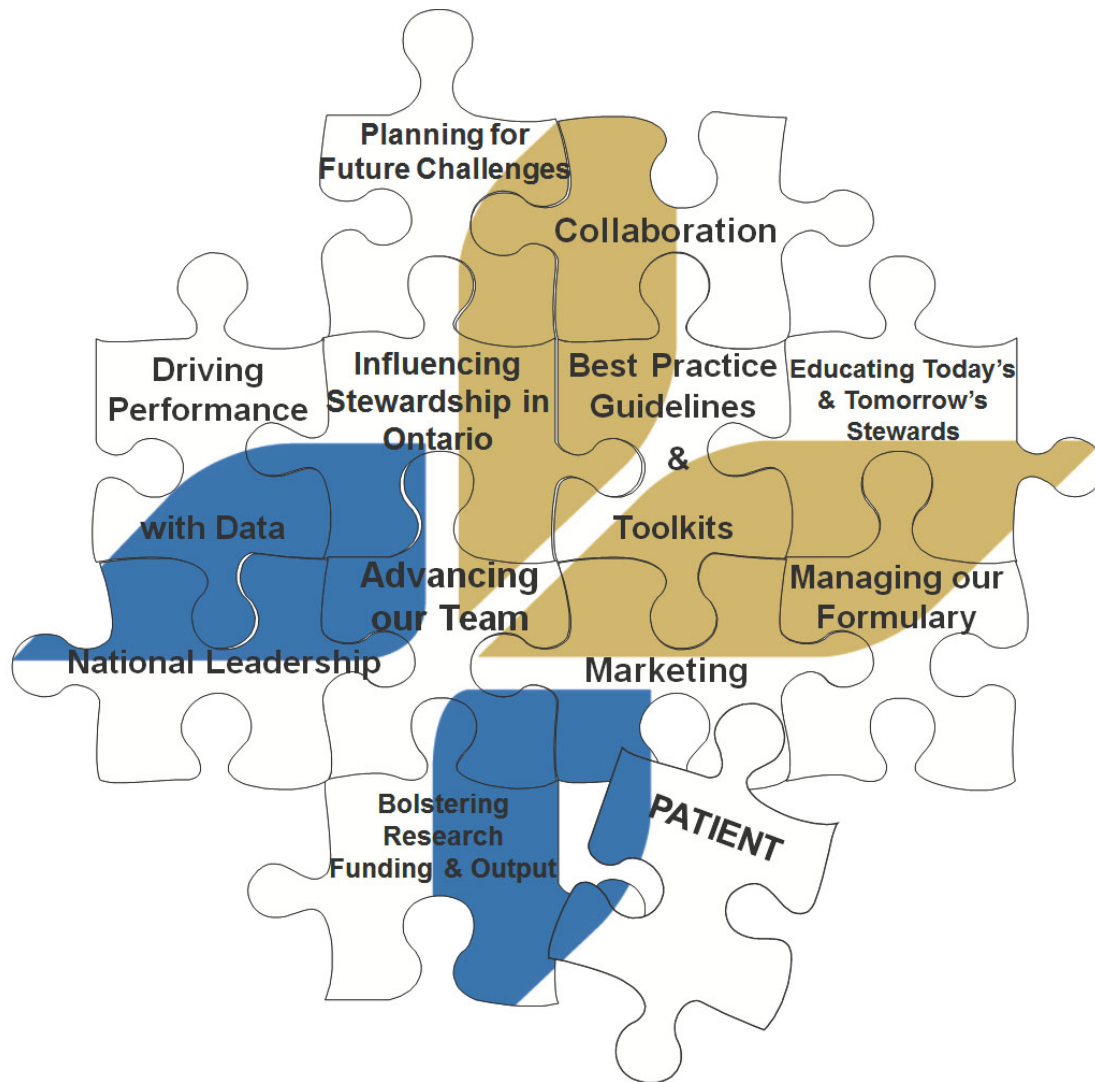
Dr. Andrew Morris is the incoming chair of AMMI Canada's Antimicrobial Stewardship and Resistance Committee.

ASP Rotations at MSH and UHN

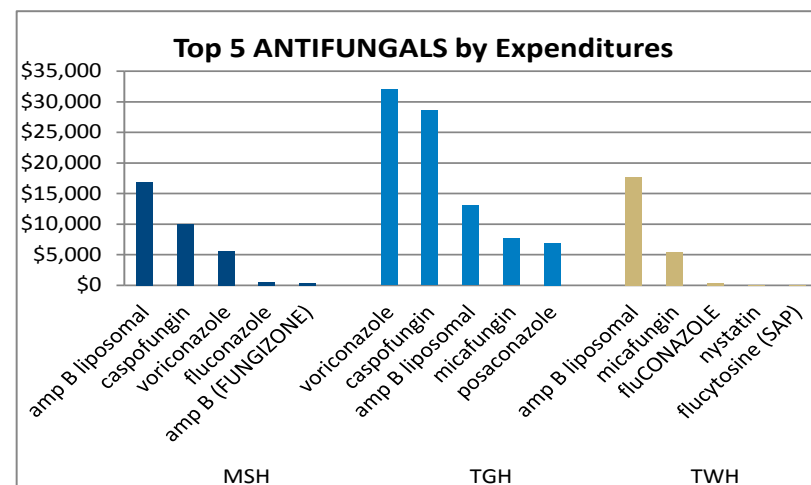
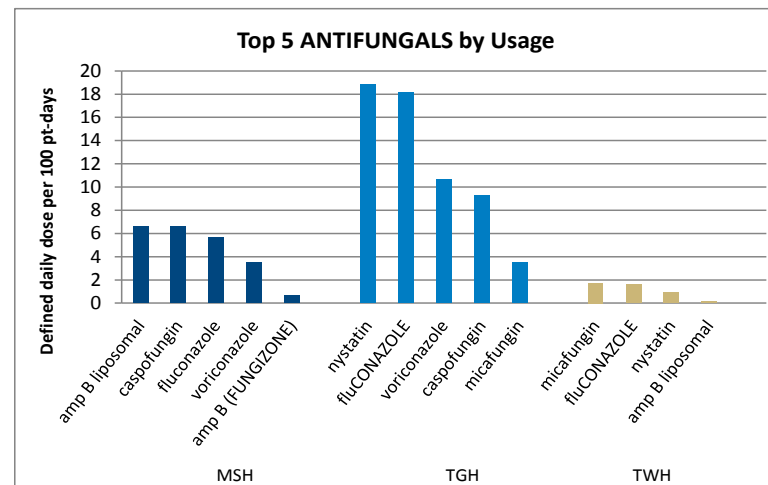
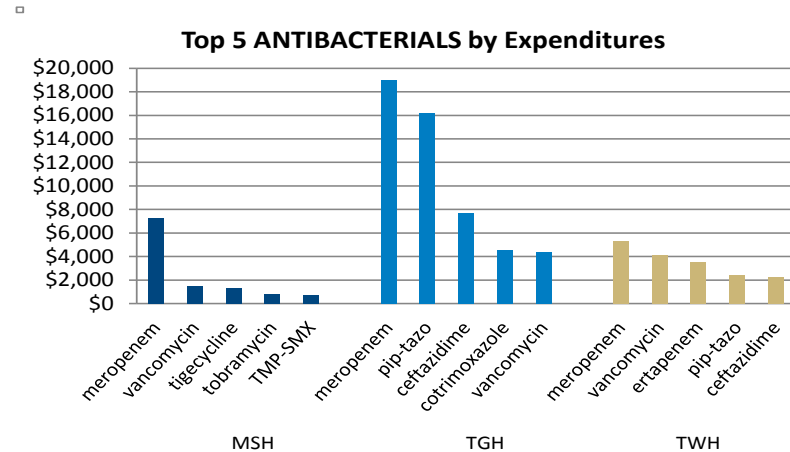
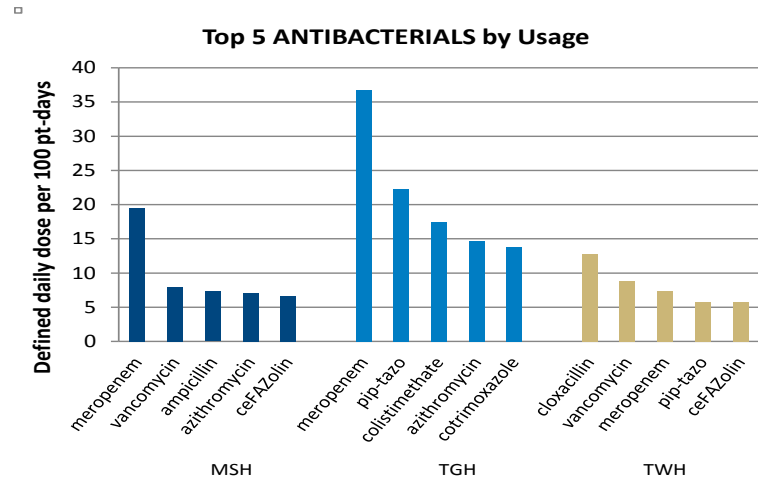
The MSH-UHN ASP continues to receive multiple requests for ASP rotations from residents and fellows across the country and internationally.

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.

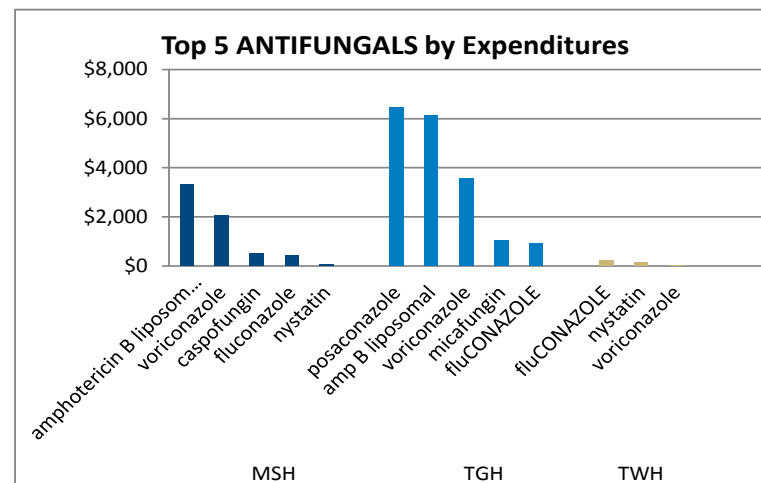
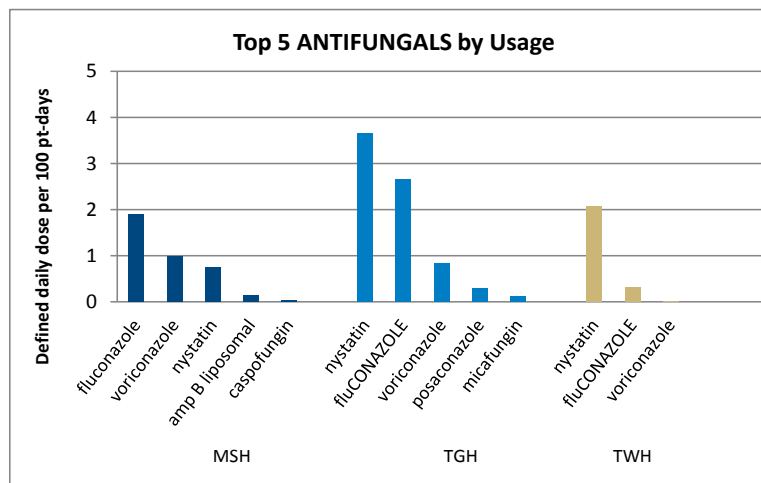
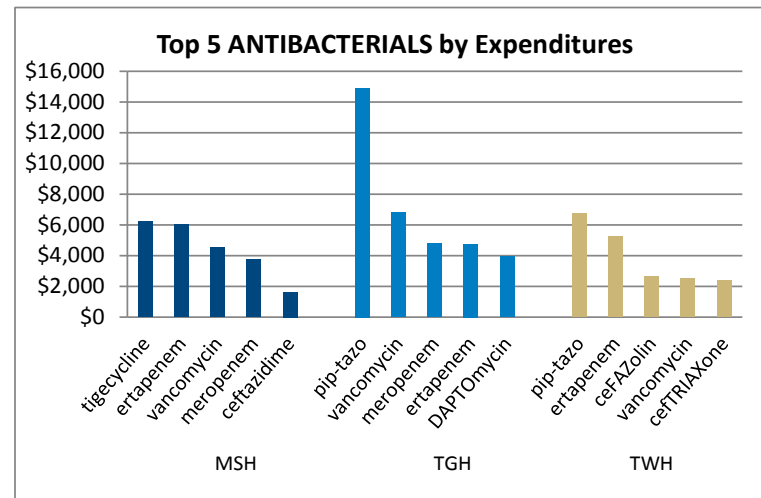
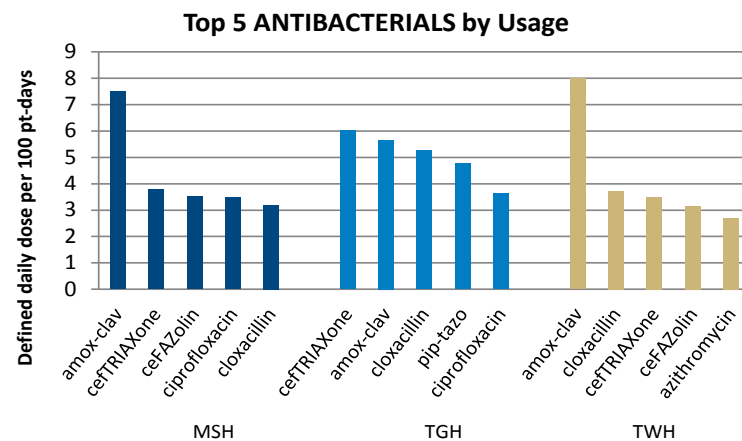


Appendix 1: FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDD per 100 Patient Days) and Expenditures by ICU Site



Appendix 2: General Internal Medicine FY 15/16 Q2 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures

□



Appendix 3: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL – Princess Margaret Cancer Centre: Leukemia and Allogeneic Bone Marrow Transplant

