

MSH + UHN

**ASP**

ANTIMICROBIAL  
STEWARDSHIP  
PROGRAM



# Q2 UPDATE

FISCAL YEAR 2011 | 2012

**MOUNT SINAI HOSPITAL**  
Joseph and Wolf Lebovic Health Complex



University Health Network  
Toronto General Hospital Toronto Western Hospital Princess Margaret Hospital



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

## EXECUTIVE SUMMARY

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



*The MSH-UHN ASP uses research and education (facilitated by Pfizer Canada’s financial support), alongside clinical care, to take a leadership role in increasing antimicrobial stewardship capacity and improving the quality of health care.*

### Revised Quarterly Report:

Every quarter an update will be provided for each clinical area as well key highlights from MSH-UHN joint activities which include education and research. The full report (as previously provided) will be distributed on an annual basis.

### Acknowledgements

We would like to thank the following individuals for their help in making this report possible: Patrick Cheng, Dr. Michael Gardam, Dr. Susy Hota, Yelena Katsaga, Donna Lowe, Dr. Allison McGeer, Karen Ong, Monique Pitre, Dr. Susan Poutanen, and many others (omissions unintentional).

The next quarterly update for FY 11/12 Q3 is expected in March 2012.

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## MSH-UHN ASP HIGHLIGHTS

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

### PATIENT SAFETY ACROSS ALL SITES

- ✦ In the Mount Sinai Hospital ICU, mortality rate and readmission rate have both decreased, despite a high Multiple Organ Dysfunction Score, which measures patient acuity.
- ✦ In the TGH MSICU, there has been a reduction in candidaemias, as a partnership of the Critical Care teams best practices, coupled with IPAC initiatives and ASP.
- ✦ In the TWH ICU, mortality rate and readmission rate have both decreased

### WORKING GROUPS

- ✦ The VAP inter-disciplinary Working Group has developed an algorithm that has been discussed and shared with colleagues across MSH and UHN. The VAP algorithm was implemented in the MSH ICU in November 2011, with plans for implementation at TGH and TWH in the next quarter.
- ✦ The ASP is leading a similar quality improvement process to recognize and manage Sepsis/Septic Shock.

### EDUCATION

- ✦ All of the clinical members of the ASP play a role in stewardship education, giving one-on-one advice to healthcare providers, having teaching sessions within the hospitals, supervising trainees, giving rounds to colleagues at other institutions, or developing educational curricula.

### PROVINCIAL LEADER

- ✦ The ASP, in collaboration with colleagues from Mount Sinai Hospital, Sunnybrook Health Sciences Centre, St. Michael's Hospital, and University Health Network, was successful in being selected for the Council of Academic Hospitals of Ontario (CAHO) Adopting Research to Improve Care (ARTIC) Program. The ASP will work with CAHO as well as the MOHLTC Critical Care Secretariat to implement antimicrobial stewardship in ICUs of 11-13 organizations throughout the province over two years.
- ✦ Members of the ASP, in partnership with Accreditation Canada, are involved in development of the new Required Organizational Practice (ROP), which requires organization to adopt Antimicrobial Stewardship practices at their organizations.



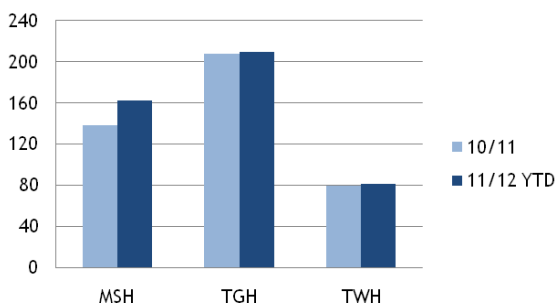
**MOUNT SINAI HOSPITAL: INTENSIVE CARE UNIT**

**KEY PERFORMANCE INDICATORS**

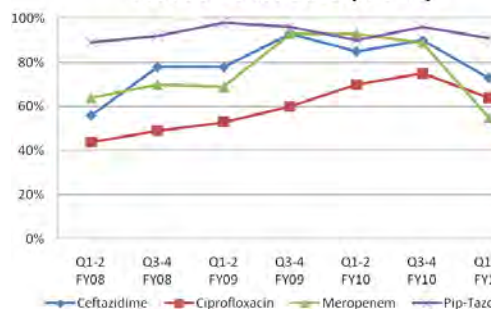
Key Performance Indicator	FY 08/09	FY 09/10	FY 10/11	FY 11/12 Q1-Q2	% Change compared to before ASP in ICU (FY 08/09)
<b>Antimicrobial Usage and Costs</b>					
Total Antimicrobial DDDs/100 Patient Days	180	164	138	162	-10.0%
Total Antimicrobial Costs	\$332,731	\$285,931	\$193,129	\$141,400	N/A
Total Antimicrobial Costs/ Patient Day	\$69.39	\$59.22	\$40.00	\$61.05	-12.0%
<b>Patient Care Indicators</b>					
ICU Average Length of Stay (days)	5.81	5.57	5.65	5.99	-3.1%
ICU Mortality Rate (as a %)	19.9	17.5	16.3	17.0	-14.6%
ICU Readmission Rate (as a %)	3.2	2.9%	2.7	1.4	-56.3%
ICU Ventilator Days	N/A	3,285	2,941	1,443	N/A
ICU Multiple Dysfunction Score (MODS)	4.00	4.03	1.44	3.82	-4.5%

PMH Patients	FY 2010/11			FY 11/12 YTD (Q1-Q2)		
	Total Costs	ICU Visits	Cost per Visit	Total Costs	ICU Visits	Cost per Visit
Total All Antimicrobial Costs (antibacterial + antifungal + other)	\$193,129	788	\$245.09	\$141,400	402	\$351.74
Non-PMH Patients	\$86,288	680	\$126.89	\$34,707	326	\$106.46
PMH Patients	\$106,841	108	\$989.27	\$106,693	76	\$1,403.85

**Total Antimicrobial DDDs/100 Patient Days**



**Pseudomonas Susceptibility**



**Antimicrobial Costs/Patient Day:**

11/12 YTD	MSH	TGH	TWH
	\$61.05	\$94.63	\$10.61

**KEY HIGHLIGHTS:**

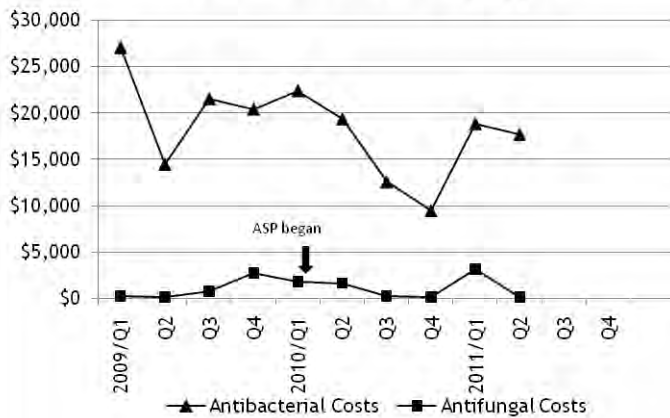
- ✦ 11/12 YTD (Q1-Q2) antimicrobial costs per patient day have decreased 10.0% and antimicrobial usage per 100 patient days has decreased 12.0% compared to before ASP started in the ICU.
- ✦ Mortality rate and readmission rate have both decreased compared to before the ASP started in the ICU, despite an increase in the Multiple Organ Dysfunction Score (MODS), which measures patient acuity.
- ✦ Excluding PMH patients, FY 11/12 YTD antimicrobial costs are \$34,707. FY 11/12 YTD PMH patients represented 19% of the ICU visits, and 75% of total antimicrobial costs (PMH: \$106,693). FY 10/11 PMH patients represented 14% of the ICU visits, and 54% of the total antimicrobial costs (PMH: \$106,841).
- ✦ There has only been 1 case of yeast isolated in blood in FY 11-12 Q2.
- ✦ The VAP inter-disciplinary Working Group has developed an algorithm that have been discussed and shared with colleagues across MSH and UHN. In November 2011, the VAP algorithm was implemented at MSH ICU.

**MOUNT SINAI HOSPITAL: 14<sup>TH</sup> FLOOR**

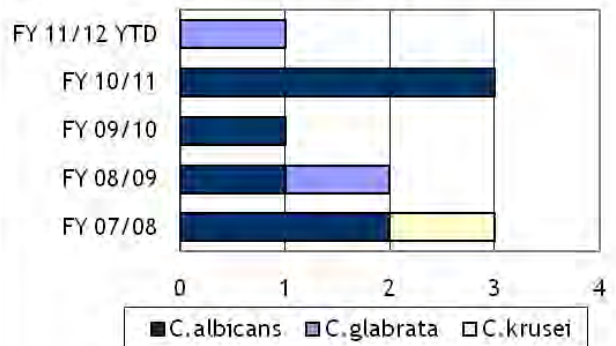
**KEY PERFORMANCE INDICATORS**

Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q2	% Change compared to before ASP in ICU (FY 09/10)
<b>Antimicrobial Usage and Costs</b>				
Total Antimicrobial DDDs/100 Patient Days	62.0	49.2	51.9	-16.3%
Total Antimicrobial Costs	\$89,053	\$67,986	\$40,034	N/A
Total Antimicrobial Costs/ Patient Day	\$4.69	\$3.72	\$4.25	-9.4%
<b>Patient Care Indicators</b>				
14 <sup>th</sup> Floor Average Length of Stay (days)	6.4	6.4	6.4	0.0%
14 <sup>th</sup> Floor Mortality Rate (as a %)	0.7	0.6	0.7	0.0%
14 <sup>th</sup> Floor Readmission Rate (as a %)	Under Review			N/A
14 <sup>th</sup> Floor Isolation Days per 100 patient days	8.6	10.1	TBD	N/A

**Antimicrobial Costs by Type**



**Episodes of Fungemia**



**KEY HIGHLIGHTS:**

- ✦ 11/12 YTD (Q1-Q2) antimicrobial costs per patient day have decreased 9.4% and antimicrobial usage per 100 patient days has decreased 16.3% compared to before ASP started in the ICU.
- ✦ There has been 0 cases of yeast isolated in blood in FY 11-12 Q2.
- ✦ Sandra Nelson is developing evidence and principle based guidelines for surgical prophylaxis. Once developed, the guidelines will be presented, along with a review of current practices, to the surgical groups for discussion and consensus.

TORONTO GENERAL HOSPITAL (TGH) MSICU

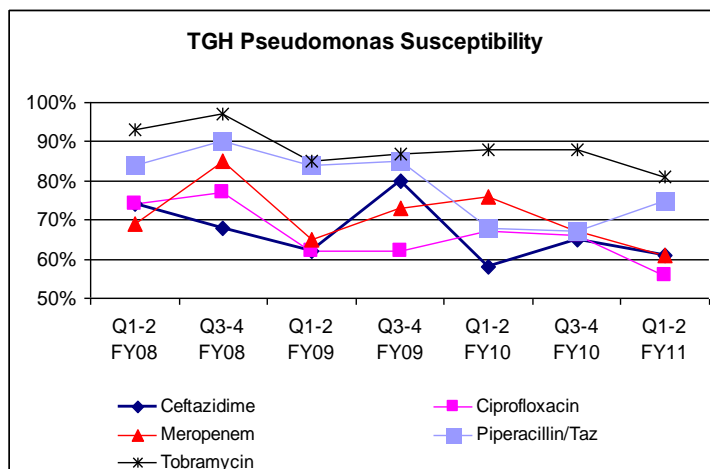
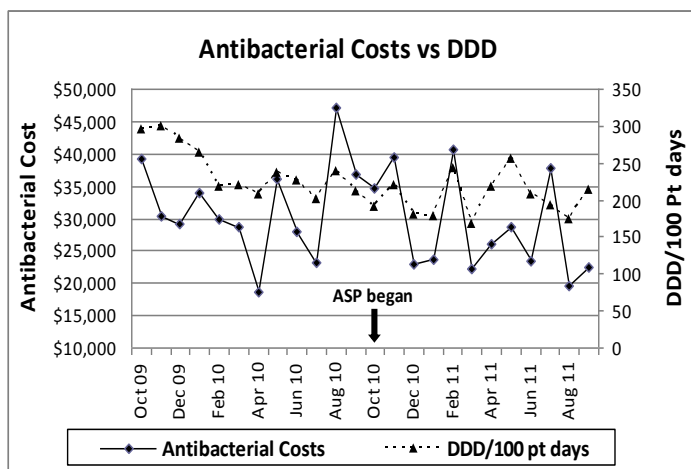
KEY PERFORMANCE INDICATORS

Key Performance Indicator	FY 10/11	FY 11/12 Q1-Q2	October 2009 to September 2010	October 2010 to September 2011	Difference	
					% Change	Numerical Change
<b>Antimicrobial Usage and Costs</b>						
Total Antimicrobial DDDs*/100 Patient Days	208.2	209.8	241.1	202.8	-15.9%	-38.3
Total Antimicrobial Costs	\$627,540	\$354,587	\$696,998	\$620,978	-10.9%	-\$76,020
Total Antimicrobial Costs/Patient Day	\$83.81	\$94.63	\$98.28	\$81.62	-16.9%	-\$16.66
<b>Patient Care Indicators</b>						
TGH ICU Average Length of Stay (days)	7.94	7.93	8.53	8.05	-5.6%	-0.5
TGH ICU Mortality Rate	15.1%	9.9%	16.2%	17.7%	9.6%	1.6%
TGH ICU Apache II Score***	16.40	N/A	17.00	16.40	-3.5%	-0.60
TGH ICU Bed Occupancy	20.45	20.45	19.38	20.80	7.3%	1.4
TGH ICU Vent Days	6043	2858	5603	6067	8.3%	464
TGH ICU Candidaemias (C. albicans)	16	5	21	11	-47.6%	-10

\* DDD = Defined Daily Dose

\*\* ASP started at TGH ICU in October 2010

\*\*\* Apache II Score: FY 09-10 vs. FY 10-11



KEY HIGHLIGHTS: OCT 2010 TO SEP 2011 VS. OCT 2009 TO SEP 2010

- ✦ Total Antimicrobial DDDs/100 Patient Days has decreased by 15.9%
- ✦ Total Antimicrobial Costs has decreased by \$76,020
- ✦ Total Antimicrobial Costs/Patient Day has decreased by 16.9%
- ✦ Average Length of Stay (days) has decreased by 5.6%

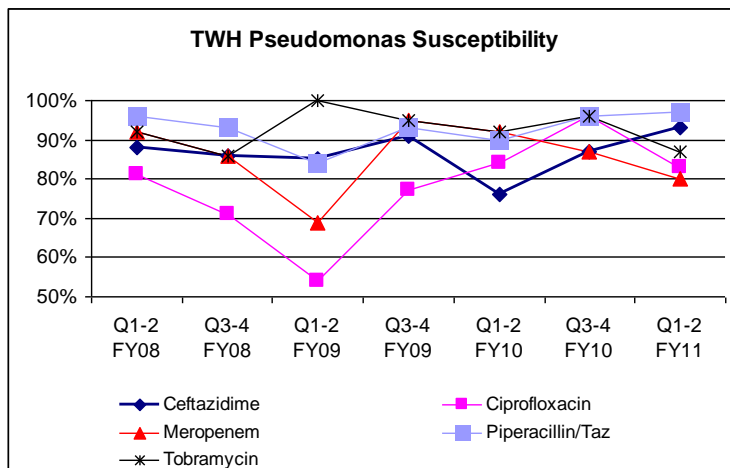
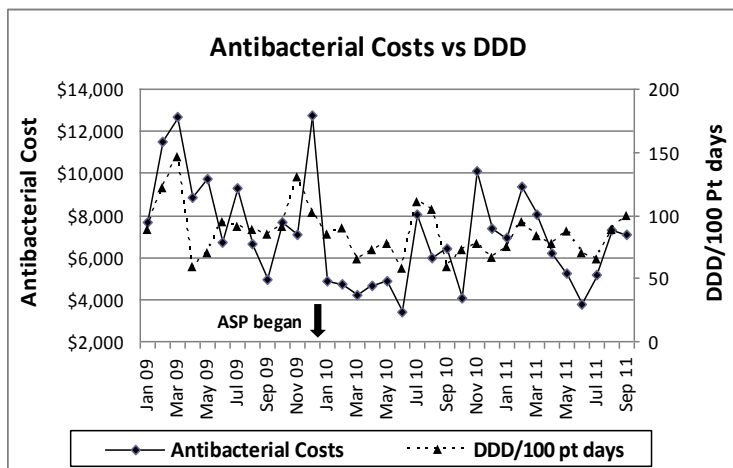
**TORONTO WESTERN HOSPITAL (TWH) ICU**

**KEY PERFORMANCE INDICATORS**

Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q2	Difference (FY 11/12 Q1-Q2 vs. FY 09/10)	
				% Change	Numerical Change
<b>Antimicrobial Usage and Costs</b>					
Total Antimicrobial DDDs*/100 Patient Days	87.6	79.2	81.2	-7.3%	-6.4
Total Antimicrobial Costs	\$100,408	\$101,191	\$40,615	N/A	N/A
Total Antimicrobial Costs/Patient Day	\$13.24	\$13.17	\$10.61	-19.8%	-\$2.62
<b>Patient Care Indicators</b>					
TWH ICU Average Length of Stay (days)	7.44	10.68	10.81	45.2%	3.37
TWH ICU Mortality Rate	19.9%	18.1%	16.7%	-16.3%	-3.3%
TWH ICU Apache II Score	14.65	13.73	13.65	-6.8%	-1.00
TWH ICU Readmissions within 48 hours	4.7%	4.9%	4.1%	-11.9%	-0.6%
TWH ICU Ventilation Days	6305	5960	1387	N/A	N/A

\* DDD = Defined Daily Dose

\*\* ASP started at TWH ICU in December 2009



**KEY HIGHLIGHTS: FY 11/12 Q1-Q2 VS. FY 09/10**

- ✦ Total Antimicrobial DDDs/100 Patient Days has decreased by 7.3%
- ✦ Total Antimicrobial Costs/Patient Day has decreased by 19.8%
- ✦ Mortality Rate has decreased by 16.3%
- ✦ Readmission within 48 hours has decreased by 11.9%



**PRINCESS MARGARET HOSPITAL (PMH) - 14A + 15B**

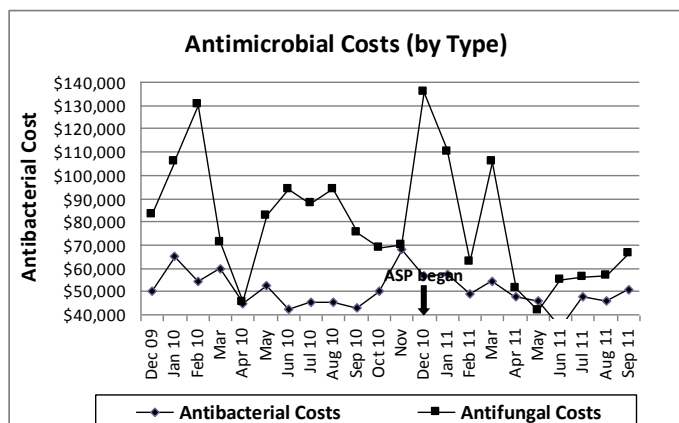
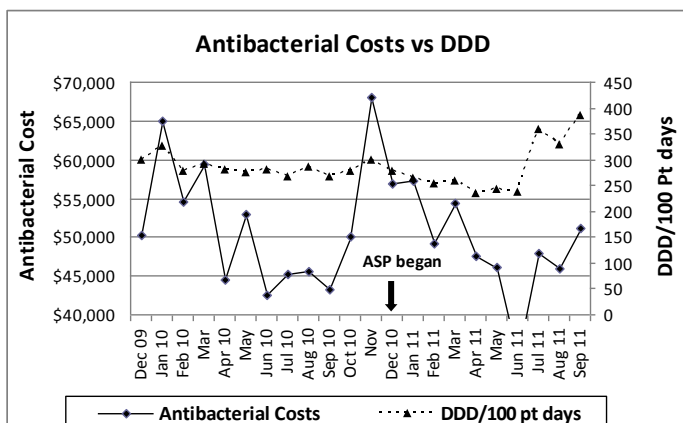
**KEY PERFORMANCE INDICATORS**

Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q2	Difference (FY 11/12 Q1-Q2 vs. FY 09/10)	
				% Change	Numerical Change
<b>Antimicrobial Usage and Costs</b>					
<b>Total Antimicrobial DDDs*/100 Patient Days</b>	295.2	274.3	299.5	1.4%	4.3
Systemic Antibacterial DDDs/100 Patient Days	190.8	166.8	190.6	-0.1%	-0.2
Systemic Antifungal DDDs/100 Patient Days	104.4	107.4	108.8	4.3%	4.5
<b>Total Antimicrobial Costs</b>	\$1,768,317	\$1,641,331	\$600,664	N/A	N/A
<b>Total Antimicrobial Costs/Patient Day</b>	\$167.12	\$154.32	\$111.36	-33.4%	-\$55.76
Systemic Antibacterial Costs/Patient Day	\$62.28	\$57.33	\$50.61	-18.8%	-\$11.68
Systemic Antifungal Costs/Patient Day	\$104.84	\$96.99	\$60.75	-42.1%	-\$44.08

\* DDD = Defined Daily Dose

\*\* ASP restarted at PMH 14A + 15B in December 2010

Patient Care Indicators	FY 10/11				FY 11/12	
	Q1	Q2	Q3	Q4	Q1	Q2
PMH 14A + 15B Average Length of Stay (days)	20.2	22.5	21.3	26.8	20.9	27.2
PMH 14A + 15B Mortality Rate (as a %)	7.8%	5.7%	6.7%	3.7%	10.3%	4.0%



**KEY HIGHLIGHTS: FY 11/12 Q1-Q2 VS. FY 09/10**

- ✦ Total Antimicrobial DDDs/100 Patient Days has increased by 1.4%
- ✦ Total Antimicrobial Costs/Patient Day has decreased by 33.4%
- ✦ Systemic Antibacterial Costs/Patient Day has decreased by 18.8%
- ✦ Systemic Antifungal Costs/Patient Day has decreased by 42.1%

## MSH-UHN ASP RESEARCH ACTIVITIES

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

- ✦ An expert Delphi panel that convened over the summer has successfully identified two measures that could be used for public reporting and five measures that can be used internally in healthcare settings as quality indicators. These indicators can be implemented across diverse health care systems to enable ongoing evaluation of Antimicrobial Stewardship Programs, and complement efforts for improved patient safety. The *Journal of Infection Control and Hospital Epidemiology* has accepted the manuscript entitled “The Use of a Structured Panel Process to Define Quality Metrics of Antimicrobial Stewardship Programs” for publication.  
  
In addition, the editors of the journal have requested that the authors submit an additional review paper on the process used to develop these measures. This review is currently being prepared for submission and the two articles will be published simultaneously in a future issue.
- ✦ A multi-site research project examining the management and outcomes of patients with *S. aureus* bacteraemia at several TASC member hospitals continues, with data collection nearing completion. This project will capture approximately 1000 episodes of *S. aureus* bacteraemia.
- ✦ A retrospective analysis to determine whether the introduction of an ASP into an ICU altered the decision to treat sterile vs. non-sterile culture sites, and subsequently, if regimens were appropriately tailored, has been completed at MSH and the manuscript is currently being prepared for submission.
- ✦ Data collection is currently underway for a large retrospective analysis of sepsis outcomes at MSH, TGH & TWH, from April 2009 through March 2011. This chart review includes all patients admitted through the ED with a diagnosis of sepsis, severe sepsis, and/or septic shock. Analysis will look at time to recognition of sepsis, process of care, length of ICU stay, time to discharge and mortality.
- ✦ Additional ongoing and upcoming studies include:
  - A study to investigate the effects of a multidisciplinary Antimicrobial Stewardship Program on antimicrobial prescribing practices in three diverse Intensive Care Units (MSH ICU, TGH Medical-Surgical ICU & TWH ICU).
  - A study looking at the role of baseline thoracic CT scans on the use of antifungal agents and outcomes in patients receiving first induction chemotherapy for AML.
  - A matched pre- and post-study comparing safety and efficacy endpoints for patients discharged with OPAT vs. a historically-matched control group.
  - A study to determine the relationship of timing of antibiotic administration during C-sections with infection rates.
  - A retrospective chart review to increase the validity and reliability of current data on patients with a history of allergic reaction to antibiotics.