MSH + UHN

ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

FISCAL YEAR 2015 | 2016
Q3 REPORT

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

UHN
Toronto General
Toronto Western
Princess Margaret
Toronto Rehab
COURAGE LIVES HERE

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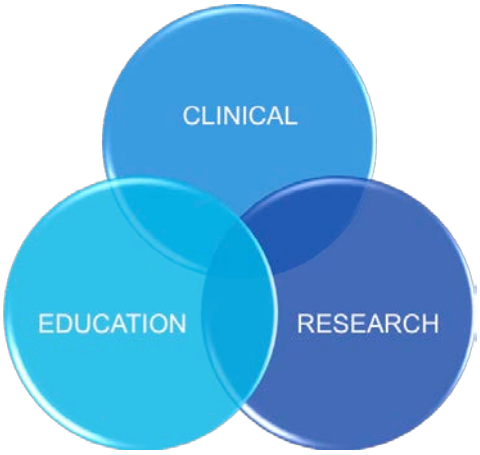
"Getting patients the right antibiotics, when they need them"

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.

We recently introduced a graphic of Defined Daily Doses (DDD) together with Days of Therapy (DOT). The metrics are extracted from the hospital pharmacy databases and 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 the MSH ICU, MSH NICU, and TGH CVICU, with a marginal increase in cost and consumption in the MSH ICU and TGH CVICU respectively. The GIM wards, Leukemia service and Allo-BMT are also showing a decrease, with no significant increase in consumption and cost. There is a greater than 10% increase in antimicrobial consumption in the TGH ICU and TGH MOT, attributable to an increase in antifungal consumption for a patient who required extensive combination antifungal therapy. The increase in consumption and cost at TWH's ICU is due to a low baseline, and the increase in antifungal use was likely influenced by one or two patients with severe invasive fungal infection. We will monitor to ensure that usage returns to baseline levels.

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	↓	↓
Toronto General Hospital: Multi-Organ Transplant Program	↑↑	↓

↓ Decrease compared to previous YTD

↑ Increase of < 10% compared to previous YTD

↑↑ Increase of > 10% compared to previous YTD

FISCAL YEAR 15/16 Q3 HIGHLIGHTS

Research – Published In This Quarter

In Q3, the following commentaries were published in peer-reviewed medical journals:

- Morris AM, Gollish J. Commentary – Arthroplasty and postoperative antimicrobial prophylaxis. Can Med Assoc J. 2015 Oct 5. pii: cmaj.150429. [Epub ahead of print]
- Morris AM, Webb GD. What to think about antibiotic prophylaxis and infective endocarditis. Can J Cardiol. 2015 Oct 24. pii: S0828-282X(15)01538-X. doi: 10.1016/j.cjca.2015.10.014. [Epub ahead of print]

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

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. **The CDI algorithm was reformatted** based on clinician and project stakeholder feedback **and can be found** here on our ASP website. The revised formatting is based on Human Factors Engineering and will be easier to navigate and print for frontline clinicians.

ASP nurse-focused initiative aimed at reducing overtreatment of **Asymptomatic Bacteriuria**: Key deliverables of this initiative included 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. All four units that took part in this initiative reduced unnecessary urine C&S utilization and reduced asymptomatic bacteriuria and/or antibiotic usage.

Provincial and National Role: The MSH-UHN ASP has been working closely with HealthCareCAN, the National Collaborating Centre for Infectious Diseases (NCCID), and the Public Health Agency of Canada (PHAC) to inform our national health leaders and to organize a Pan-Canadian Action Round Table on Antimicrobial Stewardship and Resistance, which will take place in Toronto on June 16 and 17, 2016. Our team has also partnered with Public Health Ontario in hosting an Ontario Antimicrobial Stewardship Roundtable. This roundtable meeting included a cross-section of experts in antimicrobial stewardship, including primary care, long-term care, acute care, and perspectives from the Assistant Deputy Minister, Health Systems Quality and Funding, and Strategy and Policy Advisor and Infectious Disease Policy and Programs Sections.

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).

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 fourth cohort has completed the online course, and the course will continue to be offered for 2016. Our program has also partnered with CHA Learning, the professional development branch of HealthCareCAN, to develop materials for a course in change leadership in the healthcare setting.

FISCAL YEAR 15/16 Q3 RESULTS

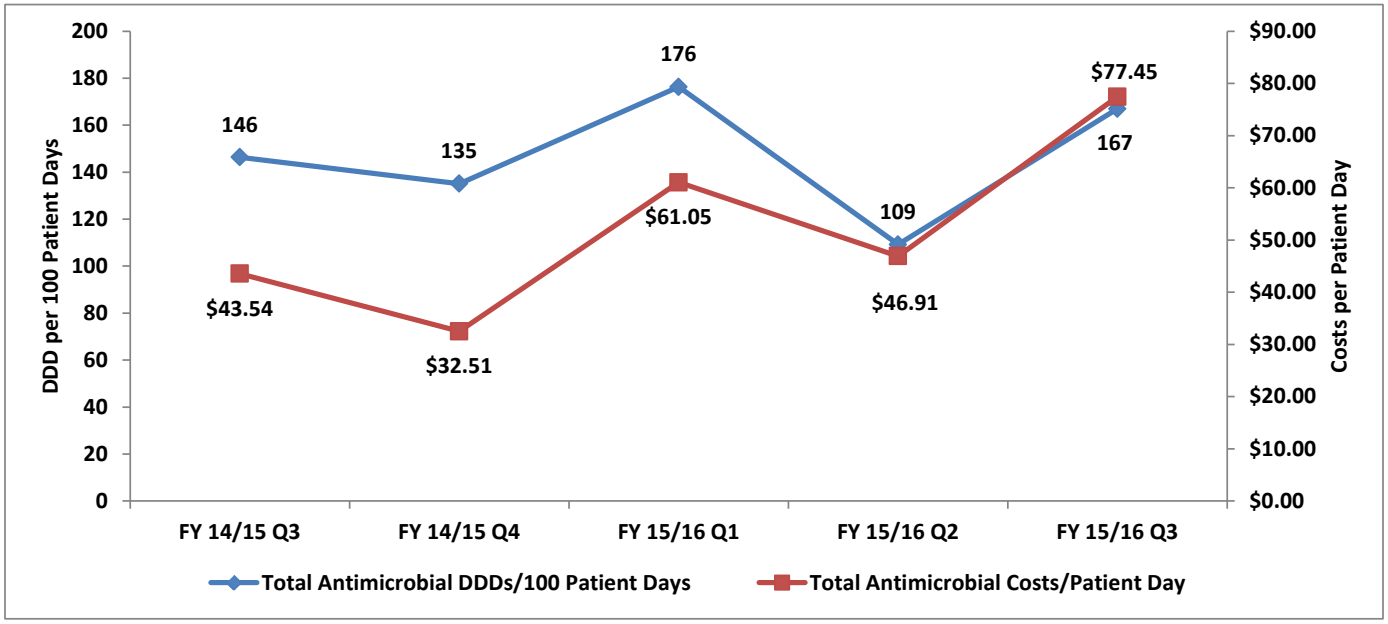
CRITICAL CARE

Mount Sinai Hospital: Medical Surgical ICU

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 10.1% compared to YTD last year.
- Antimicrobial costs per patient day increased (↑) by 3.8% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 31.9% compared to YTD last year.
- Antifungal costs per patient day increased (↑) by 22.7% compared to YTD last year.
- NB: Princess Margaret patients accounted for 16% of patient visits and 78% of the antimicrobial costs.

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



To view **Appendix 1: FY 15/16 Q3 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 increased (↑) by 0.9% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 8.5% compared to YTD last year.

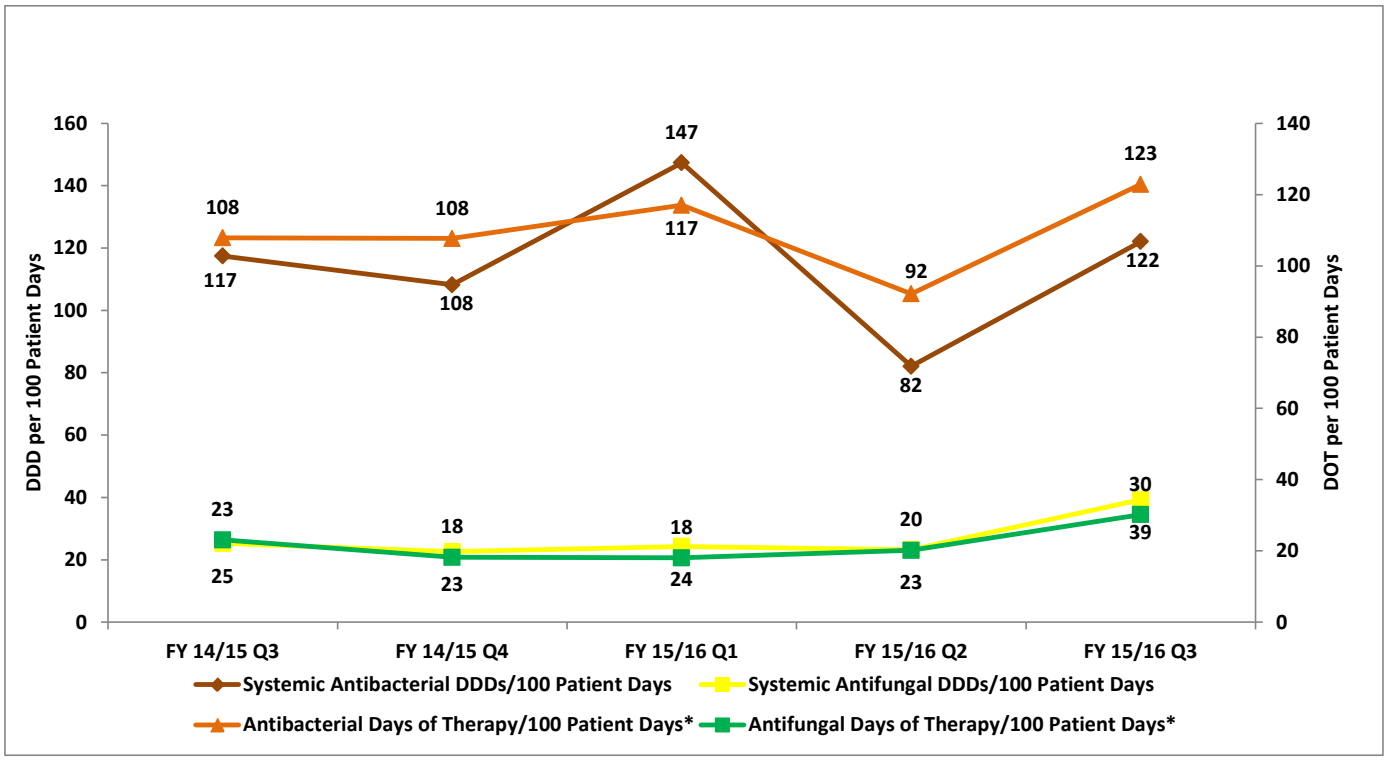


Table 2: Mount Sinai Hospital: Medical Surgical ICU

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**	**167**		**151**	**168**
Systemic Antibacterial DDDs/100 Patient Days	142	128	111	128	127	123	136	147	82	122		117	137
Systemic Antifungal DDDs/100 Patient Days	31	24	20	33	35	36	25	24	23	39		30	27
Total Antimicrobial Costs	$332,724	$285,975	$193,129	$279,859	$291,470	$422,634	$232,814	$60,318	$49,492	$95,416		$205,226	$199,277
Total Antimicrobial Costs/Patient Day	**$69.01**	**$59.23**	**$40.95**	**$59.22**	**$62.37**	**$85.07**	**$62.54**	**$61.05**	**$46.91**	**$77.45**		**$62.66**	**$60.39**
Systemic Antibacterial Costs	$174,339	$142,134	$95,773	$125,339	$134,811	$108,886	$92,928	$20,746	$14,673	$17,262		$52,680	$77,900
Systemic Antibacterial Costs/Patient Day	$36.16	$29.44	$20.31	$26.94	$28.85	$21.92	$20.71	$21.00	$13.91	$14.01		$16.09	$23.61
Systemic Antifungal Costs	$143,100	$132,519	$88,998	$141,877	$144,811	$295,163	$134,504	$31,338	$33,608	$75,612		$140,558	$115,429
Systemic Antifungal Costs/Patient Day	$29.68	$27.45	$18.87	$30.50	$30.99	$59.41	$40.53	$31.72	$31.86	$61.37		$42.92	$34.98
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	111	109	117	92	123		111	110
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	17	21	18	20	30		23	21
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)	1 (0.81)		4 (1.22)	4 (1.21)
ICU Average Length of Stay (Days)	5.84	5.57	5.67	5.51	5.24	6.10	5.26	3.71	3.7	5.61		4.3	5.26
ICU Mortality Rate (as a %)	20.1	17.6	16.3	16.5	17.04	15.3	13.9	14.5	13.2	16.2		14.6	13.9
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	3.3		2.7	2.6
ICU Ventilator Days	NA	3286	2934	2677	2749	3069	2597	489	536	785		1810	1915
ICU Multiple Organ Dysfunction Score (MODS)	4.00	4.04	4.12	4.25	4.62	4.87	4.73	4.07	4.49	4.55		4.37	4.74

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 ($25.21)	$11,443 ($14.32)	$13,463 ($15.44)		$45,953 ($18.34)	$118,833 ($44.03)
PM Patients	$114,392 ($179.02)	$191,928 ($181.58)	$182,188 ($249.91)	$272,757 ($317.16)	$97,419 ($135.68)	$39,271 ($295.27)	$38,048 ($152.81)	$81,953 ($377.66)		$159,272 ($265.9)	$78,444 ($143.67)
Total	$193,129 ($44.26)	$279,859 ($61.97)	$291,470 ($69.91)	$422,634 ($87.11)	$232,814 ($52.46)	$60,318 ($62.31)	$49,492 ($47.22)	$95,416 ($87.62)		$205,226 ($66.1)	$197,277 ($60.79)

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)

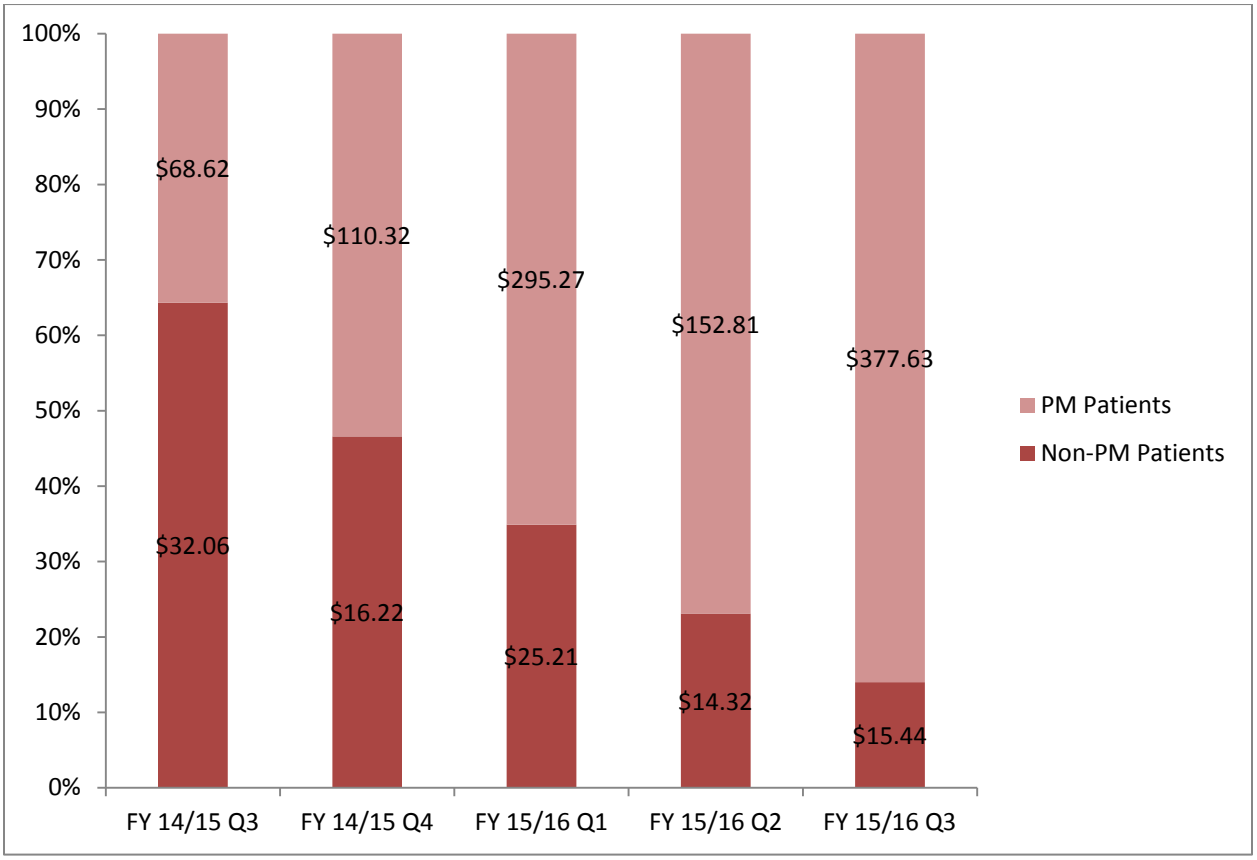


Table 4: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL – Mount Sinai Hospital: Medical Surgical ICU

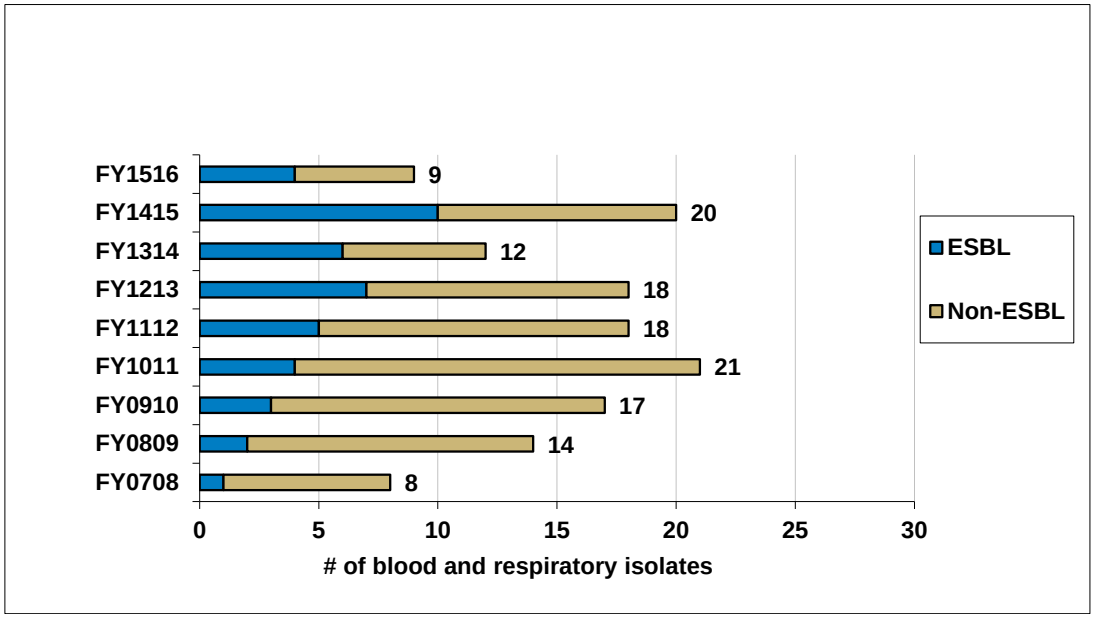
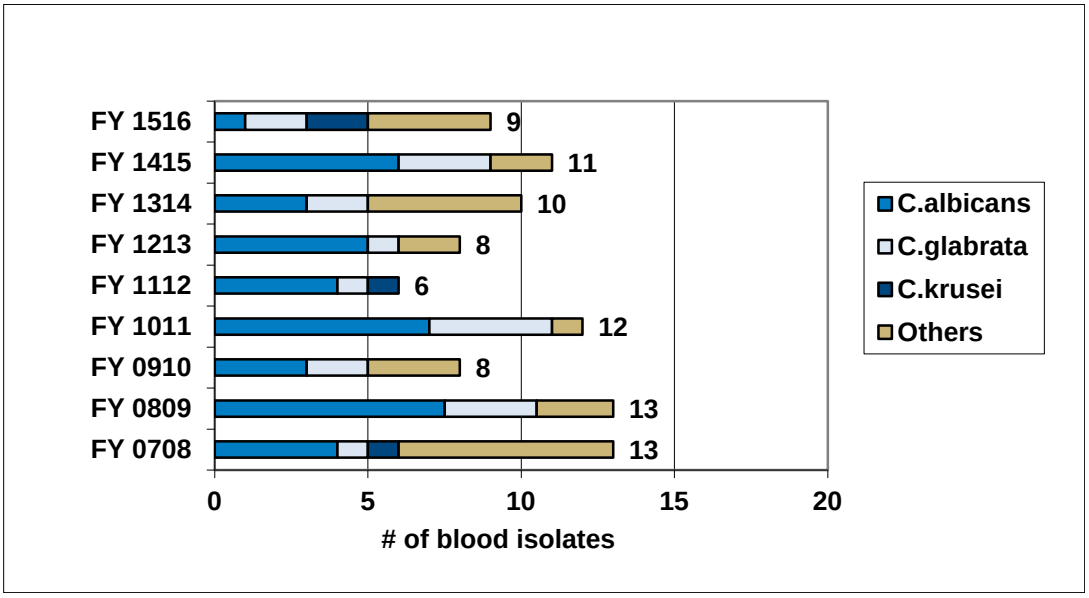


Table 5: Yeast Species Isolated in Blood – Mount Sinai Hospital: Medical Surgical ICU



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 Q3 highlights include:

- Antimicrobial days of therapy (DOT) per 100 patient days decreased (↓) by 38.1% compared to YTD last year.
- Antimicrobial costs per patient day have decreased (↓) by 3.2% compared to YTD last year ($1.31 to $1.27).

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

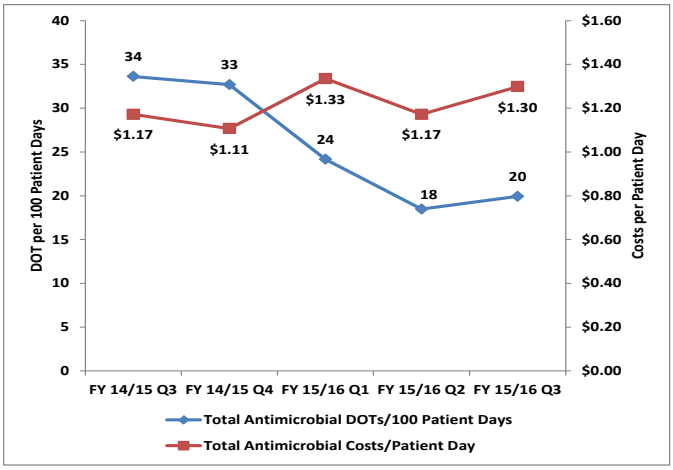


Table 6: Mount Sinai Hospital: Neonatal ICU

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**	**19.9**		**20.9**	**33.7**
Systemic Antibacterial DOTs/100 Patient Days	65.1	53.5	48.7	32.7	23.3	17.6	19.1		20.1	33.2
Systemic Antifungal DOTs/100 Patient Days	2.2	1.8	0.7	0.8	0.8	0.8	0.8		0.8	0.5
Total Antimicrobial Costs	$16,415	$17,682	$26,162	$21,371	$5,858	$5,041	$5,312		$16,211	$16,617
Total Antimicrobial Costs/Patient Day	**$1.31**	**$1.51**	**$2.17**	**$1.26**	**$1.33**	**$1.17**	**$1.30**		**$1.27**	**$1.31**
Systemic Antibacterial Costs	$14,783	$16,505	$25,290	$20,516	$5,830	$4,871	$5,091		$15,792	$15,813
Systemic Antibacterial Costs/Patient Day	$1.18	$1.41	$2.10	$1.21	$1.33	$1.13	$1.24		$1.24	$1.25
Systemic Antifungal Costs	$1,632	$1,177	$872	$855	$27	$170	$221		$419	$805
Systemic Antifungal Costs/Patient Day	$0.13	$0.10	$0.07	$0.05	$0.006	$0.04	$0.05		$0.03	$0.06

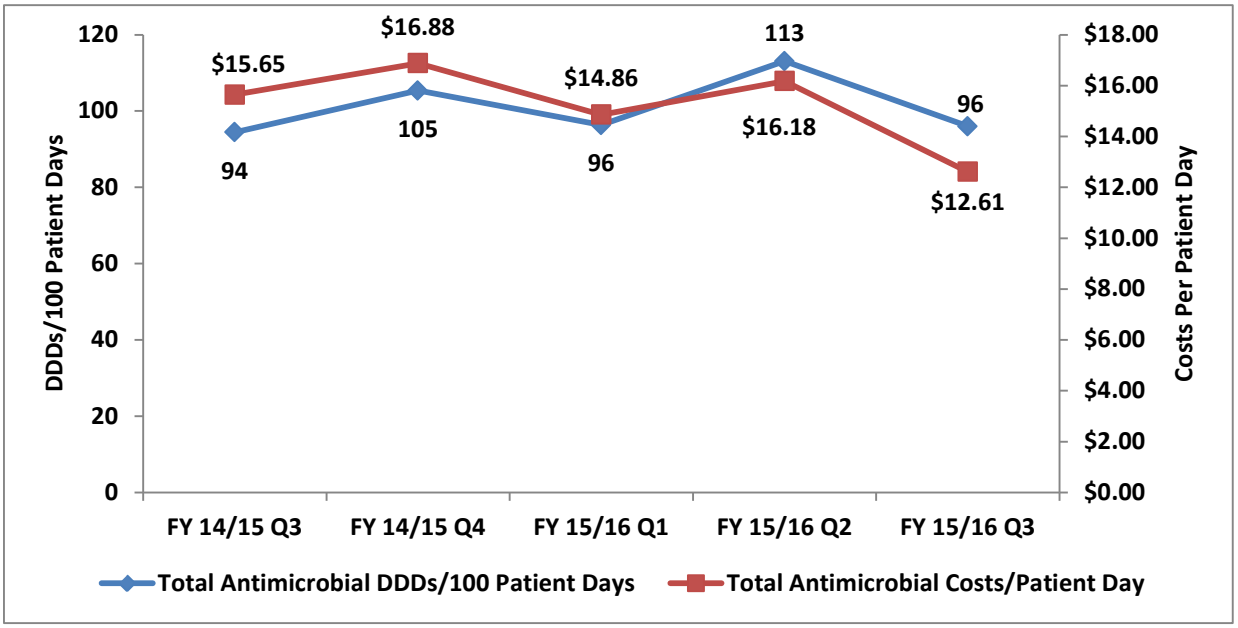
Notes: Effective January 15, 2014, the NICU changed to a mixed-acuity model of care. Prior to this, ASP reported level 3 pharmacy data only. As of January 15, pharmacy data includes both level 2 and level 3 usage and cost. Patient days include both level 2 and 3 days; January level 2 days were determined 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 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 0.7% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 32.4% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 12.5% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 73.2% 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 1.2% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 13.3% compared to YTD last year.

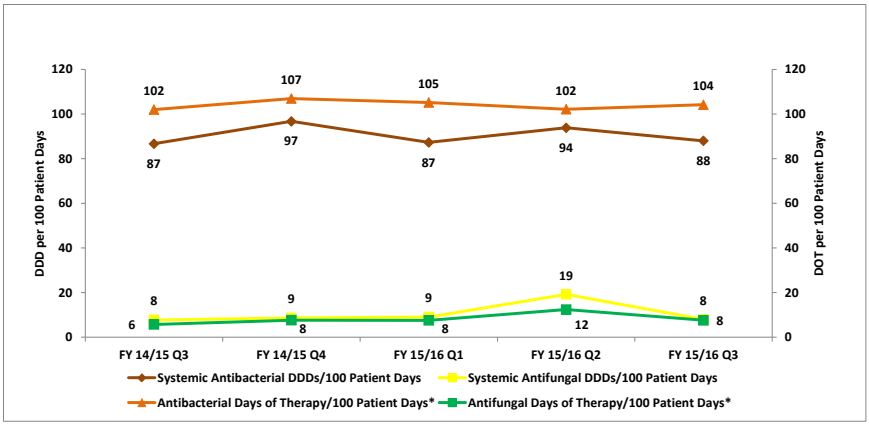
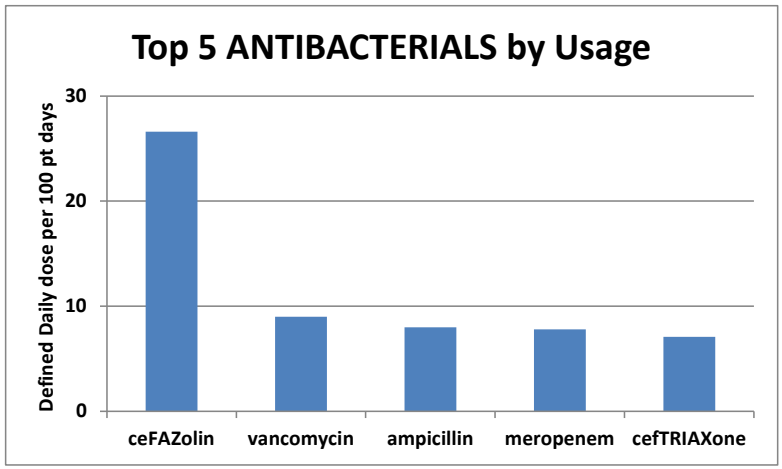


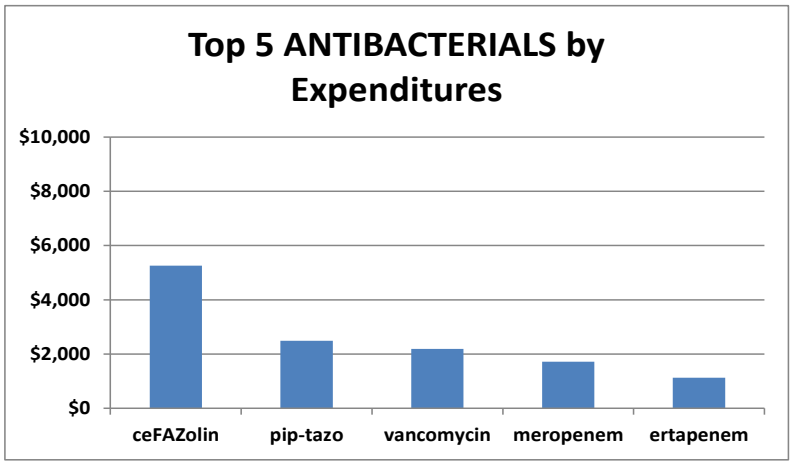
Table 7: Toronto General Hospital: Cardiovascular ICU

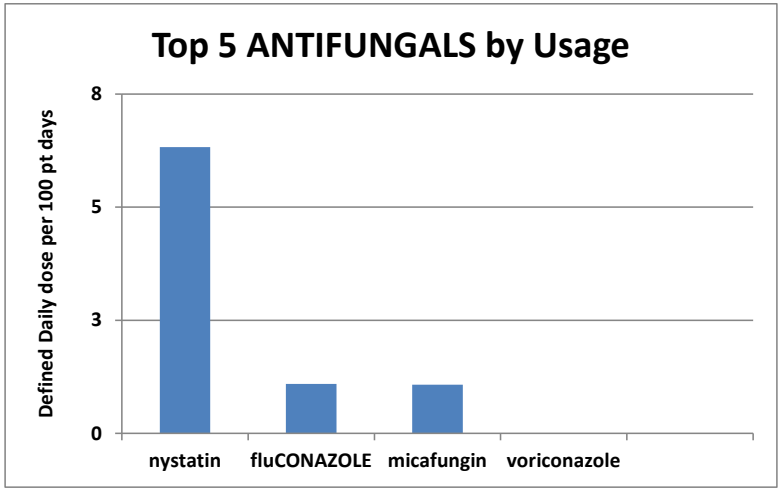
Indicators	FY 10/11 (Pre-ASP)	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY15/16 Performance					YTD of Previous Year
						Q1	Q2	Q3	Q4	YTD	
Antimicrobial Usage and Costs											
Total Antimicrobial DDDs/100 Patient Days	**105**	**98**	**102**	**97**	**102**	**96**	**113**	**96**		**102**	**101**
Systemic Antibacterial DDDs/100 Patient Days	95	86	89	86	93	87	94	88		90	92
Systemic Antifungal DDDs/100 Patient Days	10	12	13	11	9	9	19	8		12	9
Total Antimicrobial Costs	$108,172	$108,464	$85,916	$100,736	$129,314	$25,464	$29,230	$19,917		$74,611	$102,951
Total Antimicrobial Costs/Patient Day	**$18.20**	**$19.06**	**$14.99**	**$17.00**	**$20.46**	**$14.86**	**$16.18**	**$12.61**		**$14.62**	**$21.63**
Systemic Antibacterial Costs	$100,375	$99,261	$74,232	$80,204	$91,366	$22,633	$24,310	$17,933		$64,875	$69,114
Systemic Antibacterial Costs/Patient Day	$16.89	$17.44	$12.95	$13.54	$14.45	$13.20	$13.45	$11.35		$12.71	$14.52
Systemic Antifungal Costs	$7,797	$9,204	$11,684	$20,532	$37,948	$2,832	$4,921	$1,984		$9,736	$33,837
Systemic Antifungal Costs/Patient Day	$1.31	$1.62	$2.04	$3.47	$6.00	$1.65	$2.72	$1.26		$1.91	$7.11
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	129.0	105.2	102.16	104.21		103.84	105.08
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	27.7	7.55	12.41	7.6		9.29	8.2
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)	0 (0.00)		5 (0.98)	3 (0.63)
ICU Average Length of Stay (days)	3.12	2.95	2.97	3.20	3.46	3.27	3.8	3.44		3.5	3.43
ICU Mortality Rate (as a %)	3.5	3.0	3.0	4.6	4.6	3.6	4.5	4.47		4.2	4.6
ICU Readmission Rate Within 48 Hrs (as a %)	1.6	2.2	1.8	2.2	2.4	1.2	0.3	2.6		1.4	2.6
Central Line Infection Rate (per 1000 pt days)	0.73	0.17	0.34	0.16	0.15	0.5	0.00	1.25		0.7	0.20
Ventilator-Associated Pneumonia Rate (per 1,000 pt days)	2.99	2.80	1.91	1.73	2.81	1.05	0.86	0.00		0.63	3.57
ICU Multiple Organ Dysfunction Score (MODS)	6.22	6.07	5.51	5.77	5.60	5.41	6.06	5.96		5.81	5.69
ICU Ventilator Days	3015	3571	3676	4049	3925	952	1168	1061		3181	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 Q3 Top 5 Antimicrobials by Usage (DDDs per 100 patient-days) and Expenditures







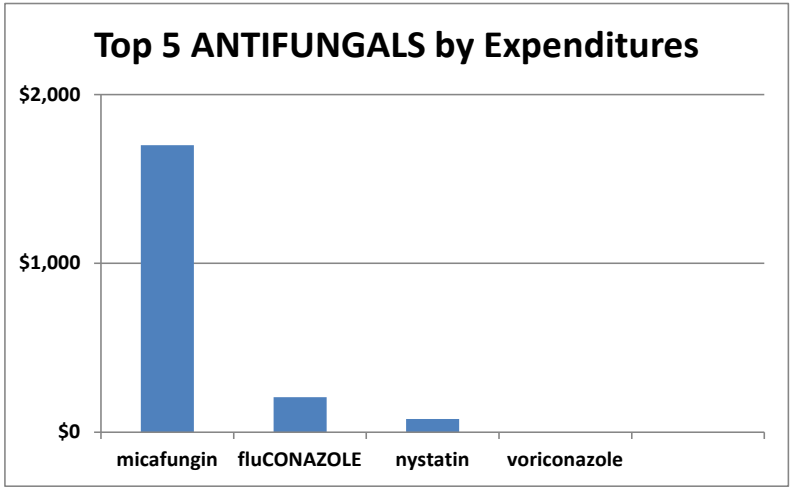


Table 9: E. coli Isolates From Blood and Respiratory System: Non-ESBL vs. ESBL – Toronto General Hospital Cardiovascular ICU

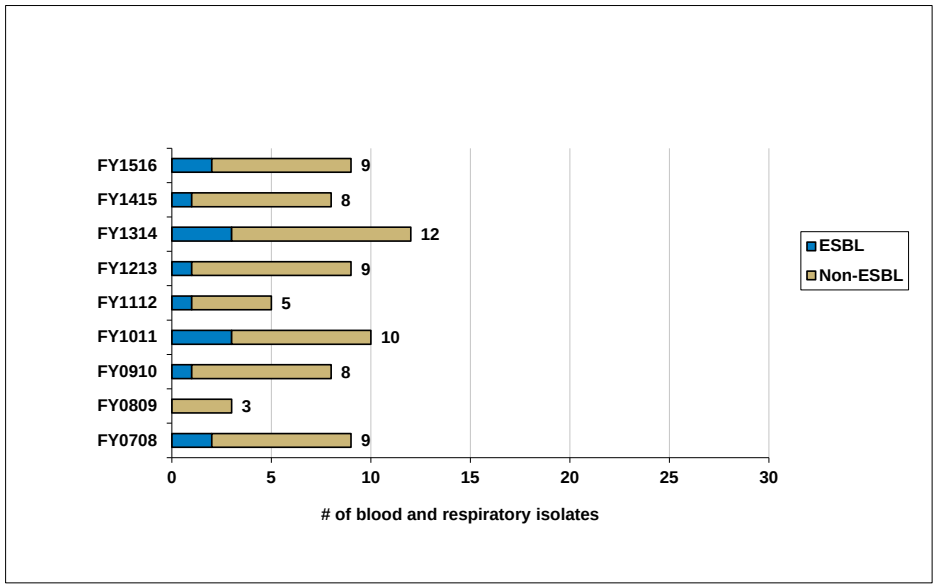
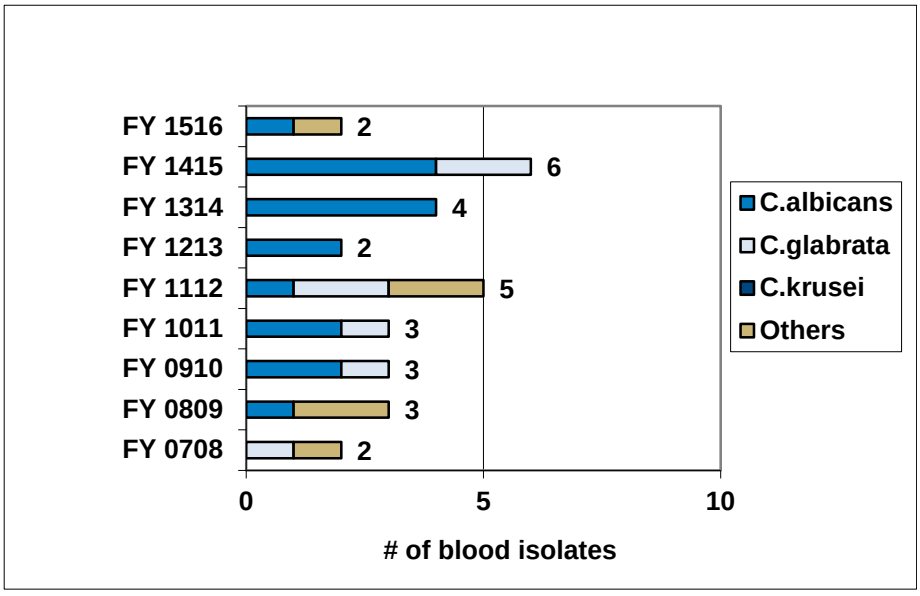


Table 10: Yeast Species Isolated in Blood – Toronto General Hospital Cardiovascular ICU

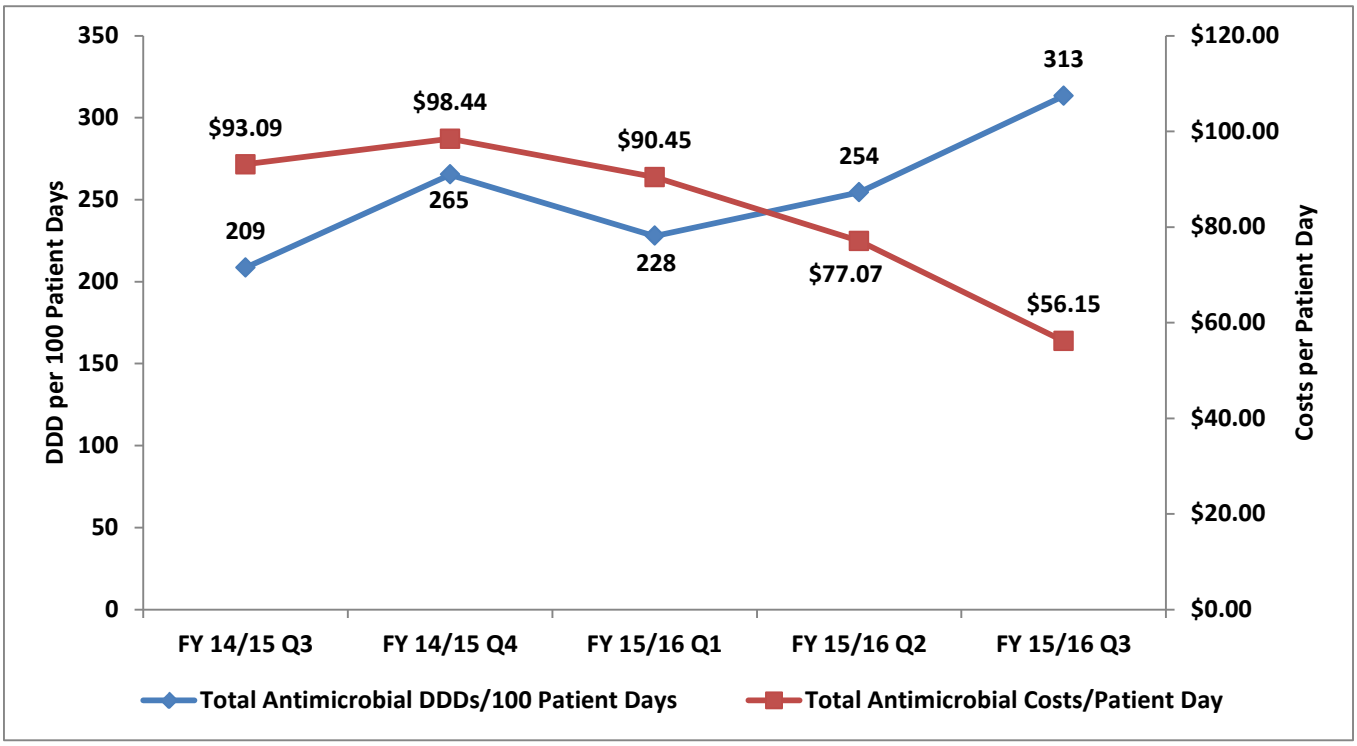


Toronto General Hospital: Medical Surgical ICU

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 17.8% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 5.6% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 9.5% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 2.6% 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 Q3 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 14.1% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 8.0% compared to YTD last year.

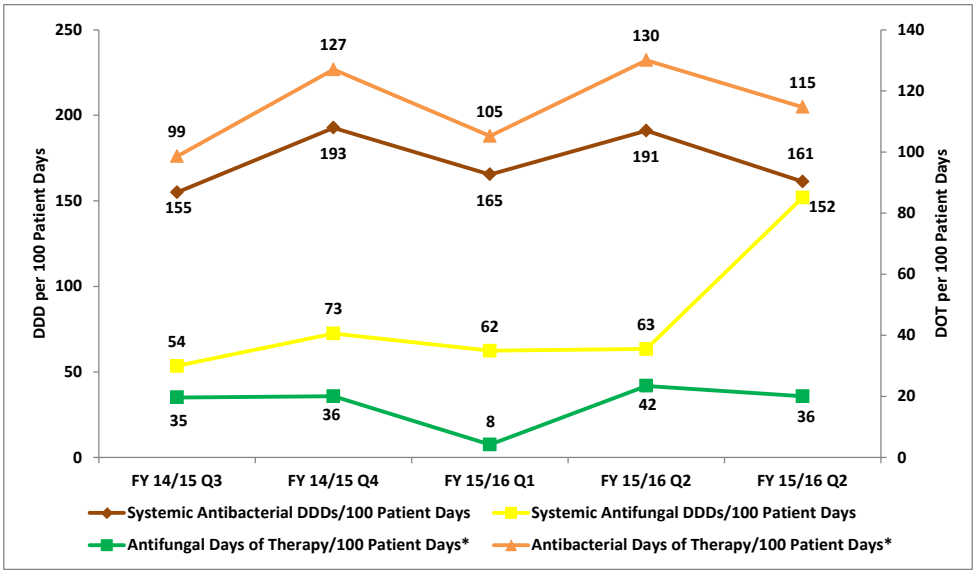


Table 11: Toronto General Hospital: Medical Surgical ICU

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	313		265	225
Systemic Antibacterial DDDs/100 Patient Days	184	155	143	159	156	175	165	191	161		173	170
Systemic Antifungal DDDs/100 Patient Days	82	55	55	54	61	60	62	63	152		92	56
Total Antimicrobial Costs	$701,451	$629,472	$567,532	$473,613	$584,018	$686,577	$175,744	$167,702	$113,867		$457,312	$487,430
Total Antimicrobial Costs/Patient Day	$102.52	$84.06	$76.93	$63.75	$75.71	$83.65	$90.45	$77.07	$56.15		$74.40	$78.81
Systemic Antibacterial Costs	$390,209	$375,436	$292,355	$231,171	$225,557	$293,126	$67,443	$76,357	$47,762		$191,562	$212,879
Systemic Antibacterial Costs/Patient Day	$57.03	$50.14	$39.63	$31.12	$29.24	$35.71	$34.71	$35.09	$23.55		$31.16	$34.42
Systemic Antifungal Costs	$311,242	$254,036	$275,176	$242,443	$358,461	$393,451	$108,301	$91,344	$66,104		$265,750	$274,551
Systemic Antifungal Costs/Patient Day	$45.49	$33.93	$37.30	$32.63	$46.47	$47.94	$55.74	$41.98	$32.60		$43.23	$44.39
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	107.9	101.7	130.03	114.71		116.0	101.6
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	34.1	30.3	41.84	35.8		36.2	33.5
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)	2 (0.99)		8 (1.3)	9 (1.46)
ICU Average Length of Stay (days)	8.24	8.61	8.85	7.79	8.22	8.08	7.32	7.31	8.02		7.53	8.25
ICU Mortality Rate (as a %)	16.2	15.7	16.3	16.0	17.8	17.2	19.3	15.4	20.3		18.3	16.0
ICU Readmission Rate Within 48 Hrs (as a %)	3.8	4.4	4.4	2.8	3.5	3.0	3.5	3.5	1.68		3.5	3.2
ICU Ventilator Days	5399	6256	6507	6458	24620	7330	1679	1910	1710		5299	5429
Apache II Score	n/a	n/a	16.1	15.775	15.9	15.1	15.3	15.2	15.9		15.5	14.7

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

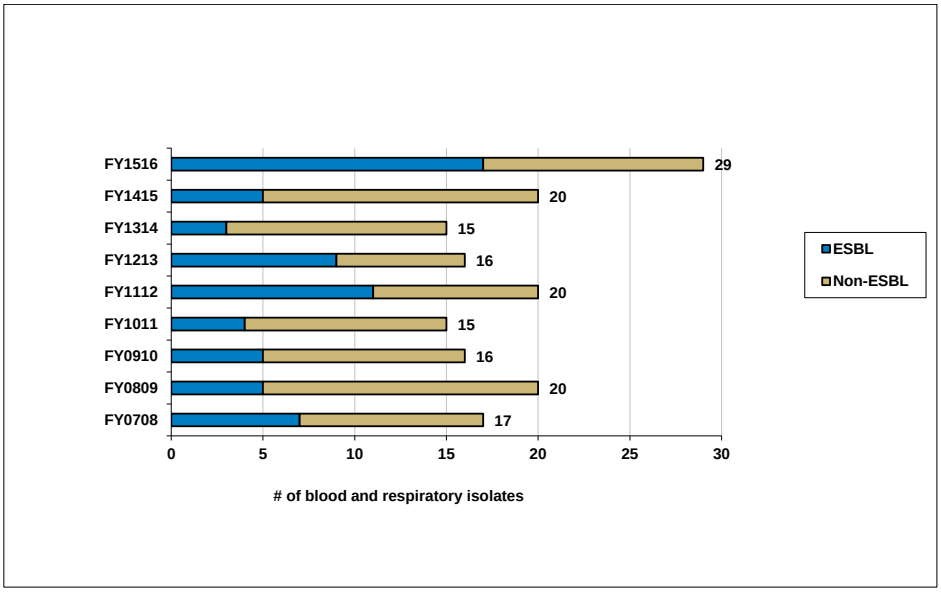
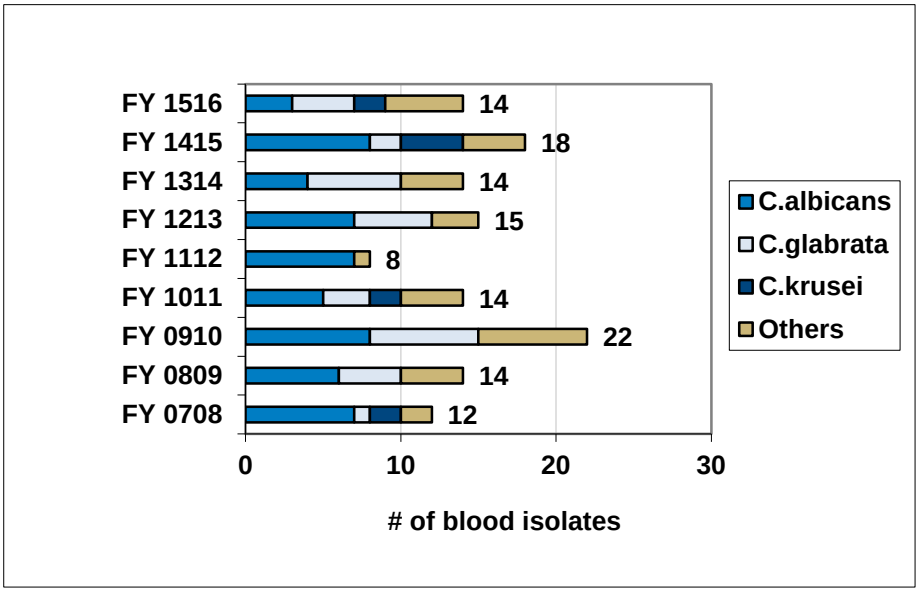


Table 13: Yeast Species Isolated in Blood – Toronto General Hospital: Medical Surgical ICU

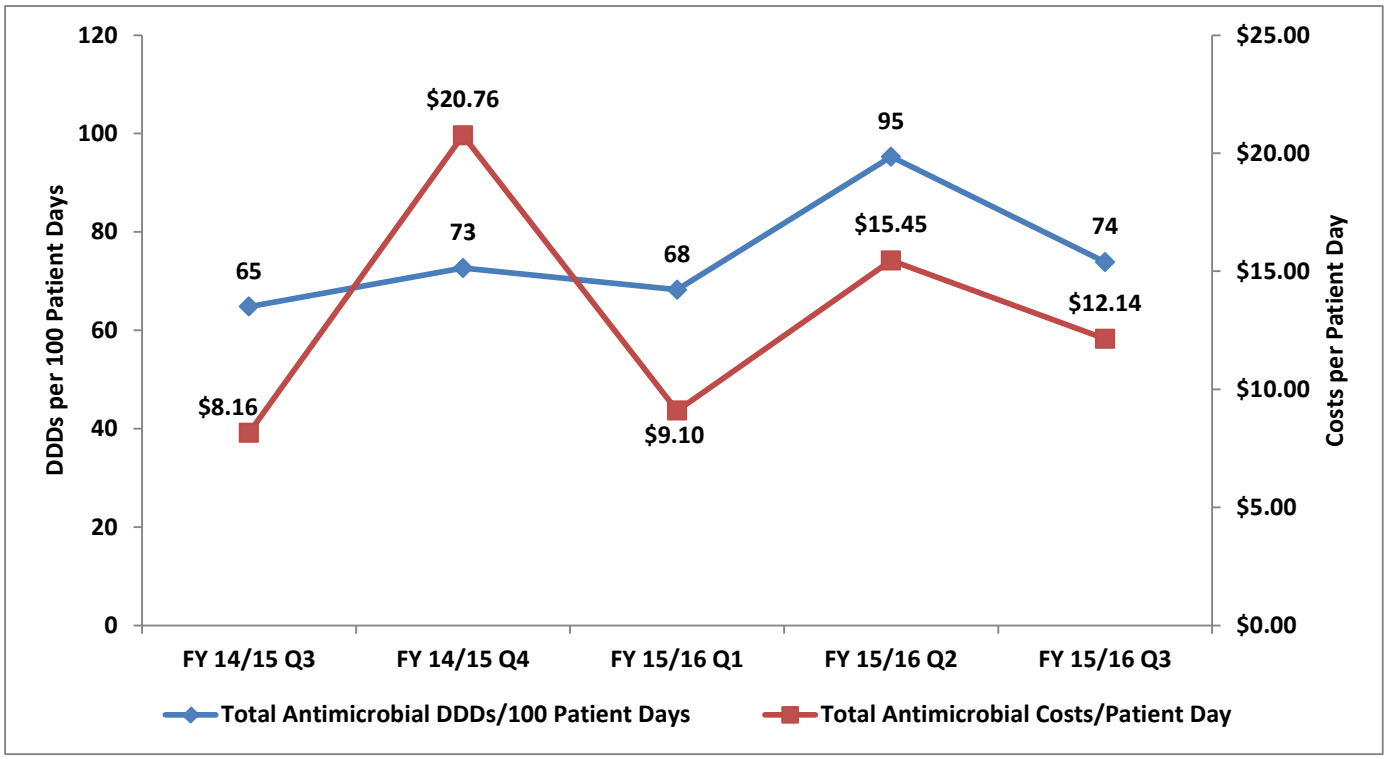


Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 22.4% compared to YTD last year.
- Antimicrobial costs per patient day increased (↑) by 36.1% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 6.3% compared to YTD last year.
- Antifungal costs per patient day increased (↑) by 210.6% 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 Q3 Top 5 Antimicrobials by Usage (DDDs 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 7.8% compared to YTD last year.
- Antifungal Days of Therapy (DOT) per 100 patient days increased (↑) by 32.0% compared to YTD last year.

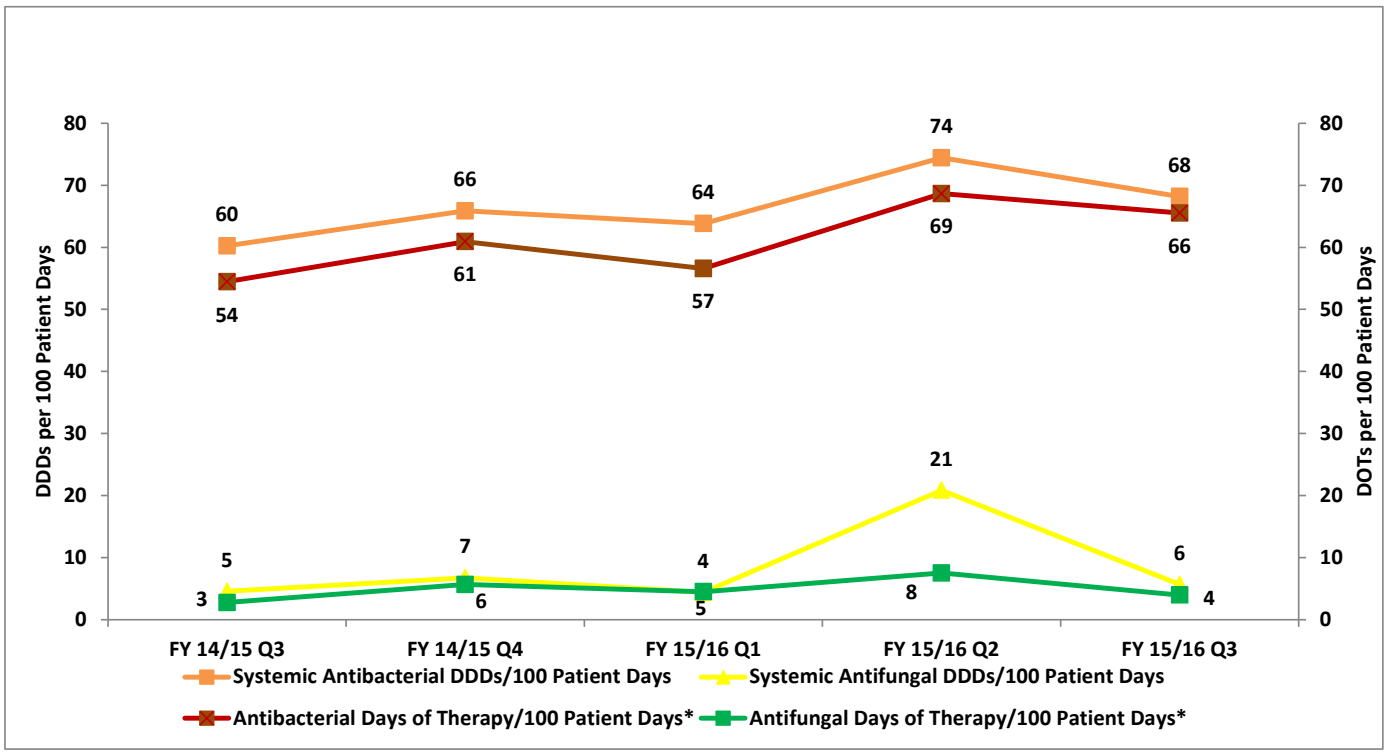


Table 14: Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU

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**	**74**		**80**	**65**
Systemic Antibacterial DDDs/100 Patient Days	92	78	73	77	78	86	62	64	74	68		69	60
Systemic Antifungal DDDs/100 Patient Days	6	10	6	6	5	6	5	4	21	6		11	5
Total Antimicrobial Costs	$136,758	$100,408	$101,191	$105,899	$102,978	$120,538	$138,014	$25,558	$47,105	$31,930		$104,593	$78,359
Total Antimicrobial Costs/Patient Day	**$18.16**	**$13.24**	**$13.17**	**$13.60**	**$13.37**	**$13.49**	**$11.97**	**$9.10**	**$15.45**	**$12.14**		**$12.32**	**$9.05**
Systemic Antibacterial Costs	$123,314	$87,445	$79,280	$89,784	$70,099	$85,916	$89,382	$17,708	$23,589	$16,621		$57,918	$63,037
Systemic Antibacterial Costs/Patient Day	$16.37	$11.53	$10.32	$11.53	$9.10	$9.61	$7.75	$6.30	$7.74	$6.32		$6.82	$7.28
Systemic Antifungal Costs	$13,444	$12,963	$21,911	$16,115	$32,879	$34,623	$48,631	$7,850	$23,516	$15,309		$46,675	$15,322
Systemic Antifungal Costs/Patient Day	$1.79	$1.71	$2.85	$2.07	$4.27	$3.87	$4.22	$2.79	$7.72	$5.82		$5.50	$1.77
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	65.51		63.8	59.2
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	3.98		5.41	4.1
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)	2 (0.76)		7 (0.82)	10 (1.16)
ICU Average Length of Stay (days)	8.39	7.44	10.68	9.71	7.98	7.68	8.7	8.2	6.8	6.6		6.9	8.2
ICU Mortality Rate (as a %)	19.6	19.9	18.1	17.0	16.4	17.1	19.0	15.7	15.5	22.1		17.8	19.0
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		2.67	3.63
ICU Ventilator Days	4617	6305	5960	5578	4947	5523	5180	1132	1578	1295		4005	2904
ICU Apache II Score	15.0	14.7	13.7	13.8	12.9	12.8	13.2	12.0	13.0	13.7		12.9	13.1

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

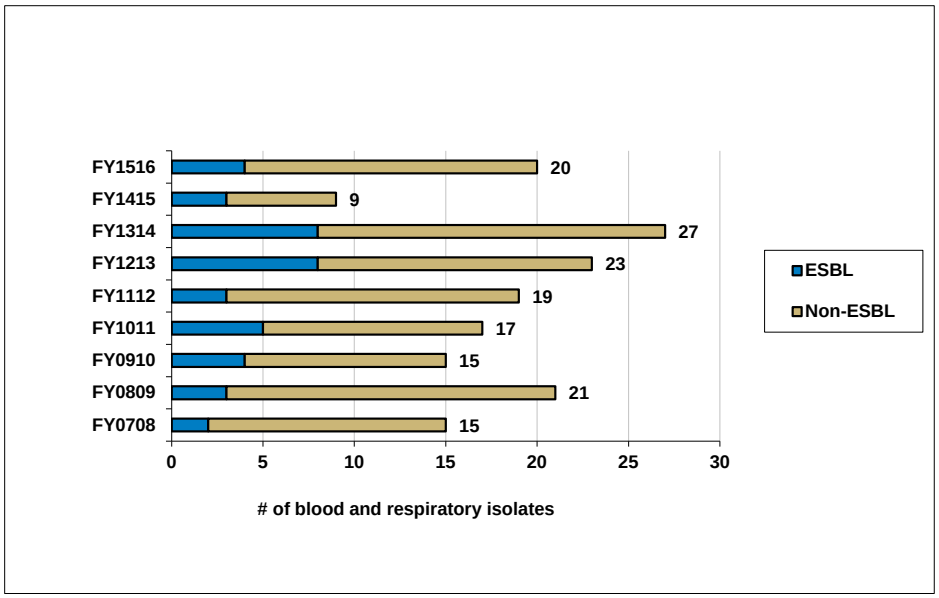
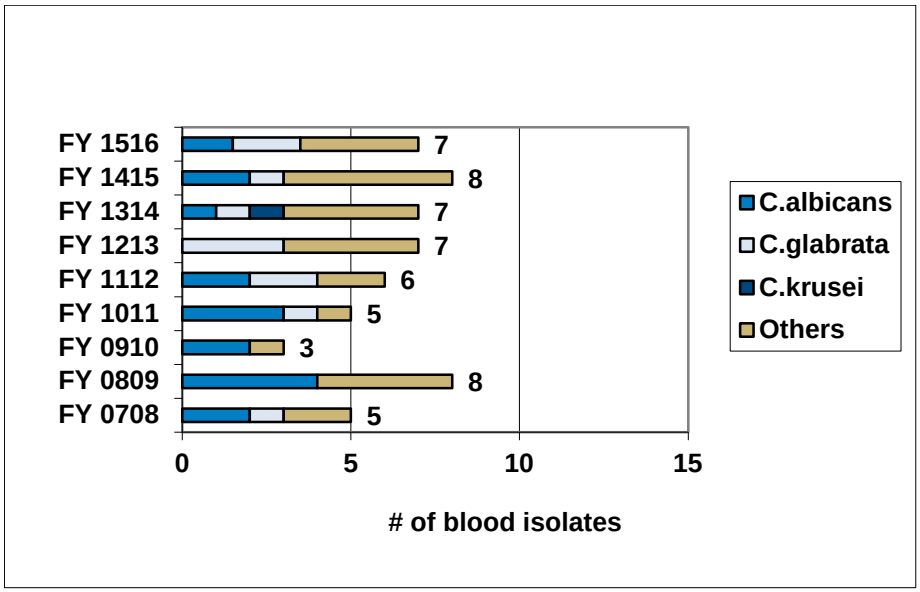


Table 16: Yeast Species Isolated in Blood – Toronto Western Hospital: Medical, Surgical, and Neurosurgical ICU



EMERGENCY DEPARTMENT

Mount Sinai Hospital: Emergency Department

FY 15/16 Q3 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.

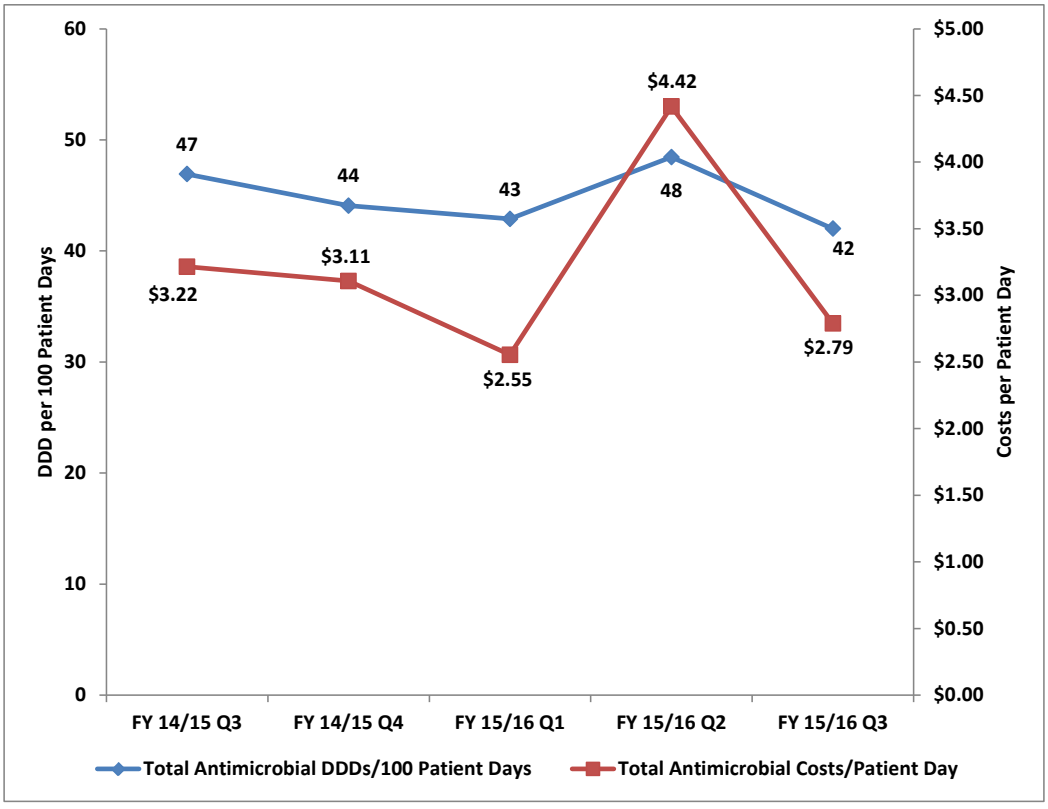
Most recently, Dr. Christine McDonald has been collecting and analyzing pre- and post-algorithm data on patients from the SNAP protocol. A manuscript detailing the results will be submitted for publication in the coming months.

Mount Sinai Hospital: General Internal Medicine

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 11.1% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 15.4% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 17.4% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 6.8% 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 Q3 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 Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs									
Total Antimicrobial DDDs/100 Patient Days	**58**	**45**	**48**	**43**	**48**	**42**		**44**	**50**
Systemic Antibacterial DDDs/100 Patient Days	53	41	43	39	43	38		40	45
Systemic Antifungal DDDs/100 Patient Days	3	3	3	3	4	3		3	4
Total Antimicrobial Costs	$125,012	$123,737	$128,661	$24,453	$39,014	$24,829		$88,296	$98,895
Total Antimicrobial Costs/Patient Day	**$5.74**	**$3.76**	**$3.63**	**$2.55**	**$4.42**	**$2.79**		**$3.23**	**$3.82**
Systemic Antibacterial Costs	$105,621	$99,731	$104,822	$22,675	$30,481	$16,765		$69,922	$80,215
Systemic Antibacterial Costs/Patient Day	$4.85	$3.03	$2.96	$2.37	$3.45	$1.89		$2.56	$3.10
Systemic Antifungal Costs	$15,422	$20,153	$16,352	$1,132	$6,390	$7,868		$15,390	$15,661
Systemic Antifungal Costs/Patient Day	$0.71	$0.61	$0.46	$0.12	$0.72	$0.88		$0.56	$0.61
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 (0.49)		6 (0.32)	6 (0.31)

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

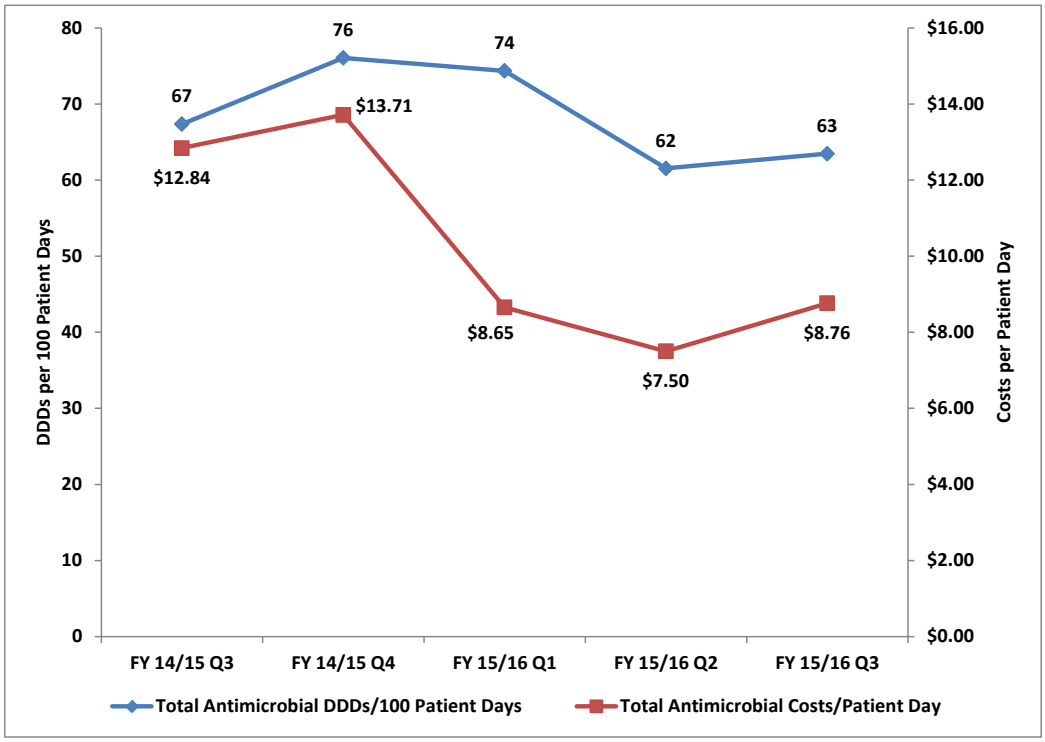
Data Sources: Antimicrobial DDD and Costs (PharmNet), C difficile (Infection Control Dashboards).

Toronto General Hospital: General Internal Medicine

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 4.5% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 21.5% compared to YTD last year for TGH.
- Antibacterial costs per patient day decreased (↓) by 20.1% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 24.3% 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 Q3 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 Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs									
Total Antimicrobial DDDs/100 Patient Days	**87**	**83**	**83**	**74**	**62**	**63**		**66**	**70**
Systemic Antibacterial DDDs/100 Patient Days	77	70	73	66	54	53		58	62
Systemic Antifungal DDDs/100 Patient Days	11	13	10	9	8	10		9	7
Total Antimicrobial Costs	$279,644	$471,342	$352,036	$79,814	$69,837	$82,673		$232,324	$232,697
Total Antimicrobial Costs/Patient Day	**$14.10**	**$18.05**	**$13.30**	**$8.65**	**$7.50**	**$8.76**		**$8.31**	**$10.58**
Systemic Antibacterial Costs	$171,817	$225,491	$221,389	$56,660	$51,035	$50,783		$158,478	$155,990
Systemic Antibacterial Costs/Patient Day	$8.67	$8.64	$8.36	$6.14	$5.48	$5.38		$5.67	$7.09
Systemic Antifungal Costs	$107,827	$245,851	$130,647	$23,154	$18,802	$31,890		$73,846	$76,707
Systemic Antifungal Costs/Patient Day	$5.44	$9.42	$4.93	$2.51	$2.02	$3.38		$2.64	$3.49
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)	1 (0.11)		6 (0.32)	14 (0.64)

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 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 0.7% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 1.0% compared to YTD last year.
- Antibacterial costs per patient day increased (↑) by 3.9% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 67.7% 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 Q3 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 Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs									
Total Antimicrobial DDDs/100 Patient Days	**44**	**47**	**42**	**47**	**42**	**41**		**43**	**43**
Systemic Antibacterial DDDs/100 Patient Days	41	44	40	44	39	39		41	40
Systemic Antifungal DDDs/100 Patient Days	3	3	3	2	2	2		2	3
Total Antimicrobial Costs	$74,737	$115,919	$110,889	$26,397	$29,042	$26,991		$82,430	$85,775
Total Antimicrobial Costs/Patient Day	**$4.36**	**$5.01**	**$3.32**	**$3.27**	**$3.55**	**$3.32**		**$3.38**	**$3.41**
Systemic Antibacterial Costs	$60,999	$93,779	$103,080	$26,180	$28,670	$25,759		$80,608	$79,969
Systemic Antibacterial Costs/Patient Day	$3.56	$4.05	$3.09	$3.24	$3.50	$3.17		$3.31	$3.18
Systemic Antifungal Costs	$13,738	$22,140	$7,810	$217	$372	$1,232		$1,822	$5,806
Systemic Antifungal Costs/Patient Day	$0.80	$0.96	$0.23	$0.03	$0.05	$0.15		$0.07	$0.23
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)	0 (0.00)		5 (0.21)	8 (0.32)

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

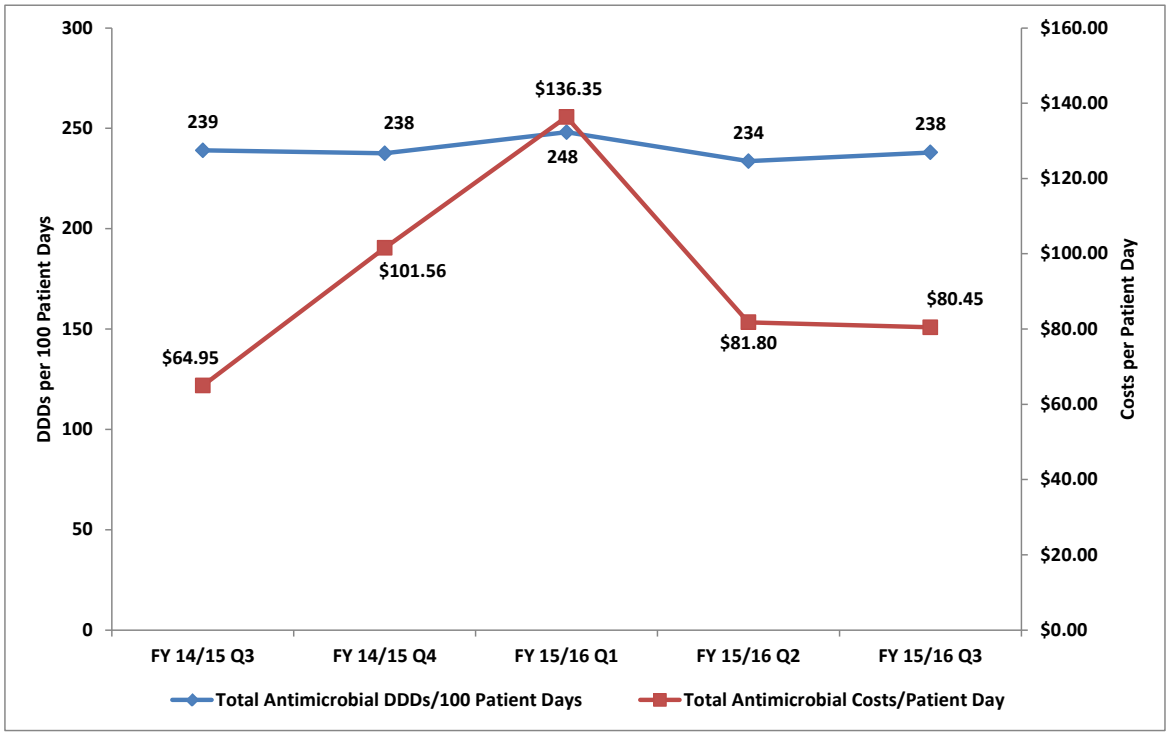
Data Sources: Antimicrobial DDD and Costs (Centricity). *An error in DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Princess Margaret Cancer Centre: Leukemia Service

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 2.4% compared to YTD last year.
- Antimicrobial costs per patient day increased (↑) by 4.6% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 12.7% compared to YTD last year.
- Antifungal costs per patient day increased (↑) by 13.3% 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 Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs												
Total Antimicrobial DDDs/100 Patient Days	**295**	**270**	**239**	**250**	**255**	**244**	**248**	**234**	**238**		**240**	**246**
Systemic Antibacterial DDDs/100 Patient Days	191	163	134	146	138	136	141	139	135		138	135
Systemic Antifungal DDDs/100 Patient Days	104	107	105	104	117	108	107	94	103		102	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	$316,572		$1,119,046	$1,040,489
Total Antimicrobial Costs/Patient Day	**$167.12**	**$154.32**	**$115.13**	**$128.91**	**$117.10**	**$96.46**	**$136.35**	**$81.80**	**$80.45**		**$99.08**	**$94.75**
Systemic Antibacterial Costs	$659,034	$609,747	$663,175	$422,438	$485,263	$471,597	$129,491	$101,119	$83,729		$314,339	$350,181
Systemic Antibacterial Costs/Patient Day	$62.28	$57.33	$58.24	$45.85	$37.03	$32.20	$35.31	$27.34	$21.28		$27.83	$31.89
Systemic Antifungal Costs	$1,109,283	$1,031,584	$647,637	$1,092,448	$1,049,236	$941,208	$370,504	$201,360	$232,843		$804,707	$690,308
Systemic Antifungal Costs/Patient Day	$104.84	$96.99	$56.88	$83.06	$80.07	$64.26	$101.04	$54.45	$59.17		$71.25	$62.86
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)	5 (1.35)	2 (0.51)		11 (0.97)	10 (0.91)

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

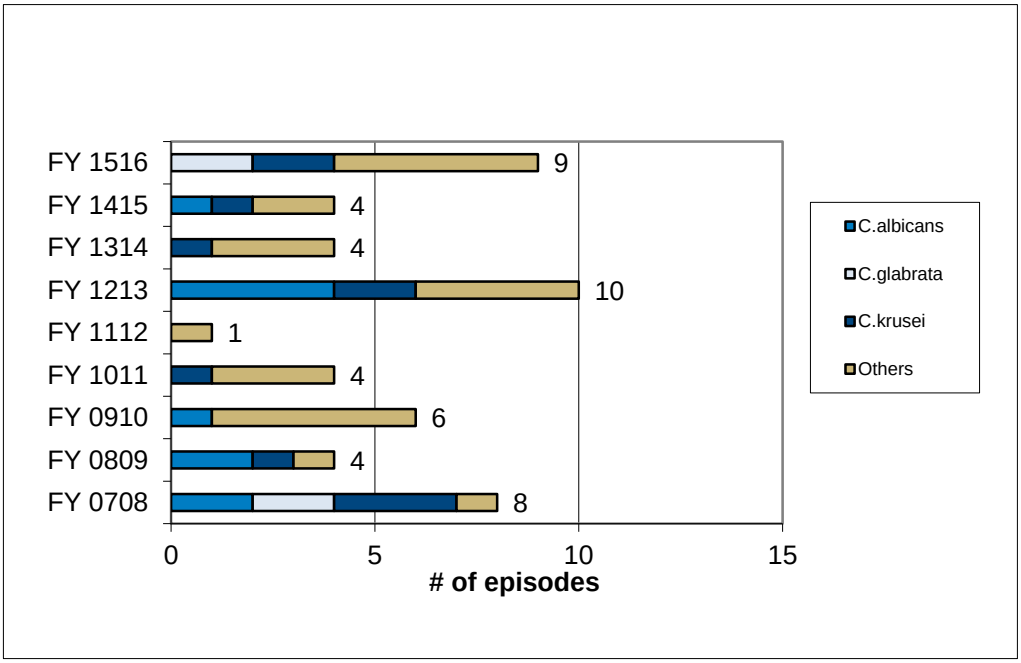
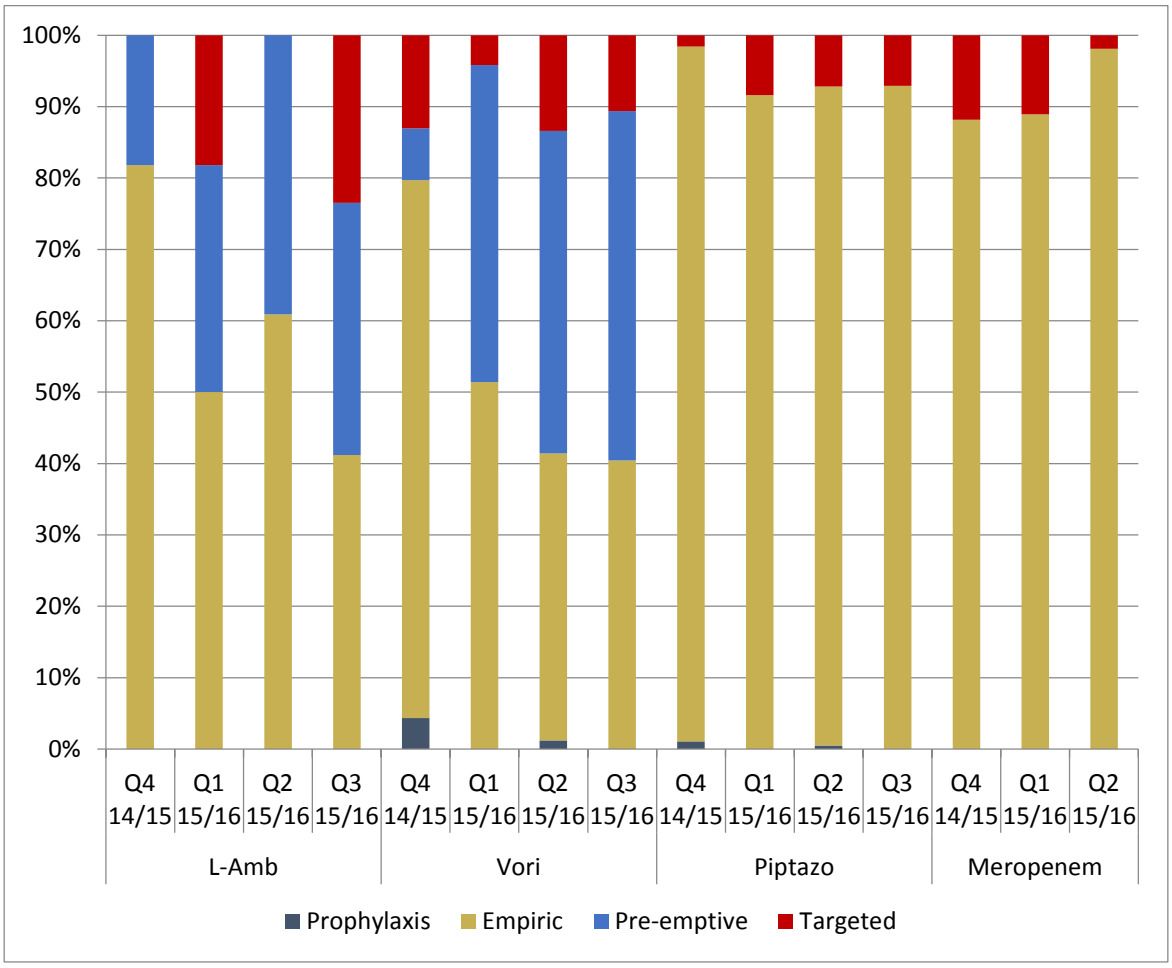


Table 22: Princess Margaret Cancer Centre: Indications for Select Antimicrobials Used in Febrile Neutropenia in Four Rolling Quarters: 14/15 Q4 and 15/16 Q1-3



Princess Margaret Cancer Centre: Indications for All Antimicrobials in Four Rolling Quarters: 14/15 Q4 and 15/16 Q1-3

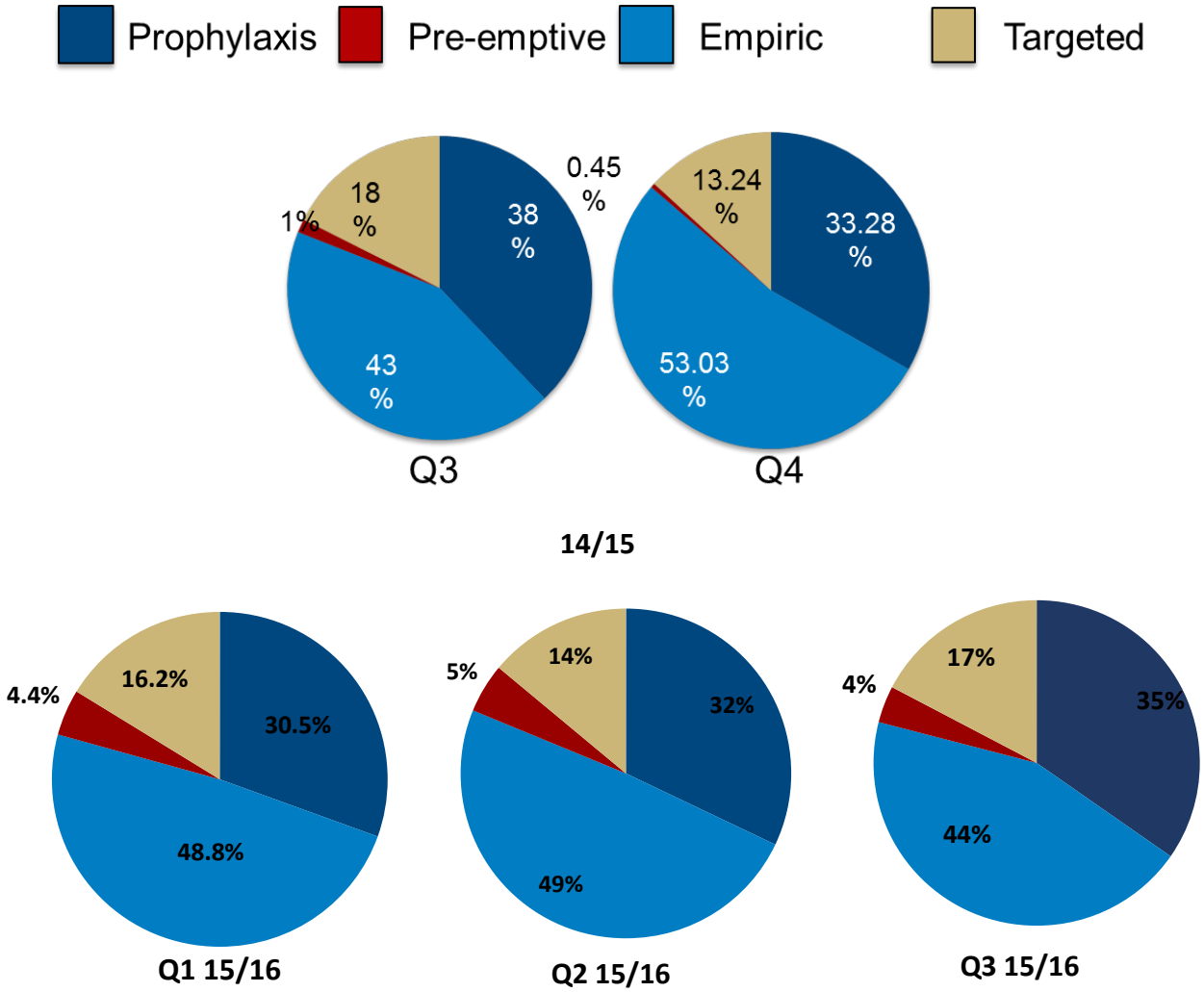
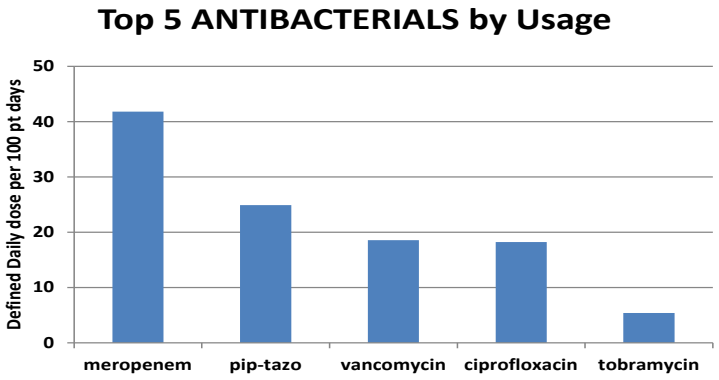
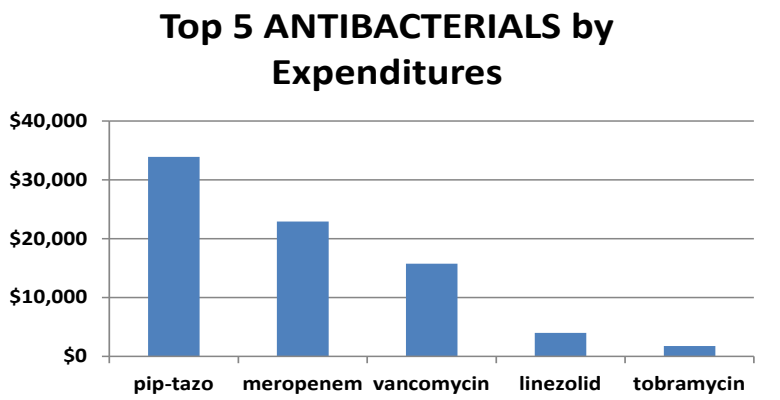
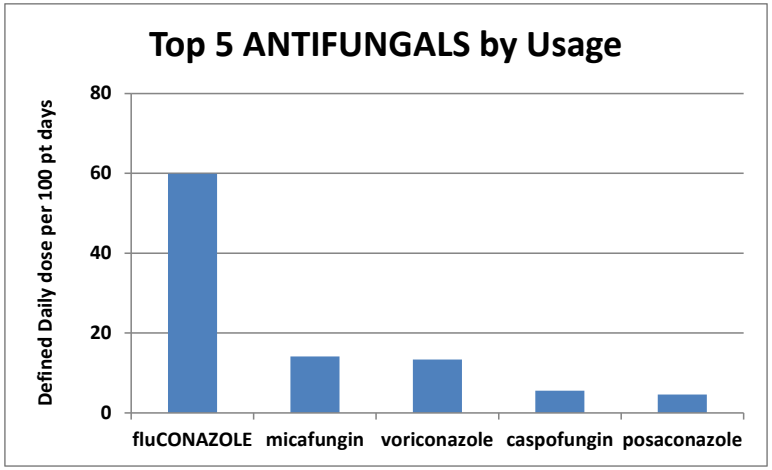
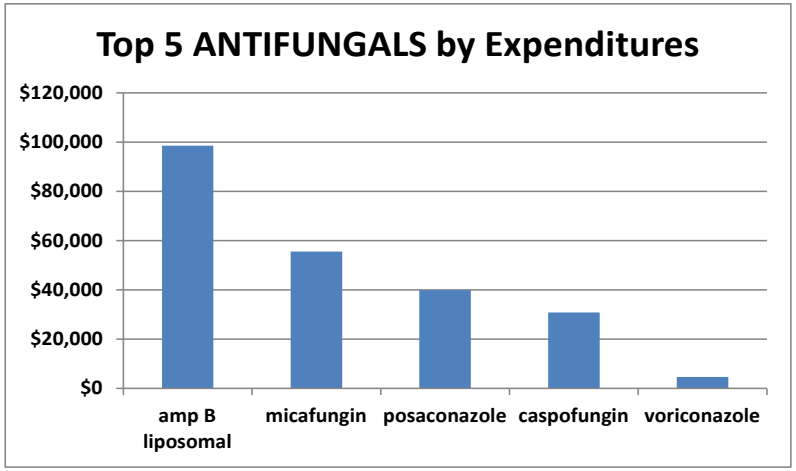


Table 23: Princess Margaret Cancer Centre: Leukemia FY 15/16 Q3 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures







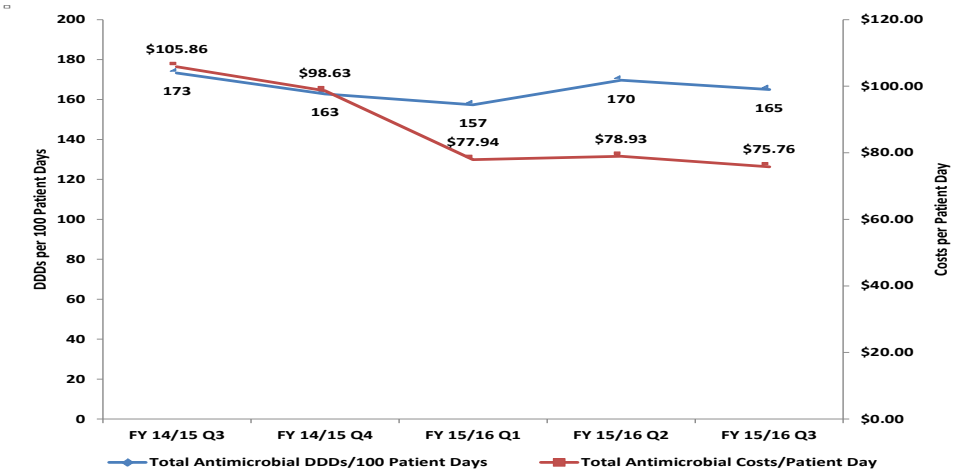


Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 6.0% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 29.7% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 30.8% compared to YTD last year.
- Antifungal costs per patient day decreased (↓) by 29.6% compared to YTD last year.

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**.

Table 24: Yeast Species Isolated in Blood – Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant

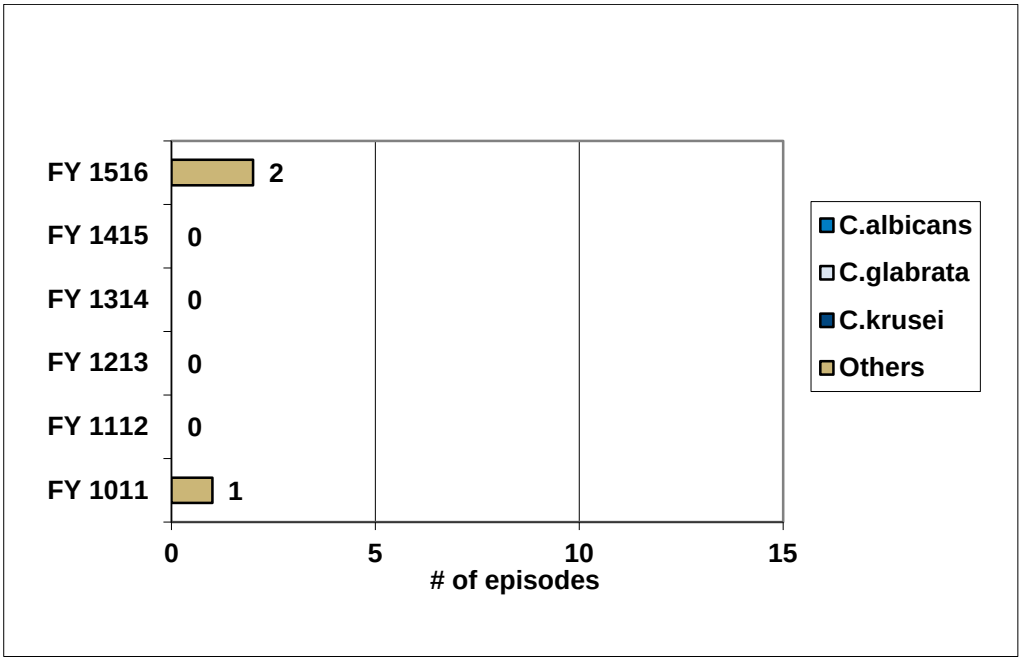


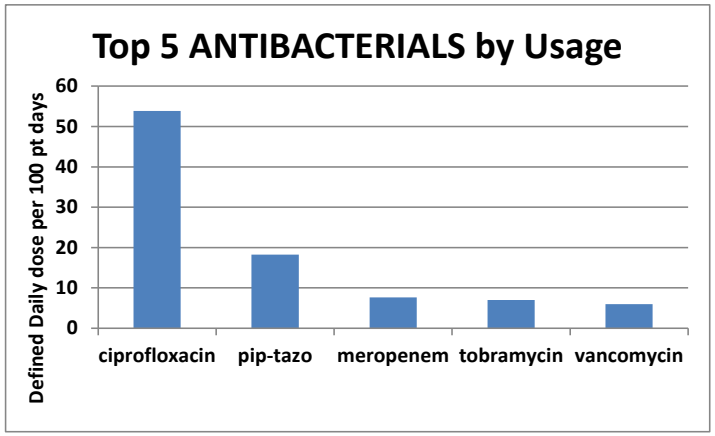
Table 25: Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant

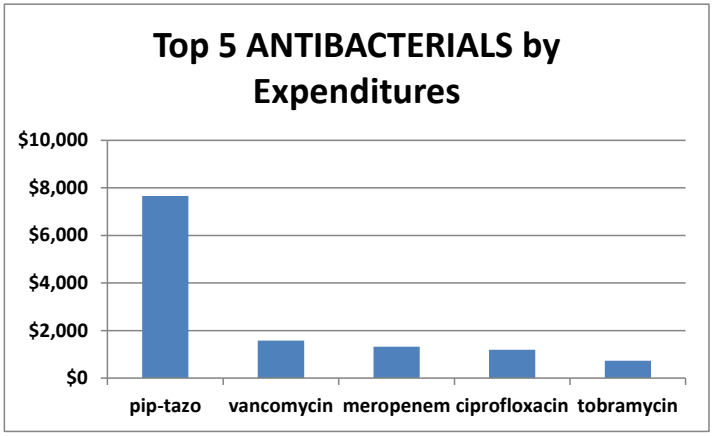
Indicators	FY 13/14	FY 14/15	FY15/16 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs								
Total Antimicrobial DDDs/100 Patient Days	**172**	**171**	**157**	**170**	**165**		**164**	**174**
Systemic Antibacterial DDDs/100 Patient Days	114	104	102	113	106		107	111
Systemic Antifungal DDDs/100 Patient Days	59	67	55	57	60		57	63
Total Antimicrobial Costs	$416,614	$512,300	$93,217	$99,133	$94,250		$286,600	$265,062
Total Antimicrobial Costs/Patient Day	**$85.65**	**$106.13**	**$77.94**	**$78.93**	**$75.76**		**$77.27**	**$109.98**
Systemic Antibacterial Costs	$75,219	$78,038	$12,487	$16,325	$13,665		$42,477	$39,858
Systemic Antibacterial Costs/Patient Day	$15.46	$16.17	$10.44	$13.00	$10.98		$11.45	$16.54
Systemic Antifungal Costs	$341,395	$434,261	$80,730	$82,809	$80,585		$244,124	$225,204
Systemic Antifungal Costs/Patient Day	$70.19	$89.97	$67.50	$65.93	$64.78		$65.82	$93.45
Patient Care Outcomes								
Hospital-Acquired C. difficile Cases (rate per 1,000 patient days)	4 (0.82)	12 (2.49)	0 (0)	5 (3.98)	2 (1.61)		7 (1.89)	11 (2.84)

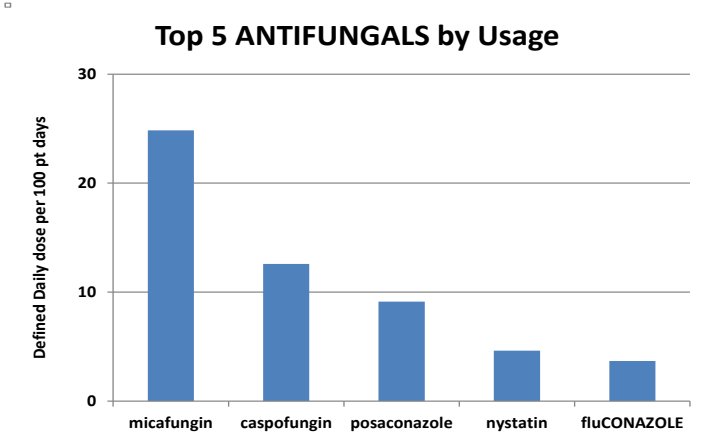
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded.

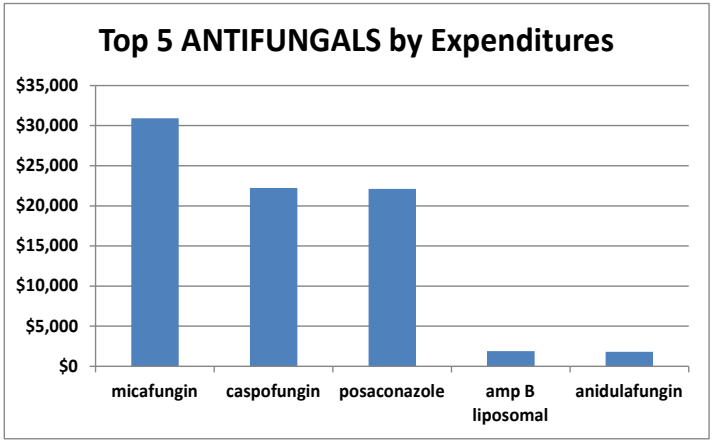
Data Sources: Antimicrobial DDD and Costs (Centricity). *An error in DDD calculation for Pip-tazo was detected in Q3 2013; all historical data prior to this was rerun, resulting in minor changes to antibacterial DDDs.

Table 26: Princess Margaret Cancer Centre: Allogeneic Bone Marrow Transplant 15/16 Q3 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures









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

FY 15/16 Q3 highlights include:

- Antimicrobial consumption (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 53.1% compared to YTD last year.
- Antimicrobial costs per patient day decreased (↓) by 0.28% compared to YTD last year.
- Antibacterial costs per patient day decreased (↓) by 3.3% compared to YTD last year.
- Antifungal costs per patient day increased (↑) by 3.2% compared to YTD last year.

Toronto General Hospital: Multi-Organ Transplant Program (MOTP) Antimicrobial Consumption and Costs Per Patient Day

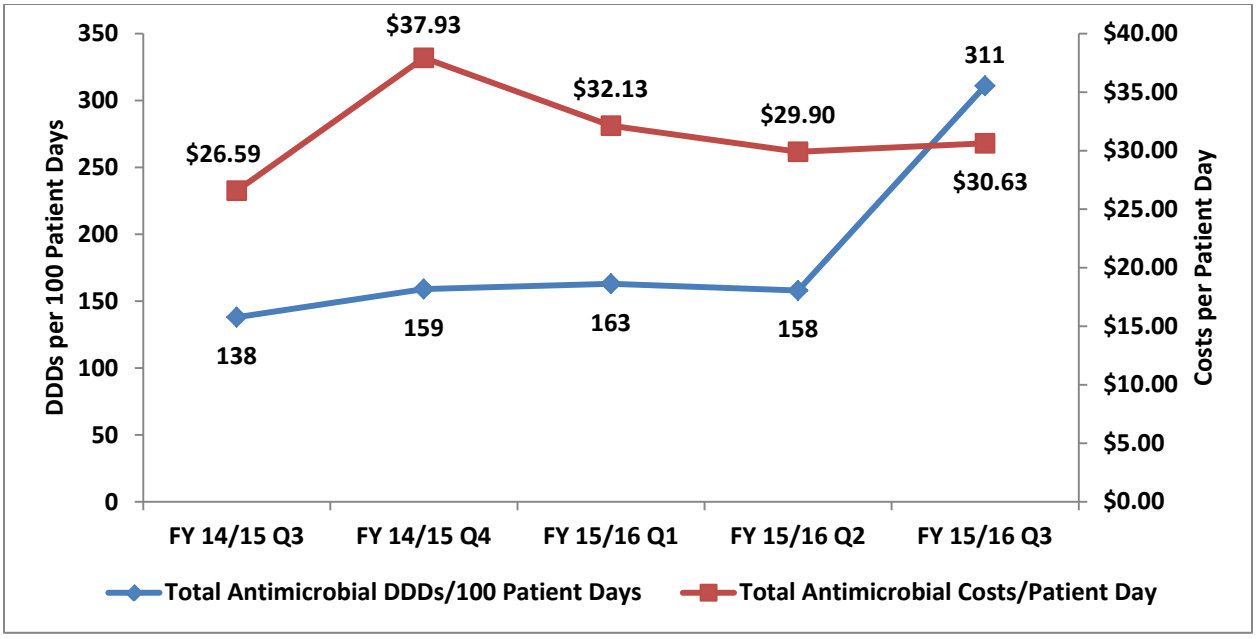


Table 27: Toronto General Hospital: Multi-Organ Transplant Program (MOTP)

Indicators	FY 13/14	FY 14/15	FY15/16 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs								
Total Antimicrobial DDDs/100 Patient Days	**136**	**143**	**163**	**158**	**311**		**211**	**138**
Systemic Antibacterial DDDs/100 Patient Days	93	98	113	115	113		114	96
Systemic Antifungal DDDs/100 Patient Days	43	45	51	43	198		97	42
Total Antimicrobial Costs	$837,263	$725,411	$180,235	$168,569	$171,497		$520,300	$519,243
Total Antimicrobial Costs/Patient Day	**$39.16**	**$32.69**	**$32.13**	**$29.90**	**$30.63**		**$30.90**	**$30.99**
Systemic Antibacterial Costs	$327,831	$379,748	$102,244	$88,979	$77,314		$268,537	$276,375
Systemic Antibacterial Costs/Patient Day	$15.33	$17.11	$18.23	$15.78	$13.81		$15.95	$16.49
Systemic Antifungal Costs	$509,433	$345,664	$77,991	$79,590	$94,183		$251,764	$242,869
Systemic Antifungal Costs/Patient Day	$23.82	$15.58	$13.90	$14.12	$16.82		$14.95	$14.49
Patient Care Outcomes								
Hospital-Acquired C. Difficile Cases (rate per 1,000 patient days)	14 (0.65)	18 (0.81)	4 (0.71)	2 (0.35)	2 (0.36)		8 (0.48)	8 (0.48)

BEST PRACTICE GUIDELINES AND ALGORITHMS

- Dr. Shahid Husain and Miranda So are drafting the ASP MOT Common Infections Management Guidelines For Solid-Organ Transplant Patients. The guidelines will undergo consultative reviews by content experts in MOT and Transplant Infectious Diseases in the coming months.
- Dr. Shahid Husain and Miranda So began prospective audit and feedback rounds for the MOT units in November after consulting key stakeholders on their plan to implement antimicrobial stewardship interventions. Nurse Practitioners, clinical pharmacists, transplant infectious diseases fellows, and kidney transplant fellows are active participants at ASP rounds. Preliminary feedback from the group has been positive. Participants reported ASP rounds enhance their knowledge and decision making skills in antimicrobial use.
- The ASP-Allogeneic BMT Working Group was formed to update the antimicrobial prophylaxis guideline for allogeneic bone marrow transplant recipients. The Working Group had a kick-off meeting in October with support from Judy Costello, Dr. Andre Schuh, and Dr. Hans Messner, and the working group will continue to meet over the next few months.
- Miranda So is the recipient of the Canadian Society of Hospital Pharmacists Ontario Branch Information Technology Award, for the interactive High-Risk Febrile Neutropenia Protocol and the Solid Tumor Febrile Neutropenia Protocol.
- 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 launched 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 was reformatted based on clinician and project stakeholders' feedback and can be found here on our ASP website. The revised formatting is based on Human Factors Engineering and will be easier to navigate and print for frontline clinicians.

RESEARCH

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

Publications

The following commentaries were published in peer-reviewed medical journals:

- Morris AM, Gollish J. Commentary – Arthroplasty and postoperative antimicrobial prophylaxis. Can Med Assoc J. 2015 Oct 5. pii: cmaj.150429. [Epub ahead of print]
- Morris AM, Webb GD. What to think about antibiotic prophylaxis and infective endocarditis. Can J Cardiol. 2015 Oct 24. pii: S0828-282X(15)01538-X. doi: 10.1016/j.cjca.2015.10.014. [Epub ahead of print]

An additional six 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:

- Hughes J, Hurford A, Patrick D, Finley R, Morris A, Wu J. How to measure antibiotic resistance using empiric therapy indices. Poster presentation at IDWeek 2015, Oct 7-11, 2015; San Diego, CA.
- Dresser L, Hughes J, McIntyre M, Nelson S, Ferguson N, Lapinsky S, Lazar N, Mehta S, Burry L, Singh J, Bell CM, Morris AM. Antimicrobial stewardship programs reduce daily prescribing variability in academic ICUs. Poster presentation at Critical Care Canada Forum, Oct 25-28, 2015; Toronto, ON.

Research Studies

The following grant-funded studies are progressing according to timelines:

- ARTIC CHILL - Community Hospital ICU Local Leadership. Council of Academic Hospitals of Ontario (CAHO) Adopting Research To Improve Care (ARTIC) Spread Project. Principal Investigator: Andrew Morris. Co-investigators: Yoshiko Nakamachi, Sarah West, Chaim Bell
- Building Capacity to Improve and Sustain Antimicrobial Stewardship Programs in ICUs (SUSTAIN). Canadian Institutes of Health Research, Knowledge to Action. Principal Investigators: Lianne Jeffs, Andrew Morris. Co-investigators: Chaim Bell, Madelyn Law, Jonathan Mitchell, Susan Straus. TGH CVICU/MSICU participation in this study is focused on building engagement and sustainability of ASPs
- FRAMING-LTC: Frailty and Recognizing Appropriate Medications IN Geriatrics and Long-Term Care. Technology Evaluation in the Elderly Network (TVN). Principal Investigator: Andrew Morris. Co-Investigators: Chaim Bell, Susan Bronskill, Colleen Maxwell, Lianne Jeffs
- Designing an Effective Outpatient Antimicrobial Stewardship Program to Reduce Unnecessary Antibiotic Use in Primary Care using a Mixed-Methods Collaborative Model. AHSC AFP Innovation Fund. Principal Investigators: Warren McIsaac, Andrew Morris. Co-investigators: Chaim Bell, Lianne Jeffs, Jeff Bloom, David Tannenbaum
- Development of an Antimicrobial Resistance Diversity Index (ARDI) to guide initiatives and investment in public health, antimicrobial stewardship and infection control. CIHR NSERC Grant. Principal Investigators: Jainhong Wu, Andrew Morris. Co-investigators: Troy Day, Amy Hurford, Allison McGeer, David Patrick, Gerry Wright.

- Evaluation of a Province Wide Roll-out of Antimicrobial Stewardship Programs in Critical Care Units: A Prospective, Stepped-wedge Observational Study. Physicians Services Incorporated Health Research Grant. Principal Investigator: Andrew Morris. Co-investigators: Chaim Bell, Lisa Burry.

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 provides 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.

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.

Over the past few months, the Hub leads have been working with the Spoke sites in assisting them with their chosen ASP interventions based on their local context. 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.

Our team has also partnered with Public Health Ontario to host an Ontario Antimicrobial Stewardship Roundtable and to share learnings from our work with hospitals across the province. This roundtable meeting included a cross-section of experts in antimicrobial stewardship, including primary care, long-term care, acute care, and perspectives from the Assistant Deputy Minister, Health Systems Quality and Funding, and Strategy and Policy Advisor and Infectious Disease Policy and Programs Sections.

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.

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 fourth cohort has completed the on-line course, and the course will continue to be offered for 2016.

HealthCare CAN

The MSH-UHN ASP has been working closely with HealthCareCAN, the National Collaborating Centre for Infectious Diseases (NCCID), and the Public Health Agency of Canada (PHAC) to inform our national health leaders and to organize a Pan-Canadian Action Round Table on Antimicrobial Stewardship and Resistance, which will take place in Toronto on June 16 and 17, 2016. Several pre-round table activities have occurred to date, and Dr. Andrew Morris and Yoshiko Nakamachi are members of both the Steering Committee and Program Committee for this national initiative.

Our program has also partnered with CHA Learning, the professional development branch of HealthCareCAN, to develop materials for a course in change leadership in the healthcare setting.

Public Health Agency of Canada

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

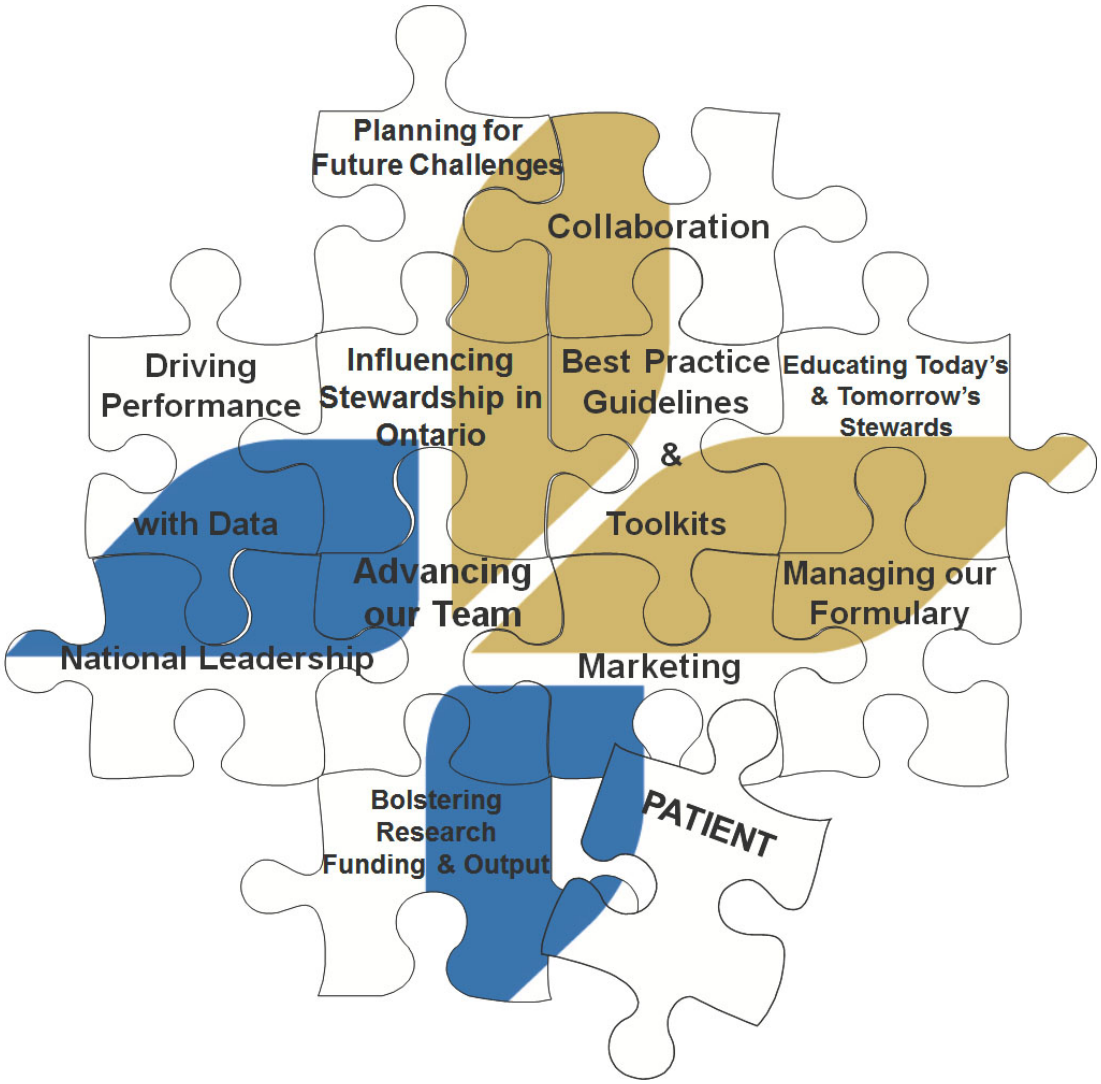
Dr. Andrew Morris is the incoming chair of AMMI Canada's Antimicrobial Stewardship and Resistance Committee.

ASP Rotations at MSH and UHN

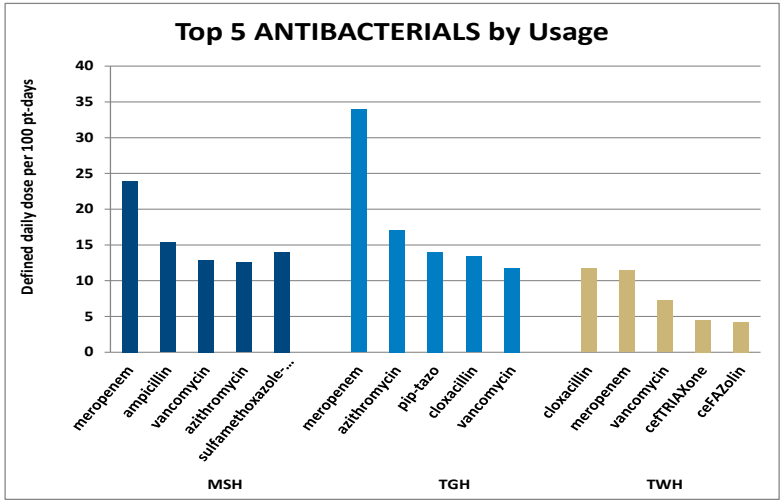
The MSH-UHN ASP continues to receive multiple requests for ASP rotations from residents and fellows across the country and internationally.

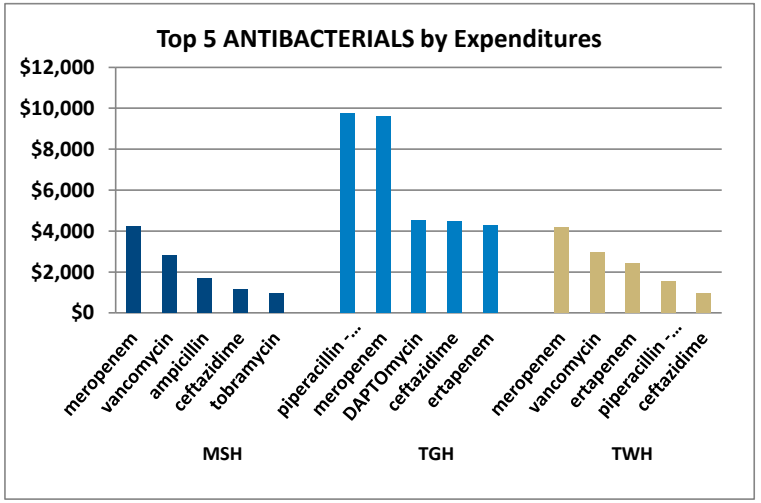
STRATEGIC PLANNING

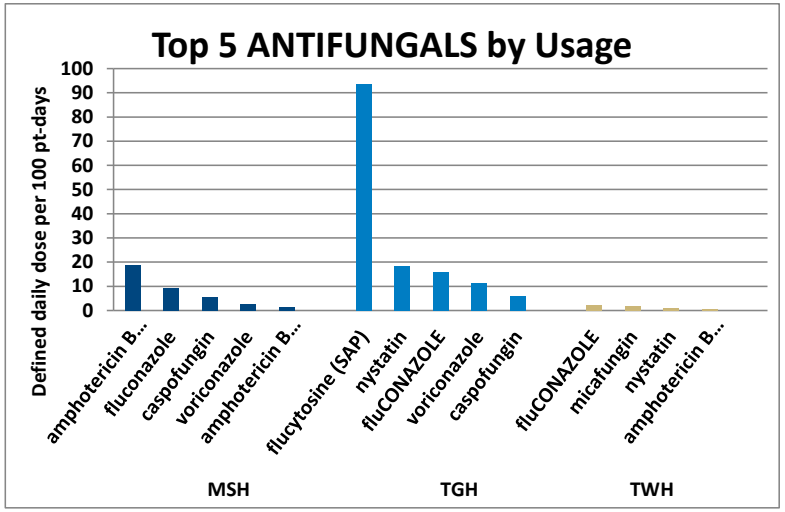
The ASP team developed the MSH-UHN ASP Strategic Plan 2013-2016. Please contact Yoshiko Nakamachi (Yoshiko.Nakamachi@uhn.ca) if you would like a copy.

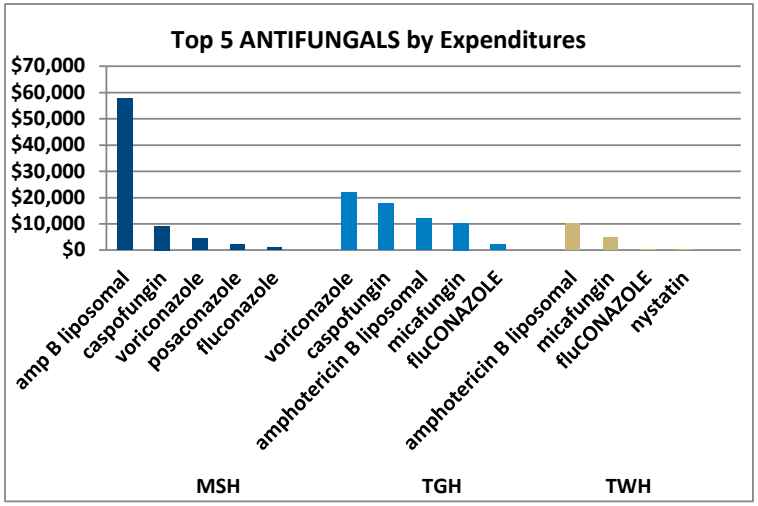


Appendix 1: FY 15/16 Q3 Top 5 Antimicrobials by Usage (DDDs per 100 Patient Days) and Expenditures by ICU Site

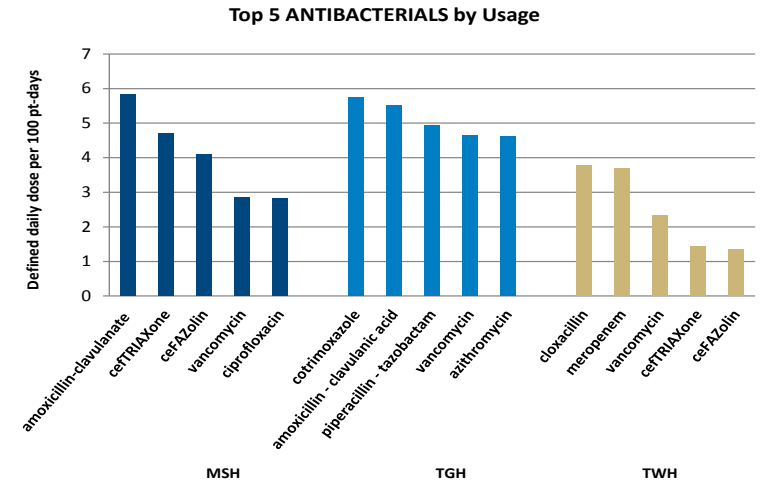


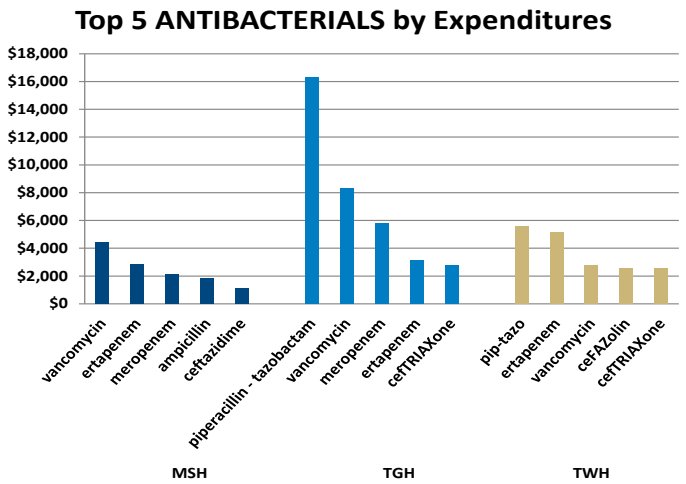


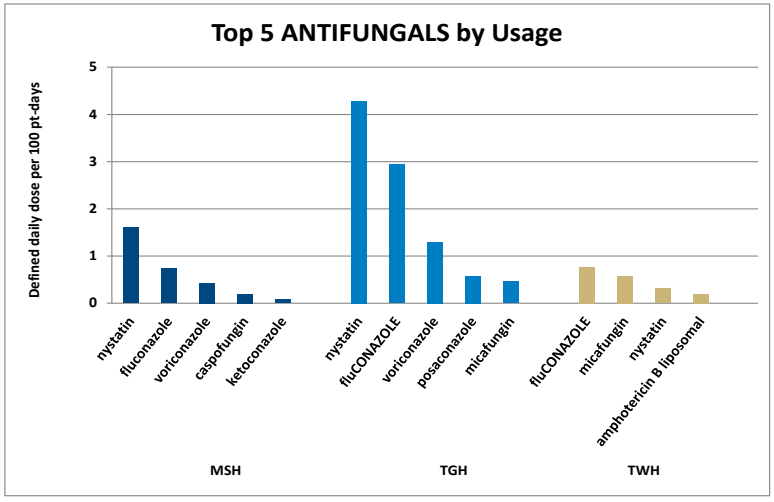


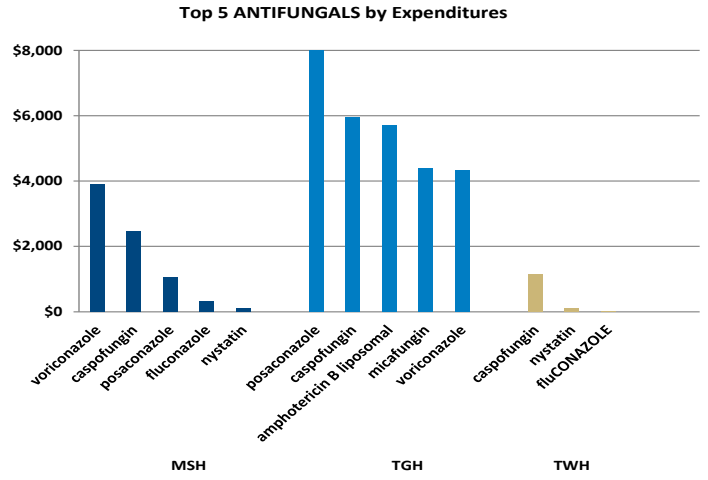


Appendix 2: General Internal Medicine FY 15/16 Q3 Top 5 Antimicrobials by Usage (DDDs per 100 patient days) and Expenditures









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