

MSH + UHN

ASP

ANTIMICROBIAL
STEWARDSHIP
PROGRAM



Q3 REPORT

FISCAL YEAR 2011 | 2012

MOUNT SINAI HOSPITAL
Joseph and Wolf Lebovic Health Complex



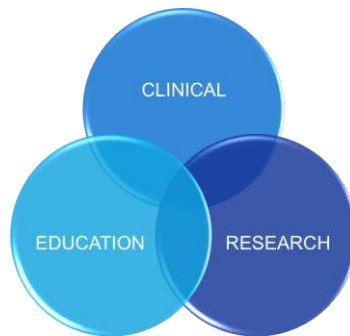
University Health Network
Toronto General Hospital | Toronto Western Hospital | Princess Margaret Hospital



“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.

Key Highlights of this quarterly report:

- ✦ **Antimicrobial Consumption & costs:** The ASP has been associated with sustained reductions in antimicrobial costs in the intensive care unit (ICU) at Toronto General Hospital, and the General Surgery service at Mount Sinai Hospital. Antimicrobial costs have decreased substantially on the Leukemia Service at Princess Margaret Hospital. Consumption and costs have increased substantially in the Toronto Western Hospital ICU. At Mount Sinai Hospital, antimicrobial utilization has continued to reduce substantially for all patients other than those originating from Princess Margaret Hospital: those patients now constitute almost three quarters of total antimicrobial consumption in the MSH ICU.
- ✦ **Safety Indicators:** The ASP has been associated temporally with a marked reduction in candidemias in both the TGH and MSH ICUs.
- ✦ **Research:** Multiple research projects continue within the program, with many important projects nearing completion and being prepared for submission to key medical journals. These projects are expanded upon further in the report. In addition, the ASP continues to build partnerships with key stakeholders to expand our research activities.
- ✦ **Education:** Dr. Vicky Fera and Dr. Nisha Thampi are the inaugural holders of the Pfizer Canada Fellowship with the MSH-UHN Antimicrobial Stewardship Program
- ✦ **Personnel Changes:** Dr. Susy Hota, an infectious diseases physician with Infection Prevention and Control, and Dr. Shahid Husain, an infectious diseases physician who directs the Immunocompromised Host Service, have joined the MSH-UHN ASP. Dr. Chaim Bell, a general internist and longstanding consultant to the MSH-UHN ASP, will be moving to Mount Sinai Hospital; this will allow him to increase his involvement with the ASP and will facilitate development of our research mandate. Yoshiko Nakamachi was recently hired as project manager for the CAHO ASP project (see below). She comes with knowledge of information technology, research study coordination and healthcare systems.
- ✦ **Partnerships:** The ASP has partnered with **Emergency Physicians with the Toronto Central LHIN (Local Health Integration Networks)** to develop emergency department algorithms for the investigation and management of community-acquired pneumonia and cellulitis. Members of the ASP, in connection with the Toronto Antimicrobial Stewardship Corridor (TASC) and the **Best Practice in General Surgery (BPiGS) group**, have also collaborated with ASP to develop and disseminate [guidelines for the management of intra-abdominal infections](#).
- ✦ **Leadership:** [The Council of Academic Hospitals of Ontario \(CAHO\) ASP in ICUs ARTIC \(Advancing Research to Improve Care\) Project](#) (herein referred to as the CAHO ASP Project) will be launched in January 2012. The MSH-UHN ASP Team—in collaboration with colleagues from Mount Sinai Hospital, Sunnybrook Health Sciences Centre, St. Michael's, and University Health Network—will work with CAHO and the **MOHLTC Critical Care Secretariat** to implement antimicrobial stewardship programs in the ICUs of 12 Academic Health Sciences Centres throughout the province over a two-year period and develop standardized reporting metrics for antimicrobial use in ICUs.

The following table summarizes the activities of the MSH-UHN ASP (mostly in collaboration with a variety of colleagues):

SUMMARY OF CURRENT ASP ACTIVITIES AND RESULTS

LOCATION/ STAKEHOLDERS	METHODS	START DATE	HIGHLIGHTS
MSH Intensive Care Unit	Prospective audit and feedback	February 2009	Quarterly antimicrobial consumption has increased 15% compared to the same period last year, but remains lower than the reference (pre-ASP) period. Antimicrobial costs have also increased over this past quarter, primarily due to an increase in antimicrobial cost for patients originating from PMH. Candidemias are at a historic low. VAP algorithm implemented.
MSH General Surgery	Prospective audit and feedback	March 2010	Quarterly antimicrobial consumption has remained steady, but costs have increased. Total antimicrobial costs remain relatively low (approximately \$4/patient-day).
PMH 14A & 15B/ Leukemia and Immunocompromised Host Service	Prospective audit and feedback	February 2010 (interrupted August-November 2010)	Quarterly antimicrobial costs have decreased 31% compared to the same period last year, with a 12% reduction in antimicrobial consumption. Roughly two-thirds of savings come from reductions in antifungal costs. This translates to minimum saving of roughly \$140K over the 3 rd quarter. (Data for ward C were not included.)
TGH Intensive Care Unit	Prospective audit and feedback	October 2010	Quarterly antimicrobial consumption has decreased 6.5% compared to the same period last year, with a corresponding 18% reduction in antimicrobial costs. Quarterly antimicrobial costs this past quarter were at a historic low, as were candidemias.
TWH ICU	Prospective audit and feedback	December 2009	Quarterly antimicrobial consumption has increased 44% compared to the same period last year, with a corresponding 70% increase in antimicrobial costs. The reasons for this are uncertain.

ASP Working Groups	Best practice collaboration	January 2011	The VAP algorithm was implemented at MSH ICU in November 2011. There has been a 30% decrease in sputum sampling, with further improvement underway. Planning has commenced to implement the VAP algorithm at TGH and TWH ICUs.
Antimicrobial Stewardship Retreat		February 2012	The MSH-UHN ASP held a mini-retreat to review the program's current state and set priorities going forward on February 29, 2012. A follow-up retreat will be held in mid/end of April 2012.
CAHO ASP Project	On site project kick-off meetings at each of the participating sites	January 2012	The MSH-UHN ASP Team has been meeting with executive sponsors and key stakeholders from the 12 participating academic hospitals for the purpose of implementing ASPs in their ICUs. Project kick-off meetings to be completed in April 2012. The MSH-UHN ASP Team met with the Critical Care Secretariat and with CritiCall to discuss potential expansion of the CCIS to include additional fields to capture antimicrobial data and ICU acquired <i>C.diff</i> rates.
GIM	Prospective audit and feedback	February 2012	Rounds have started at MSH, TGH, TWH with one Clinical Teaching Unit team per site.
Website		July 2011	The MSH-UHN ASP External website is scheduled to be completed in July 2012.
Database			We have already completed requirements gathering, data analysis, technical design, architectural design, and initial user interface design. The next step will be to start programming but some architectural challenges are still being sorted out with the MSH Informatics Team. Things are moving relatively quickly on the UHN side.

LOOKING FORWARD

CLINICAL

- ✦ The ASP is looking forward to expanding its partnerships with clinical teams throughout Mount Sinai Hospital and University Health Network. In addition to hopeful expansion throughout General Internal Medicine, we hope to collaborate with the cardiovascular intensive care unit (CVICU) at Toronto General Hospital and the neonatal intensive care unit (NICU) at Mount Sinai Hospital.
- ✦ **Dr. Shahid Husain** and **Dr. Miranda So** hope to collaborate with key stakeholders to develop a febrile neutropenia algorithm for patients with hematological malignancies and stem cell transplantation. Unlike traditional guidelines, the hope is that this algorithm will include all aspects of initial investigation and management of such patients.

RESEARCH

- ✦ There are exciting new research opportunities for multi-centre collaboration which we continue to explore. Additionally, several of our ongoing research projects are close to completion, and we anticipate submission for publication by the release of our next quarterly report.
- ✦ **Dr. Chaim Bell**, a long-standing member of our ASP team, will be joining the staff of MSH as a clinician scientist, and will have expanded responsibilities with the Antimicrobial Stewardship Program to expand its research mandate.

EDUCATION

- ✦ Two physicians, **Dr. Vicky Fera** and **Dr. Nisha Thampi**, are the successful applicants to the Pfizer Canada Fellowship with the MSH-UHN Antimicrobial Stewardship Program. Dr. Fera is currently the Chief Resident in the Paediatric Infectious Diseases Residency Training Program. Dr. Thampi is an infectious diseases physician currently completing her Masters of Science Degree in Health Economics at the London School of Hygiene and Tropical Medicine. Drs. Fera and Thampi will also be enrolled in the prestigious Veterans Affairs Quality Scholars Program over the course of their 2-year fellowship.

MOUNT SINAI HOSPITAL (SUPPORTED BY PFIZER CANADA INC.)

INTENSIVE CARE UNIT

The ASP began working in the MSH ICU in February 2009. In FY 11/12, **Dr. Sandra Nelson** continues to round 3 days a week, a change that was made in FY 10/11 Q4. Full results on data collected are in the [Appendix](#), but are summarized below:

- ✦ FY 11/12 YTD **antimicrobial usage** (using defined daily doses (DDDs) per 100 patient days) **has increased by 15% compared to the same time period last year**, but remains decreased by 11% compared to the 2008/9 fiscal year. Much of this is due to an almost 30% increase in antibacterial usage compared to the same period last year, with a corresponding 20% decrease systemic antifungal usage.
- ✦ The aforementioned antimicrobial usage increase is associated with increased utilization for patients originating from PMH: In 2009/10, **patients originating from PMH** accounted for 54% of antimicrobial costs, and in 2010/11 they accounted for 59% of costs; they **now account for 73% of all ICU antimicrobial costs**.
- ✦ There was only one case of yeast isolated in blood in FY 11-12 Q3.
- ✦ Since the introduction of the ASP in the MSH ICU, crude mortality has not increased. (Crude mortality has dropped from 20% in FY 08/09 to 16% in 11/12 YTD, corresponding with slightly rising mean MODS (multiple organ dysfunction score).
- ✦ *Pseudomonas aeruginosa* susceptibilities are updated bi-annually. FY 10/11 Q1-Q2 data can be found in the Appendix. FY 11/12 Q3-Q4 data will be provided in the Q4 Report.

GENERAL SURGERY (14TH FLOOR)

The ASP began working with the General Surgery Teams at MSH in March 2010. **Dr. Nelson** performs prospective audit and feedback, and communicates with the surgical residents two times a week. Outcome data are available in the [Appendix](#), but are summarized below:

- ✦ Third quarter antimicrobial **consumption has decreased 3%** compared to last year, with a **55% increase in costs**.
- ✦ Antimicrobial costs are approximately \$4/patient-day, which is 10% lower than prior to the introduction of the ASP.
- ✦ There have been 0 cases of yeast isolated in blood in FY 11-12 Q3.

GENERAL INTERNAL MEDICINE (GIM)

The ASP started working with GIM at Mount Sinai on March 6, 2012, the same date that it also started at TWH. **Dr. Nelson** is working with Team C as part of this pilot phase. Sandra meets with the team, including the GIM pharmacist for Team C, each Tuesday and Friday afternoon. She has been collecting data on the interactions, which will be reviewed by the MSH-UHN ASP in April. Initial feedback from Team C has been positive.

PRINCESS MARGARET HOSPITAL (14A, 15B AND 15C)

LEUKEMIA SERVICE

The ASP has been working with the Leukemia Service at PMH since February 2010 (with a brief interruption the summer and fall of 2010). **Dr. Miranda So** is the lead ASP pharmacist for this initiative. **Dr. Shahid Husain** and **Dr. So** meet with the PMH Leukemia team three times per week (Mon, Wed, Fri). This quarter saw the introduction of an additional ward, 15C, for patients with leukemia. Outcome data (only for 14A and 15B) are available in the [Appendix](#), but are summarized below:

- ✦ Comparing FY 11/12 Q3 vs. FY10/11 Q3 there has been a 31% reduction in antimicrobial costs (21% reduction in antibacterial costs and 31% reduction in antifungal costs), corresponding with a 12% reduction in antimicrobial consumption. Compared to the 2009-10 fiscal year, work with the Leukemia service has resulted in only a slight (4%) reduction in antimicrobial consumption but a 30% reduction in antimicrobial costs.
- ✦ Mean quarterly antimicrobial costs in FY 09/10 was \$442K; for this fiscal year, mean quarterly costs are \$304K.

TORONTO GENERAL HOSPITAL

INTENSIVE CARE UNIT

The ASP started its work at the TGH ICU in October 2010. **Dr. Linda Dresser** is the lead ASP pharmacist for this initiative where she meets with the TGH ICU team four times per week (Mon, Tue, Thu, Fri). Outcome data are available in the [Appendix](#), but are summarized below:

- ✦ Comparing FY 11/12 Q3 vs. FY10/11 Q3 there has been an **18% reduction in antimicrobial costs** and **6% reduction in antimicrobial consumption**.
- ✦ Antibacterial costs are 21% lower than the same quarter last year, and antifungal costs are 6% lower.
- ✦ Post-ASP Median for antibacterial costs of \$79,716 vs. pre-ASP Median of \$95,479

- ✦ We hope to have data broken down according to whether or not the patient is part of the Multi-Organ Transplant Program for the next quarterly report.

GENERAL INTERNAL MEDICINE (GIM)

The ASP started working with GIM at Toronto General on March 2012. **Dr. Miranda So** is the lead antimicrobial steward for this initiative. Currently, she is rounding each Tuesday and Thursday with Team 6 as a pilot phase. The pilot phase will continue to allow further accumulation of data for impact analysis, which will be reviewed with stakeholders.

TORONTO WESTERN HOSPITAL

INTENSIVE CARE UNIT

The ASP started its work at the TWH ICU in December 2009. **Dr. Kevin Duplisea** is the lead ASP pharmacist for this initiative where he meets with the TWH ICU team four times per week (Mon, Tue, Wed, Fri). Outcome data are available in the [Appendix](#), but are summarized below:

- ✦ Comparing FY 11/12 Q1-Q2 vs. FY10/11 Q1-Q2 (Before ASP) there has been a 26.9% reduction in antimicrobial costs/pt-day and 29.2% reduction in Systemic Antifungal DDD/100 pt-days.
- ✦ There is also a 30.5% reduction in readmissions rate from FY 11/12 Q3 vs. FY 10/11 Q3.
- ✦ Post-ASP Median for antibacterial costs of \$20,026 vs. Pre-ASP Median of \$25,293
- ✦ Weekly Friday noon teaching rounds continue to take place where each ICU Fellow takes turns delivering an informal therapeutic discussion to the ICU medical team on an antimicrobial stewardship related topic of his/her choice.

GENERAL INTERNAL MEDICINE (GIM)

The ASP started working with GIM at Toronto Western on March 2012. **Dr. Kevin Duplisea** is the lead antimicrobial steward for this initiative. Currently, he is rounding two times a week (Tuesday and Thursday). Feedback from the GIM team members about the interactions has been extremely positive. The most apparent strength of ASP on GIM has been the creation of a 'safe learning environment' for medical trainees to ask antimicrobial related questions and to develop a rationale approach to antimicrobial prescribing.

ASP WORKING GROUPS

In addition to prospective audit and feedback, the ASP has been focusing on reducing variation in practice when there is no clear clinical or evidence-based explanation for the variation to improve patient outcomes. The ASP has begun collaborations with various stakeholders to develop working groups to improve care by reducing variation.

The **Ventilator-Associated Pneumonia (VAP) Working Group** is a multi-disciplinary group, including Pharmacists, Physicians, Respiratory Therapists, Radiologists and Nursing. This group has developed a VAP algorithm that was shared with colleagues across MSH and UHN for feedback. The VAP algorithm was introduced at MSH ICU in November 2011 and initial evaluation showed a reduction in sputum sampling by 50%: the mean number of sputum samples sent for microbiology testing prior to introduction of the VAP algorithm was 25/month, and is now approximately 13/month. Two nursing education sessions recently occurred to inform and educate them on the change in practice. Planning is also underway to introduce the VAP algorithm at TGH and TWH ICUs.

In conjunction with the Toronto Central (TC) LHIN ER group (ER Physician Lead: Dr. Howard Ovens) algorithms for the diagnosis and management of basic infectious diseases are being developed for TC-LHIN Emergency Departments. Currently, the **Community-Acquired Pneumonia (CAP) Working Group** and **Skin and Soft Tissue Infection (SSTI) Working Group** are in the midst of developing their algorithms.

TORONTO ANTIMICROBIAL STEWARDSHIP CORRIDOR (TASC)

A subgroup of TASC members, led by **Monique Pitre**, is working on developing a TASC Antimicrobial Stewardship Handbook that could be used at any of the TASC sites.

Our next meeting is March 29, 2012.

ANTIMICROBIAL STEWARDSHIP PROGRAM RESEARCH

The ASP continues to pursue the model that all of its activities should be based on the best available evidence, should be studies to observe real-world outcomes, and should contribute to modern medical practice with knowledge translation. Some of this research has been listed below.

ANTIMICROBIAL STEWARDSHIP IN THE ICU

Two studies investigating the effects of a multidisciplinary Antimicrobial Stewardship Program on Intensive Care Units are nearing completion. The first study is to determine if an ASP altered treatment of non-sterile culture sites, de-escalation and cost. Data was collected from the MSH ICU pre- and post-ASP implementation. The manuscript is in the final stages of revision prior to submission. The second project examines the effects of an ASP on antimicrobial prescribing

practices in three diverse intensive care units (MSH, TGH & TWH). Data collection is nearing completion and will soon be analyzed.

STAPHYLOCOCCUS AUREUS BACTERAEMIA

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. An audit of data capture has been carried out at almost all sites. This project will capture over 1000 episodes of *S. aureus* bacteraemia at 7 hospitals across the GTA..

DELPHI PANEL

An expert Delphi panel convened last summer and 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 manuscript, entitled **"THE USE OF A STRUCTURED PANEL PROCESS TO DEFINE QUALITY METRICS OF ANTIMICROBIAL STEWARDSHIP PROGRAMS"**, has been accepted for publication by the Journal of Infection Control and Hospital Epidemiology, and will be published in May 2012. A second article - a review paper on the process used to develop these measures - has been commissioned by ICHE, and is currently in preparation for future submission to ICHE.

SEPSIS PROJECT

Data collection is continuing for a large retrospective analysis of sepsis outcomes at MSH, TGH & TWH, from April, 2010 through March, 2011. This chart review will include 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. Data collection has been completed at MSH.

ADDITIONAL RESEARCH PROJECTS

Additional ongoing and upcoming studies include:

- ✦ A study to investigate the effects of a multidisciplinary Antimicrobial Stewardship Program on antimicrobial prescribing practices in the General Internal Medicine services at MSH, TGH & TWH.
- ✦ A study looking at how thoracic CT scans influence the use of antifungal agents and patient outcomes in AML patients.
- ✦ A matched pre- and post-study comparing safety and efficacy endpoints for patients discharged with OPAT vs. a historically matched control group.
- ✦ A retrospective chart review to increase the validity and reliability of current data on patients with a history of allergic reaction to antibiotics.

- ✦ A survey of Critical Care Trainees to capture their experiences in working with different models of ASPs, vs. no ASP, while rotating through various ICUs across the GTA.
- ✦ A survey of Canadian intensivists to determine their knowledge, perceptions and attitudes towards ASPs

ANTIMICROBIAL STEWARDSHIP PROGRAM EDUCATION

One of the ASP's mandates is to increase the antimicrobial stewardship capacity locally, provincially, and nationally. 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.

ANTIMICROBIAL STEWARDSHIP LEADERSHIP

COUNCIL OF ACADEMIC HOSPITALS OF ONTARIO (CAHO) ADOPTING RESEARCH TO IMPROVE CARE (ARTIC) PROGRAM

Under the initiative of the CAHO ASP Project, the ASP Project Team members will provide clinicians at the participating sites peer support, education, and assist in the evaluation and reporting of project outcomes. The ASP Project Team is being managed by **Yoshiko Nakamachi**, an experienced expert in healthcare systems, who has worked with diverse projects in healthcare ranging from multisite antimicrobial research studies to implementing complex databases for healthcare system improvement. The team consists of: ASP Pharmacists and Infectious Diseases Physicians, Intensivists, Research Methodologists, and Project Management. The 12 Academic Health Sciences Centres participating in the CAHO ASP project will be provided with:

- ✦ a package of educational materials/tools needed to provide and/or receive antimicrobial stewardship advice in the ICU
- ✦ an education and orientation session that will acquaint participants to the project, and offer education surrounding the nuances of prospective audit and feedback
- ✦ a series of online education modules for participants to use either as resources or for the purpose of educating colleagues
- ✦ ongoing project management support to help with issues surrounding program development, data collection and management, and ensure that implementation is proceeding in a timely and straightforward manner
- ✦ timely ASP Pharmacist and ASP Physician support

- ✦ scientific evaluation and reporting of the outcomes to formally evaluate the relationship between antimicrobial stewardship (in the form of prospective audit and feedback) and antimicrobial utilization, antimicrobial resistance, C. difficile, and patient outcomes in the intensive care unit

DATABASE

ASP database will be an integrated web based database that combines clinical, laboratory, administrative, pharmacy, and radiology (CLAPR) data. Database will be combined MSH-UHN ASP database. It will use available microbiology and other laboratory data to generate real-time decision support for antimicrobial therapy. DB will be used to produce a variety of reports to support quality improvement efforts. Having an ASP database have many benefits including patient safety, quality improvement, time saving, cost saving etc. ASP database will be housed on UHN virtual server, with all ASP members having log-in access to the database. Data security will be priority.

We have already completed requirements gathering, data analysis, technical design, architectural design, and initial user interface design. The next step will be to start programming but some architectural challenges are still being sorted out with the MSH Informatics Team. Things are moving relatively quickly on the UHN side. Thanks to **Tim Tripp** and team for helping us with data and for providing space on UHN server.

WEBSITE

The MSH-UHN ASP External website is scheduled to be completed in July 2012. Currently the ASP team is working to finalize the new website's contents.

ACKNOWLEDGEMENTS

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

NEXT QUARTERLY REPORT

The next quarterly report (end of fiscal year 2011/12) is expected in June 2012.

APPENDIX

MOUNT SINAI HOSPITAL ICU
Mount Sinai Hospital ICU Antimicrobial Cost and Usage

Note: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage, although it does have limitations. Example of a DDD: the DDD for cefazolin is 3 g since the standard daily dose is 1 g IV q8h. (Source: World Health Organization, http://www.whooc.no/atc_ddd_index/)

Key Performance Indicator	FY 08/09	FY 09/10	FY 10/11	FY 11/12 Q1-Q3	% Change	
					Q3 11/12 compared to Q3 10/11	FY 11/12 YTD compared to FY 08/09 (Before ASP)
Antimicrobial Usage and Costs						
Total Antimicrobial DDDs*/100 Patient Days	177	171	144	157	15.4%	-11.3%
Systemic Antibacterial DDDs/100 Patient Days	142	128	111	126	29.9%	-11.3%
Systemic Antifungal DDDs/100 Patient Days	31	24	20	26	-19.9%	-16.1%
Total Antimicrobial Costs	\$332,724	\$285,975	\$193,129	\$204,424	21.8%	N/A
Total Antimicrobial Costs/ Patient Day	\$69.01	\$59.23	\$40.95	\$59.22	31.8%	-14.2%
Systemic Antibacterial Costs	\$174,339	\$142,134	\$95,773	\$89,071	23.5%	N/A
Systemic Antibacterial Costs/Patient Day	\$36.16	\$29.44	\$20.31	\$25.80	33.3%	-28.6%
Systemic Antifungal Costs	\$143,100	\$132,519	\$88,998	\$108,253	17.1%	N/A
Systemic Antifungal Costs/Patient Day	\$29.68	\$27.45	\$18.87	\$31.36	26.8%	5.7%
Patient Care Indicators						
Hospital acquired <i>C.difficile</i> cases (rate per 1,000 patient days)	N/A	N/A	N/A	3 (0.87)	N/A	N/A
ICU Average Length of Stay (days)	5.84	5.57	5.67	5.59	-26.9%	-4.3 %
ICU Mortality Rate (as a %)	20.1	17.6	16.3	15.9	-27.2%	-20.9%
ICU Readmission Rate within 48 hrs (as a %)	3.2	2.9	2.7	2.8	N/A	-12.5%
ICU Ventilator Days	N/A	3286	2934	2009	-25.1%	N/A
ICU Multiple Dysfunction Score (MODS)	4.00	4.04	4.12	4.14	10.4%	3.5%

*DDD = Defined Daily Dose

*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

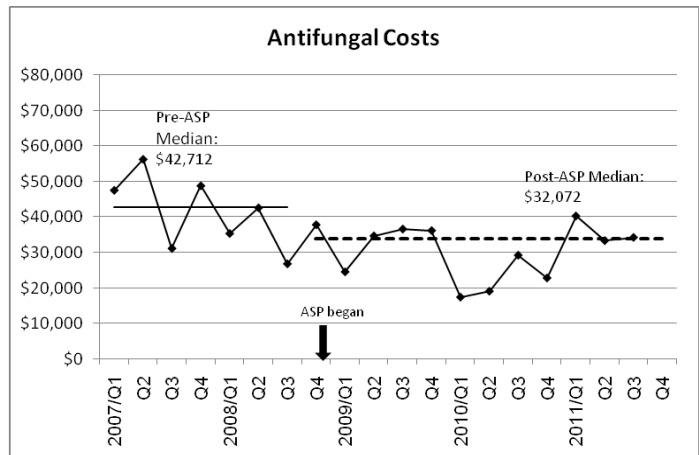
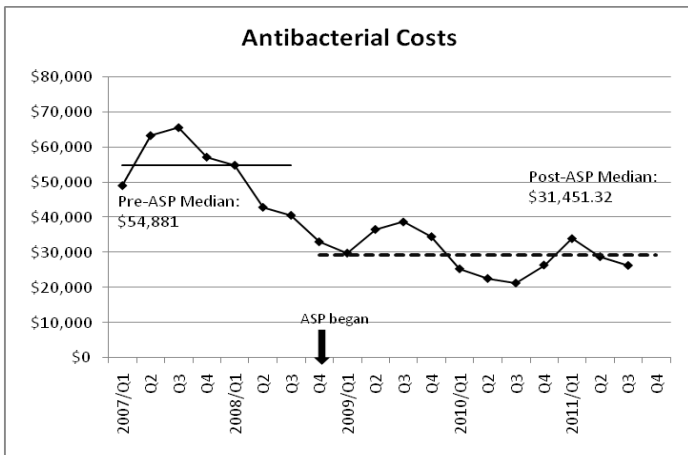
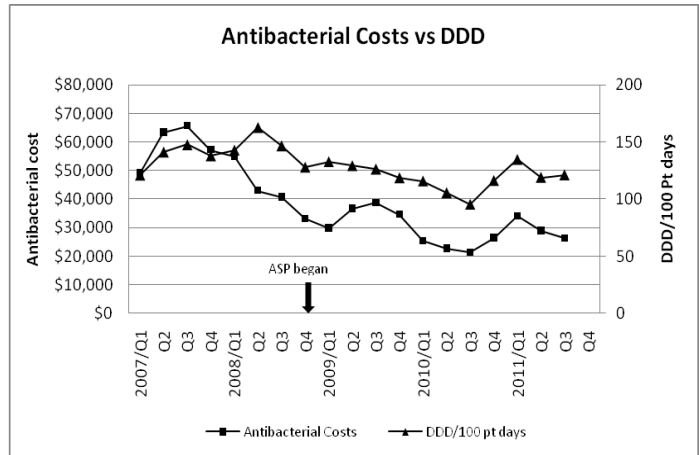
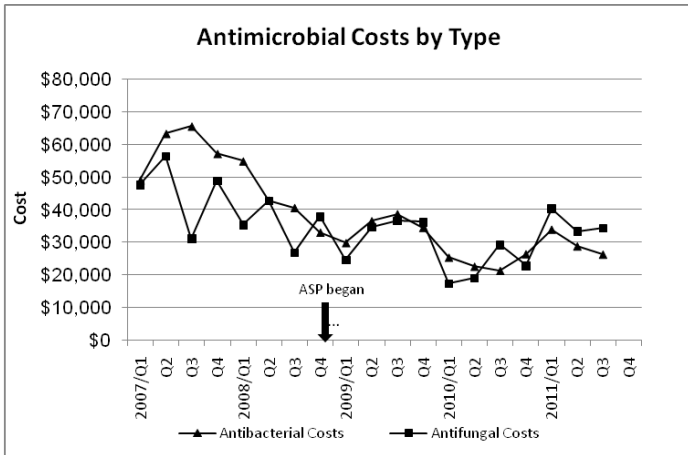
Other ICU Patient Care Indicators: Critical Care Information System (CCIS)

Antimicrobial Costs in MSH ICU, according to PMH or non-PMH origin

Antimicrobial Costs	FY 09/10	FY 10/11	FY 11/12 Q1-Q3
Total Antibacterial Costs	\$142,134	\$95,773	\$89,071
Non-PMH Patients	\$79,166	\$56,995	\$43,025
PMH Patients	\$62,968	\$38,778	\$46,046
Total Antifungal Costs	\$132,519	\$88,998	\$108,253
Non-PMH Patients	\$49,382	\$19,769	\$8,993
PMH Patients	\$83,137	\$69,229	\$99,260
Total Other Antimicrobial Costs	\$11,322	\$8,358	\$7,100
Non-PMH Patients	\$3,414	\$1,975	\$2,350
PMH Patients	\$7,908	\$6,383	\$4,750
Total All Antimicrobial Costs (antibacterial + antifungal + other)	\$285,975	\$193,129	\$204,424
Non-PMH Patients	\$134,962	\$78,737	\$54,368
PMH Patients	\$154,013	\$114,392	\$150,056

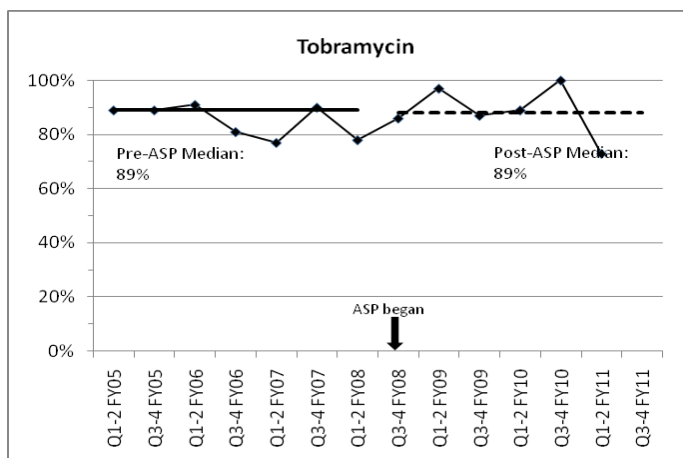
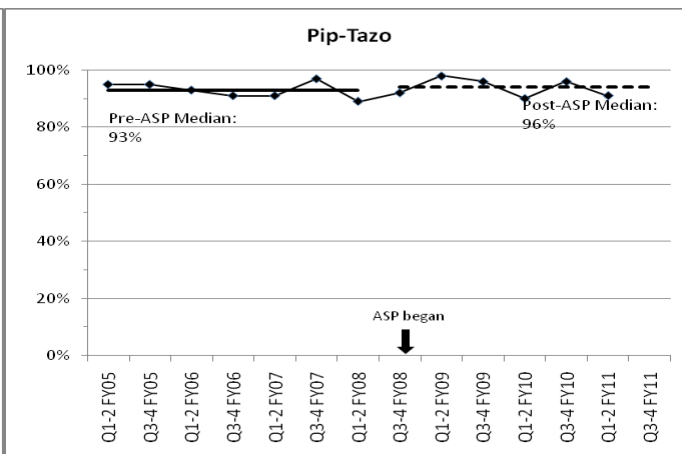
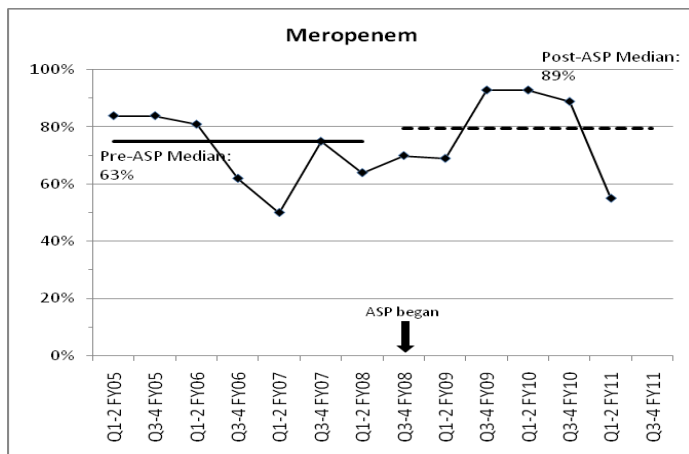
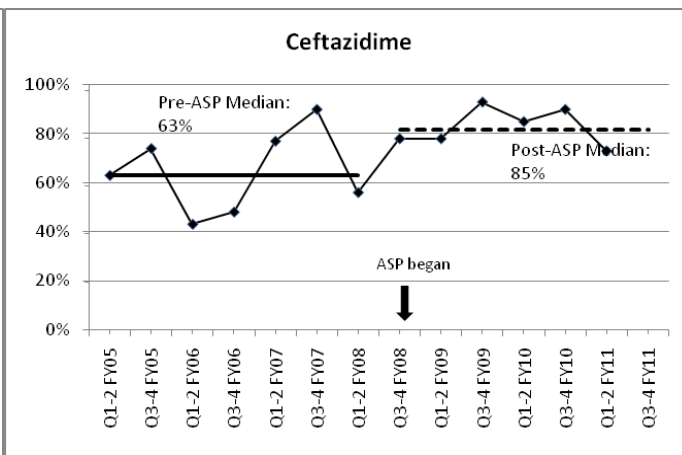
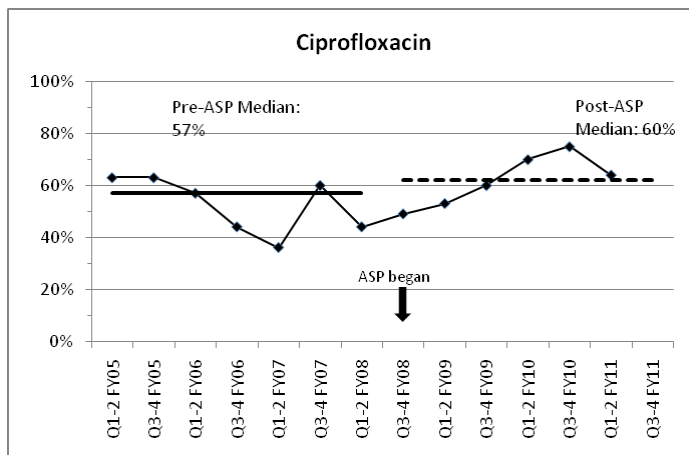
Note: Overall total antimicrobial cost differs slightly from that reported key performance indicator table above due to data run at different times on an open year.

MSH ICU Antimicrobial Costs and Usage cont.



Antimicrobial Susceptibility and Pathogen Surveillance

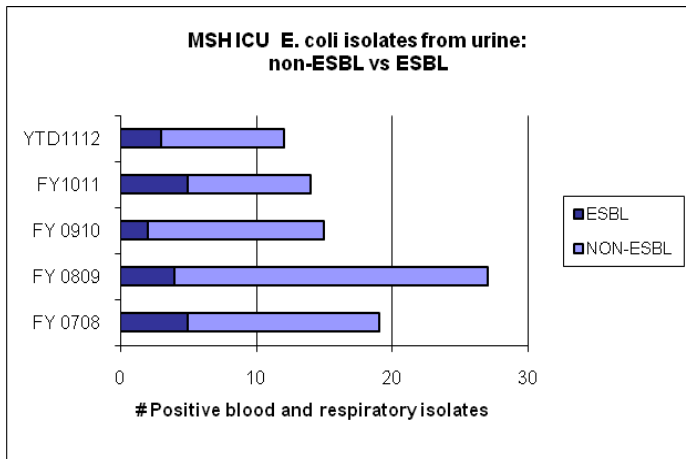
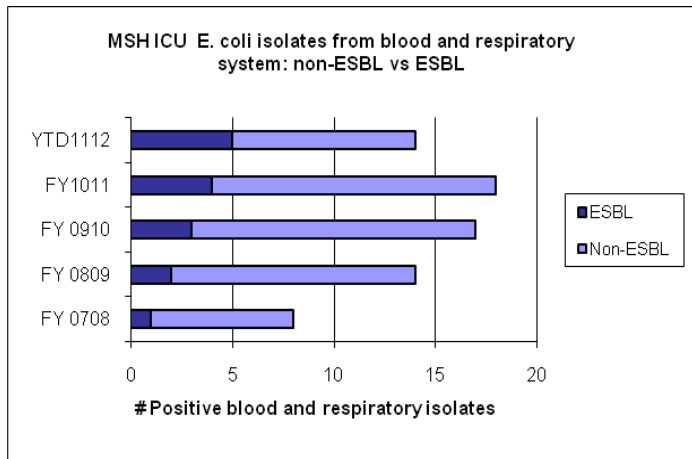
Pseudomonas Susceptibility - MSH ICU



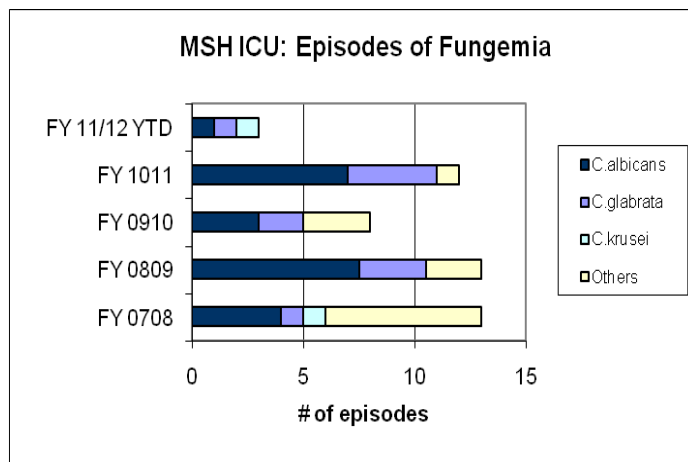
Note: Antimicrobial susceptibility data updated bi-annually

Antimicrobial Susceptibility and Pathogen Surveillance cont.

E. Coli isolates: Blood, Respiratory, Urine



Yeast Species Isolated in Blood - MSH ICU



14TH FLOOR

Mount Sinai Hospital 14th Floor Antimicrobial Usage and Costs

Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q3	% Change	
				Q3 11/12 compared to Q3 10/11	FY 11/12 YTD compared to FY 09/10 (Before ASP)
Antimicrobial Usage and Costs					
Total Antimicrobial DDDs*/100 Patient Days	63.0	52.1	52.1	-2.8%	-17.3%
Systemic Antibacterial DDDs/100 Patient Days	58.2	48.0	48.8	-6.4%	-16.2%
Systemic Antifungal DDDs/100 Patient Days	3.9	3.8	3.2	50.0%	-17.9%
Total Antimicrobial Costs	\$89,313	\$68,375	\$60,701	59.6%	-
Total Antimicrobial Costs/Patient Day	\$4.71	\$3.73	\$4.27	55.0%	-9.3%
Systemic Antibacterial Costs	\$83,359	\$63,907	\$56,315	58.1%	-
Systemic Antibacterial Costs/Patient Day	\$4.39	\$3.49	\$3.97	53.7%	-9.6%
Systemic Antifungal Costs	\$4,152	\$4,071	\$3,914	85.6%	-
Systemic Antifungal Costs/Patient Day	\$0.22	\$0.22	\$0.28	85.7%	27.3%
Patient Care Indicators					
14th floor Average Length of Stay (days)	6.2	6.7	7.1	10.8%	14.5%
14th floor Mortality Rate (as a %)	0.7	0.6	0.9	N/A	25.6%
14th floor Readmission Rate	Under Review				
14th floor Isolation Days per 100 pt days	8.6	10.1	TBD	N/A	N/A

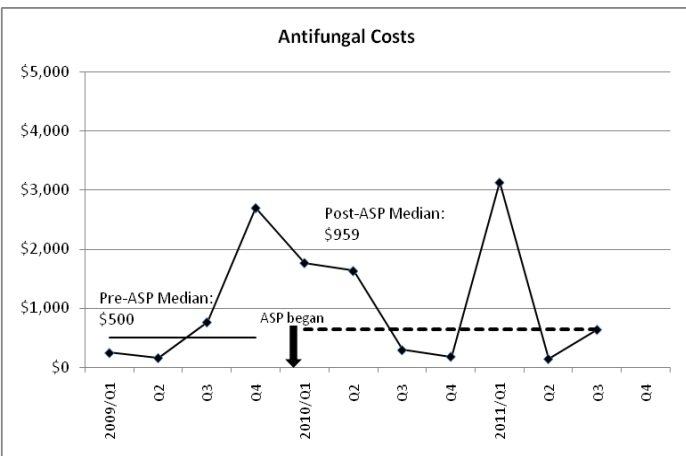
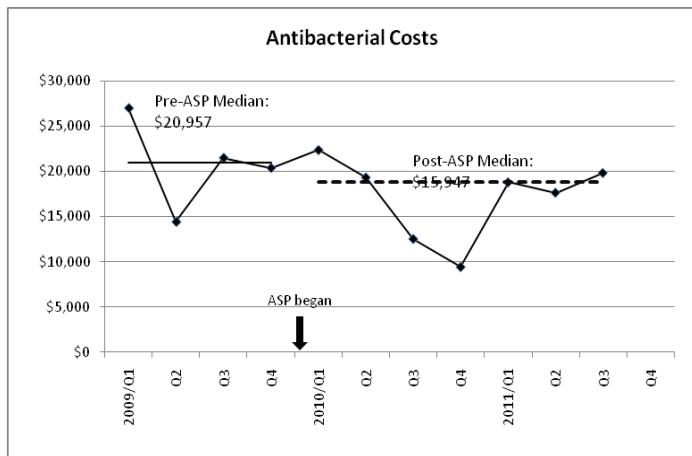
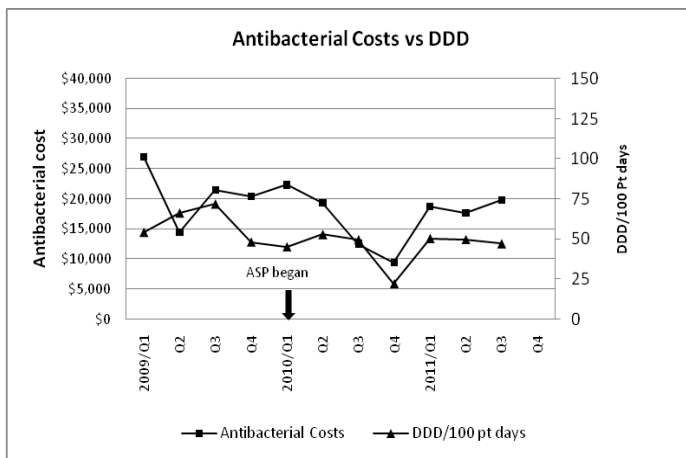
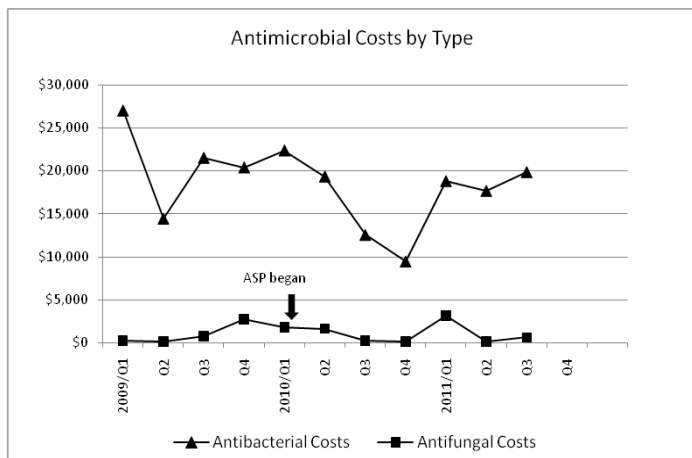
*DDD = Defined Daily Dose

** ASP started on 14th level in March 2010; data will be populated for this indicator beginning Q1 2011/12

Antimicrobial DDD and Costs Source: Pharmnet

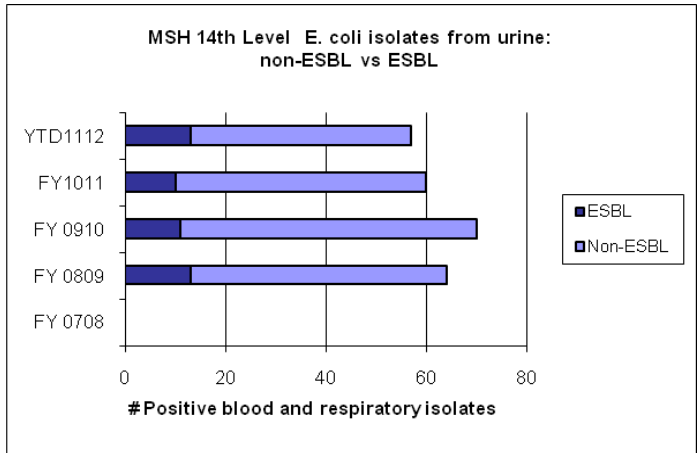
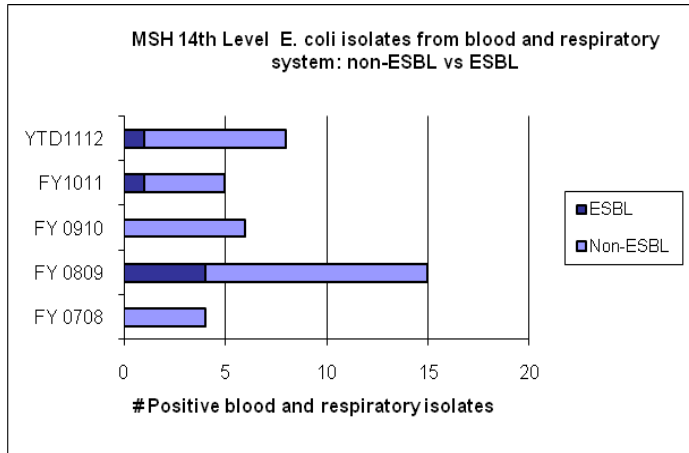
Total Antimicrobials is the sum of systemic antibacterial + systemic antifungal + systemic antivirals; non-systemic antimicrobials are excluded

Hospital 14th Floor Antimicrobial Usage and Costs cont.

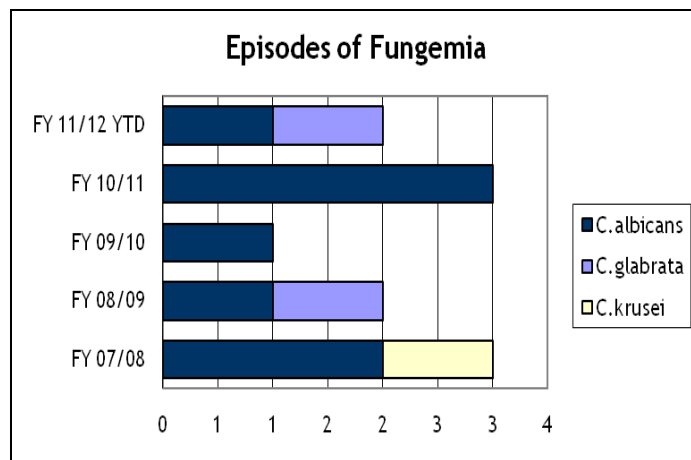


Antimicrobial Susceptibility and Pathogen Surveillance cont.

E. Coli isolates: Blood, Respiratory, Urine



Yeast Species Isolated in Blood - MSH 14th Level



PRINCESS MARGARET HOSPITAL

PMH I4A & 15B Antimicrobial Usage and Costs

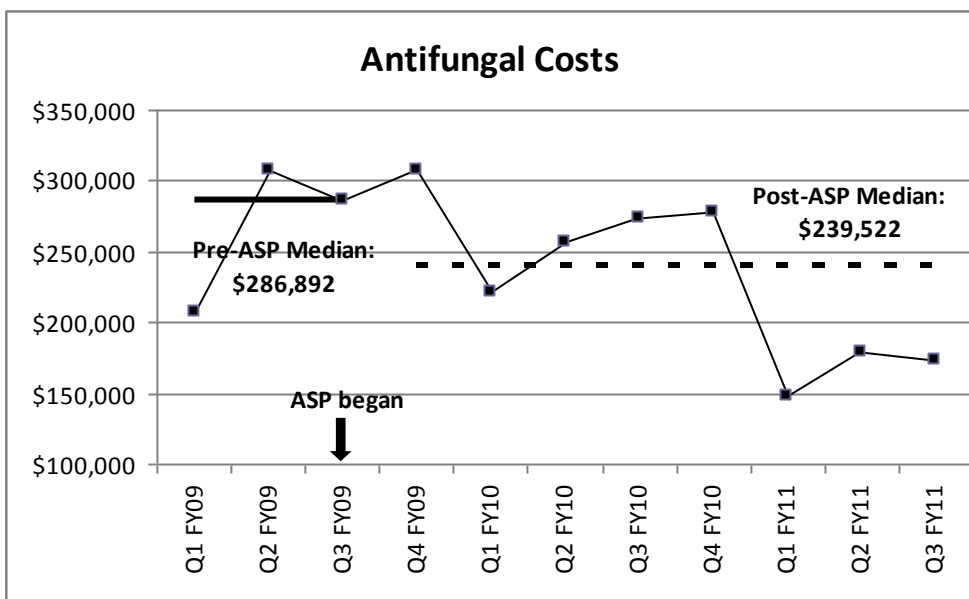
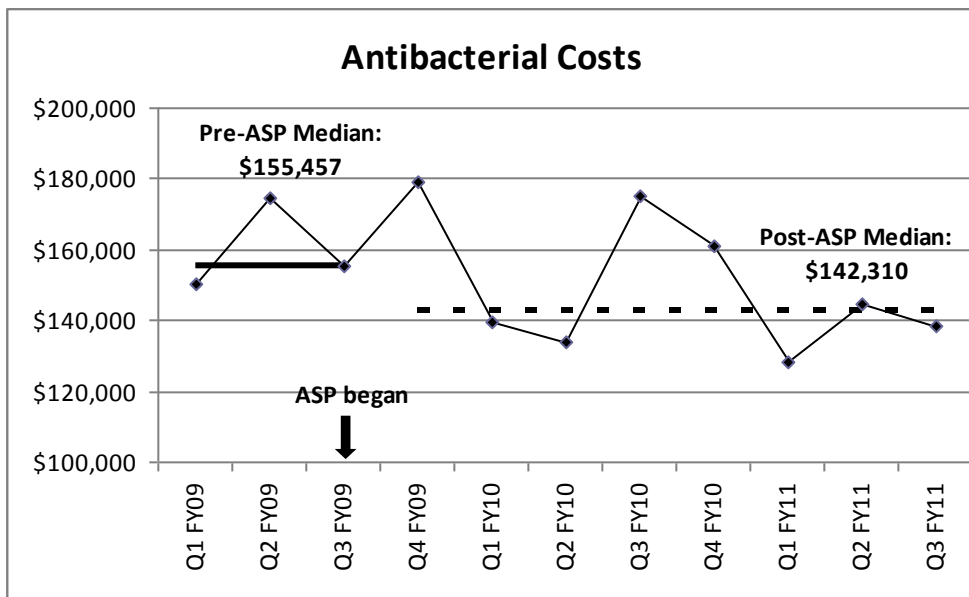
Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q3	% Change	
				FY 11/12 Q3 compared to FY 10/11 Q3	FY 11/12 YTD compared to FY 09/10 Q1-Q3 (Before ASP **)
Antimicrobial Usage and Costs					
Total Antimicrobial DDDs*/100 Patient Days	295.2	274.3	282.7	-12.4%	-3.8%
Systemic Antibacterial DDDs/100 Patient Days	190.8	166.8	173.0	-22.9%	-10.5%
Systemic Antifungal DDDs/100 Patient Days	104.4	107.4	109.6	5.3%	9.1%
Total Antimicrobial Costs	\$1,768,317	\$1,641,331	\$912,001	-30.7%	-28.9%
Total Antimicrobial Costs/Patient Day	\$167.12	\$154.32	\$112.63	-30.7%	-30.0%
Systemic Antibacterial Costs	\$659,034	\$609,747	\$411,343	-20.9%	-14.3%
Systemic Antibacterial Costs/Patient Day	\$62.28	\$57.33	\$50.80	-20.9%	-15.7%
Systemic Antifungal Costs	\$1,109,283	\$1,031,584	\$500,658	-36.9%	-37.6%
Systemic Antifungal Costs/Patient Day	\$104.84	\$96.99	\$61.83	-36.9%	-38.6%

Note:

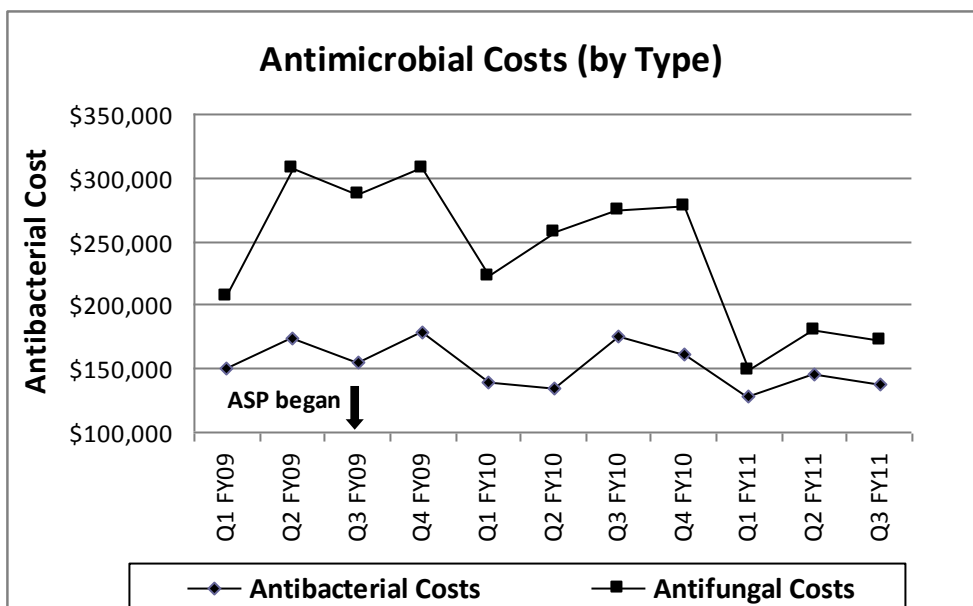
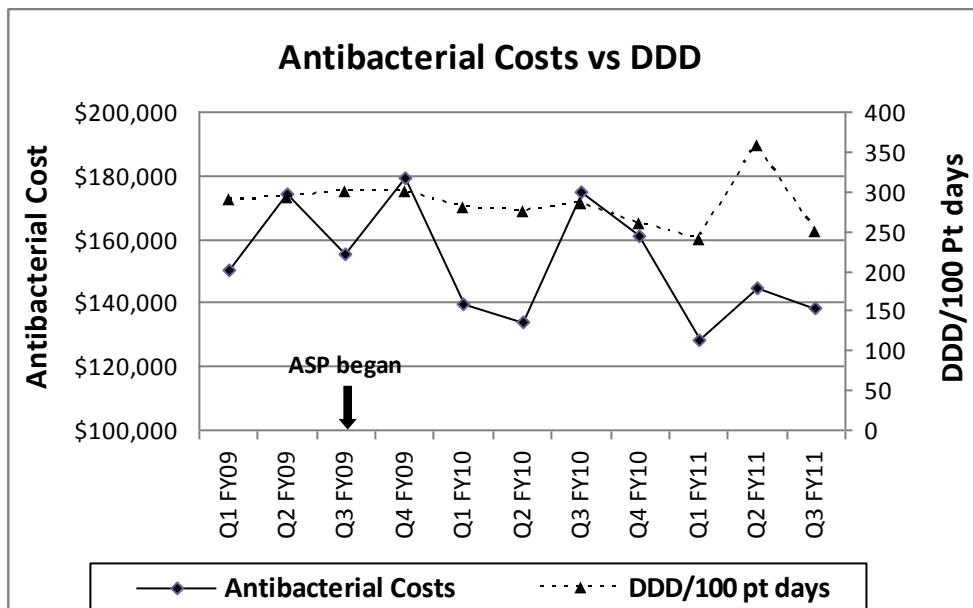
* DDD = Defined Daily Dose

** ASP initially started at PMH 14A + 15B in February 2010 (~ FY 09/10 Q4) and restarted in December 2010 (~ FY 10/11 Q4)

PMH I4A & 15B Antimicrobial Usage and Costs

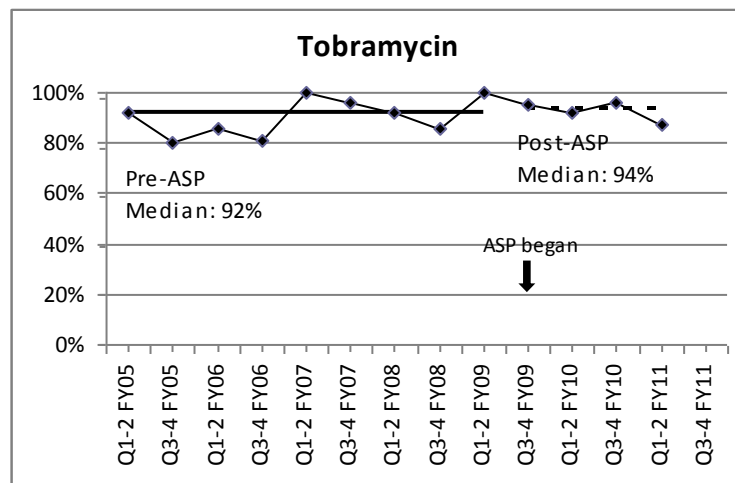
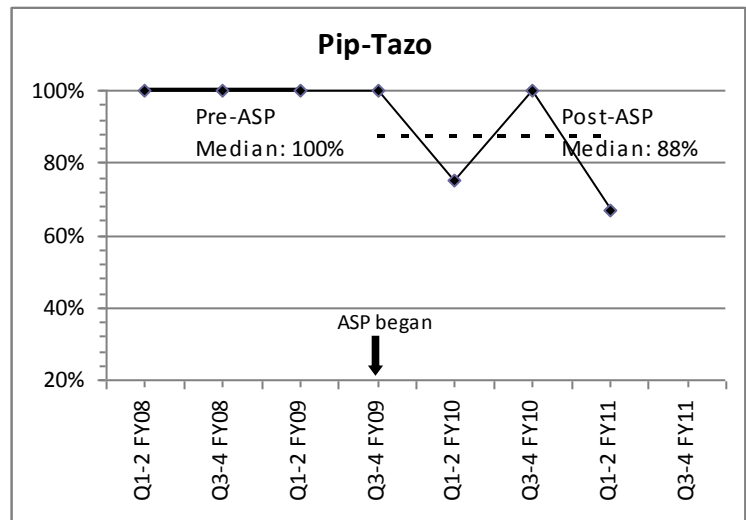
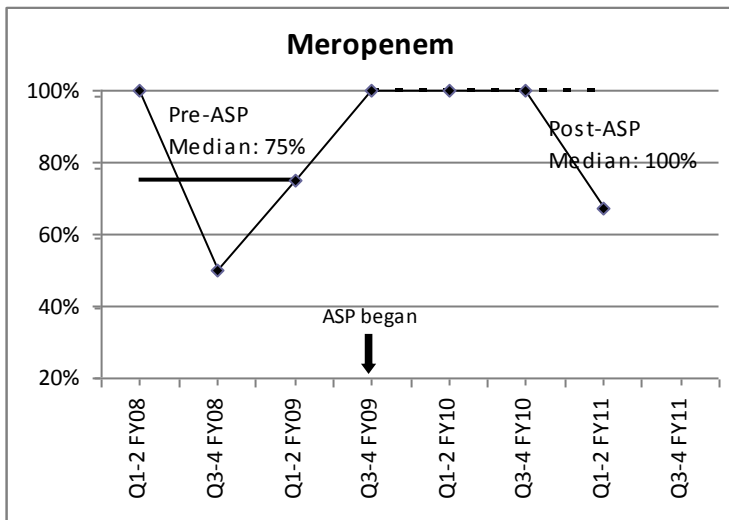
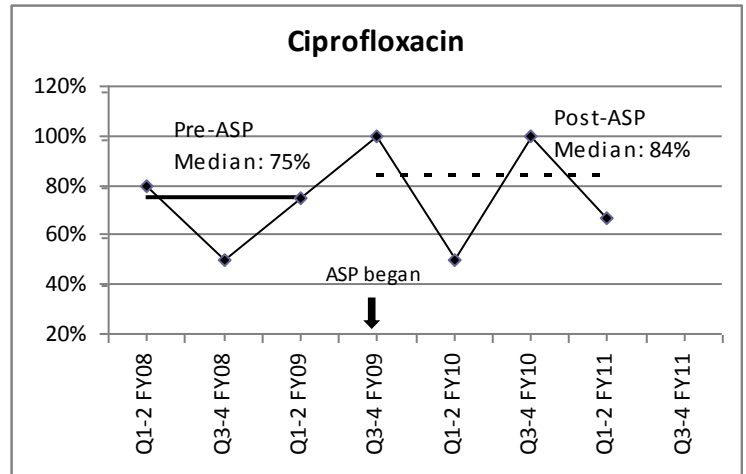
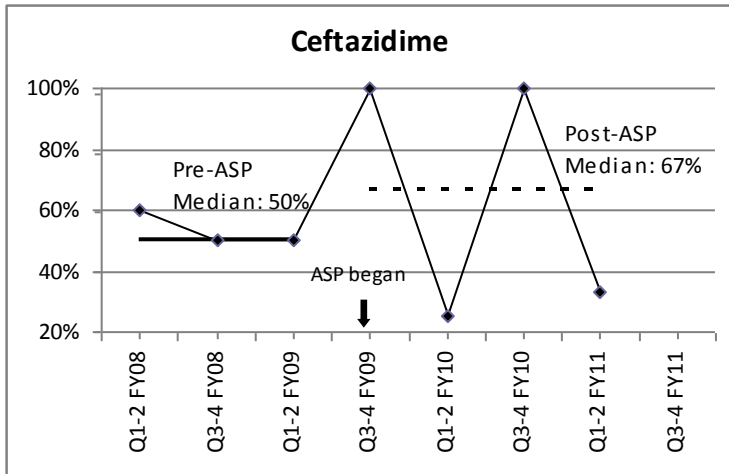


PMH I4A & 15B Antimicrobial Usage and Costs



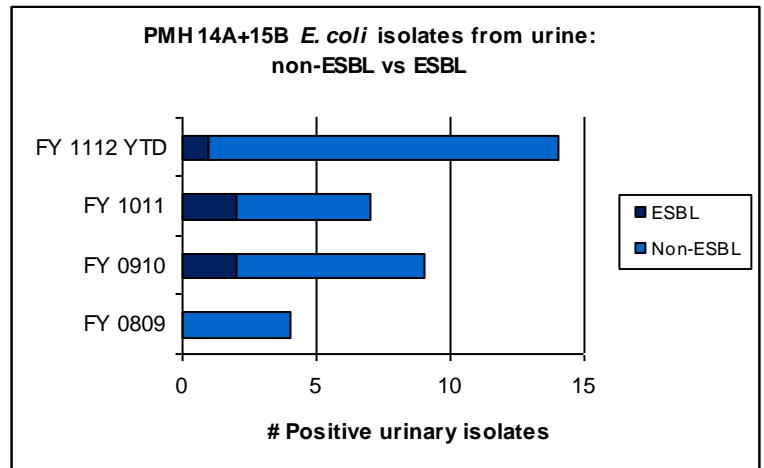
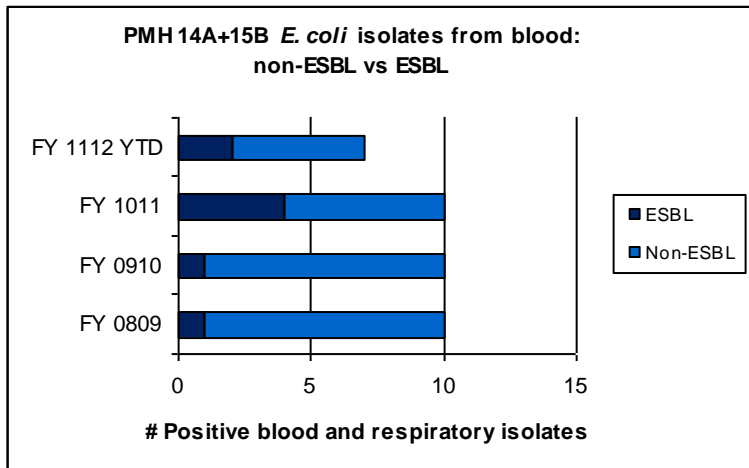
Antimicrobial Susceptibility and Pathogen Surveillance

Pseudomonas Susceptibility - PMH

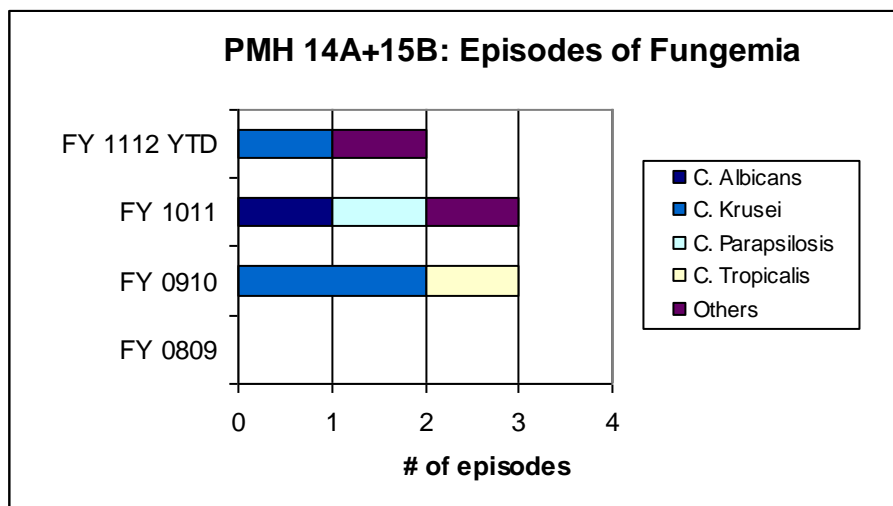


Antimicrobial Susceptibility and Pathogen Surveillance cont.

E.Coli isolates: Blood, Urine



Yeast Species Isolated in Blood - PMH 14A & 15B



TORONTO GENERAL HOSPITAL

TGH ICU Antimicrobial Usage and Costs

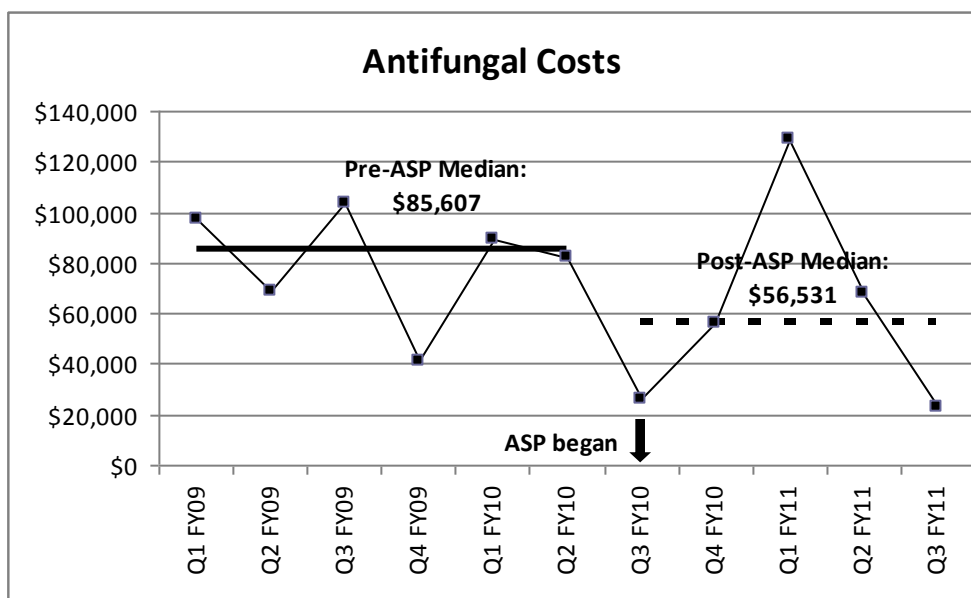
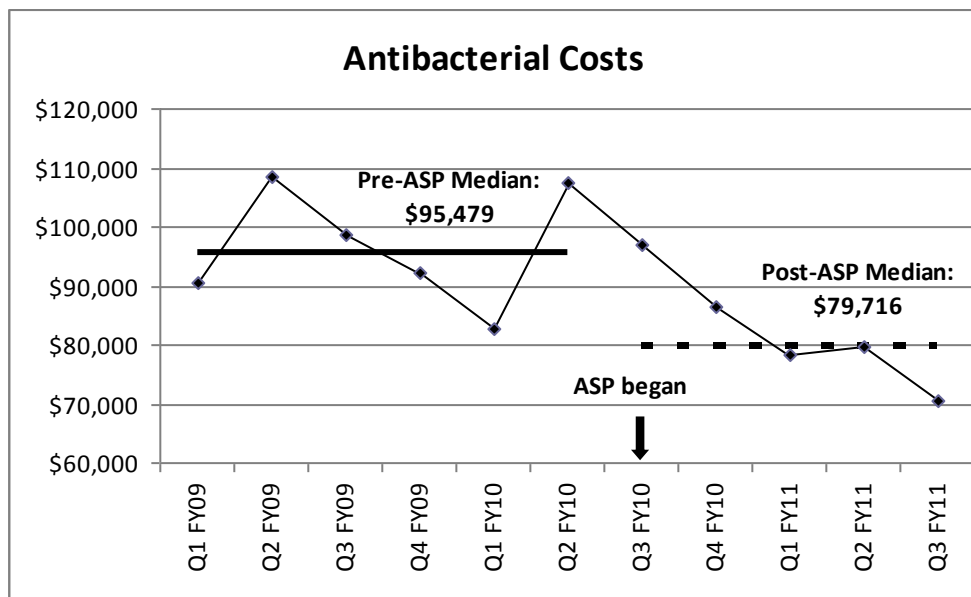
Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q3	% Change	
				FY 11/12 Q3 compared to FY 10/11 Q3	FY 11/12 YTD compared to FY 09/10 - FY 10/11 Q1-Q2 (Before ASP **)
Antimicrobial Usage and Costs					
Total Antimicrobial DDDs*/100 Patient Days	266.1	208.2	201.5	-6.5%	-19.6%
Systemic Antibacterial DDDs/100 Patient Days	184.0	153.5	146.2	-17.1%	-16.0%
Systemic Antifungal DDDs/100 Patient Days	82.1	54.7	55.3	39.7%	-27.7%
Total Antimicrobial Costs	\$701,451	\$627,540	\$448,031	-24.3%	-
Total Antimicrobial Costs/Patient Day	\$102.52	\$83.81	\$81.25	-18.0%	-19.9%
Systemic Antibacterial Costs	\$390,209	\$373,504	\$228,514	-27.3%	-
Systemic Antibacterial Costs/Patient Day	\$57.03	\$49.88	\$41.44	-21.3%	-25.2%
Systemic Antifungal Costs	\$311,242	\$254,036	\$219,518	-13.1%	-
Systemic Antifungal Costs/Patient Day	\$45.49	\$33.93	\$39.81	-5.8%	-13.6%
Patient Care Indicators					
TGH ICU Average Length of Stay (days)	8.24	8.61	7.60	-14.9%	-5.7%
TGH ICU Mortality Rate	16.2%	12.7%	17.8%	-13.0%	11.5%
TGH ICU Bed Occupancy	18.59	20.45	20.00	-7.6%	5.4%
TGH ICU Readmissions within 48 hours	3.8%	4.4%	3.2%	-26.1%	-21.8%
TGH ICU Ventilation Days	5399	6256	4383	-6.6%	-

Note:

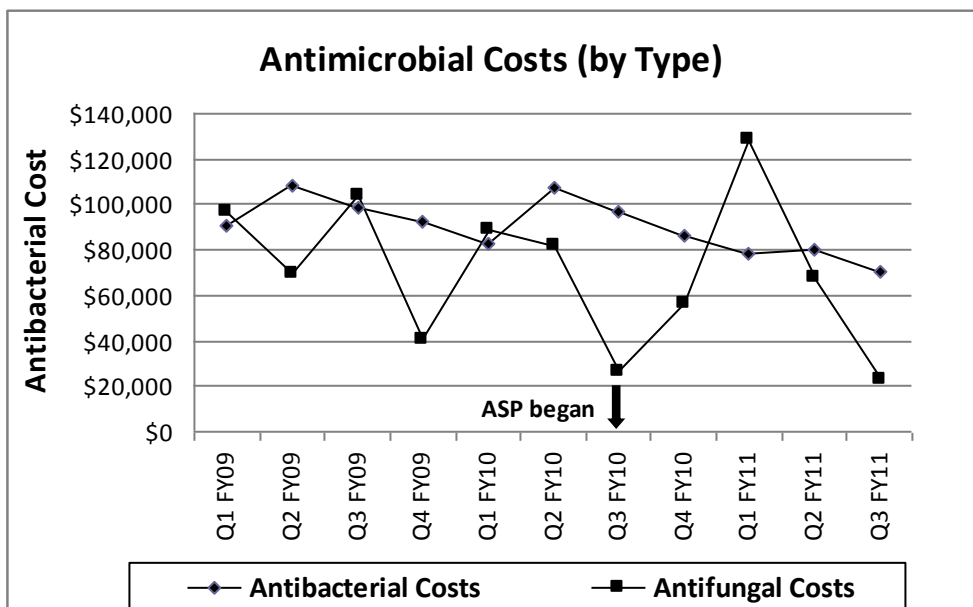
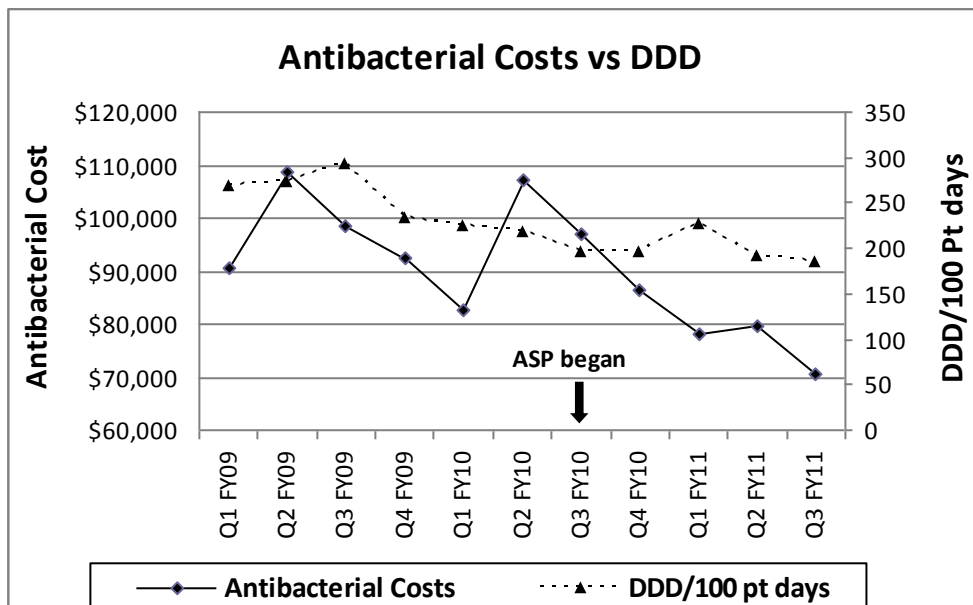
* DDD = Defined Daily Dose

** ASP started at TGH ICU in October 2010 (~ FY 10/11 Q3)

TGH ICU Antimicrobial Usage and Costs

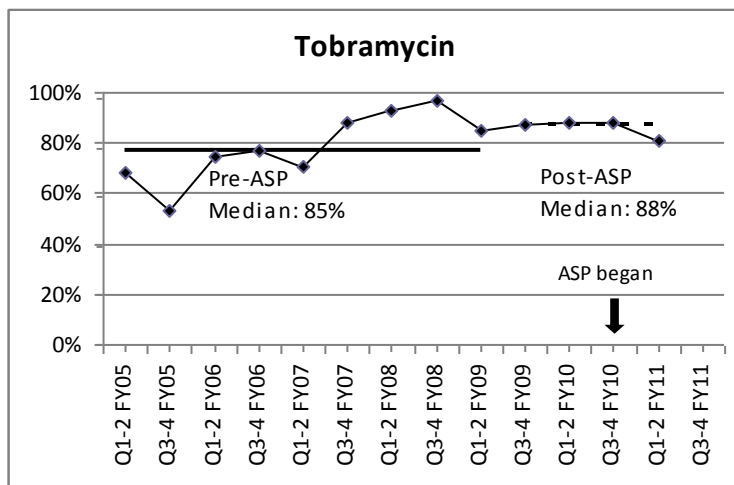
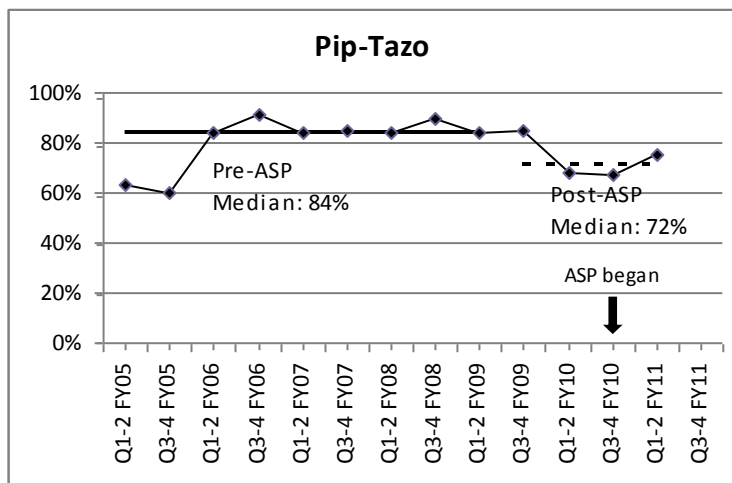
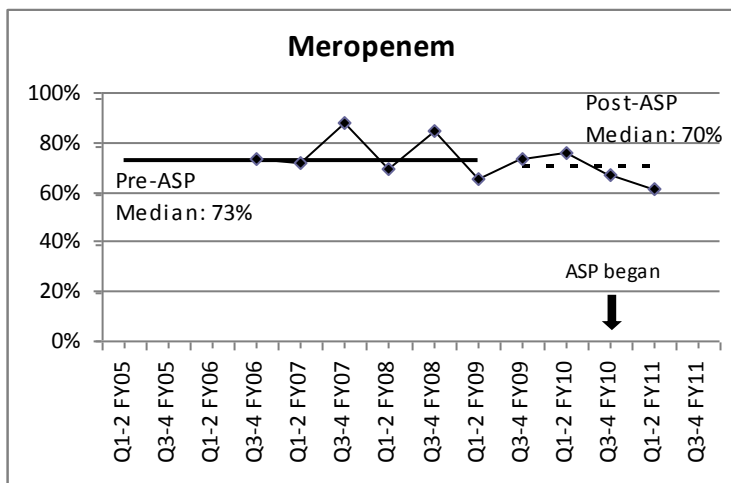
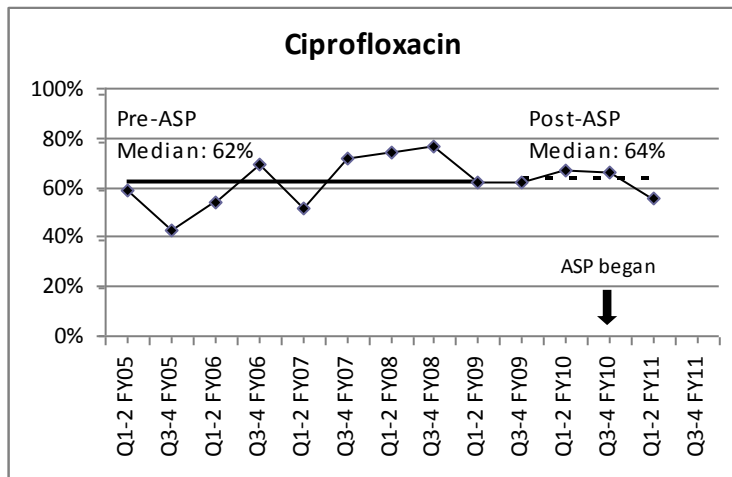
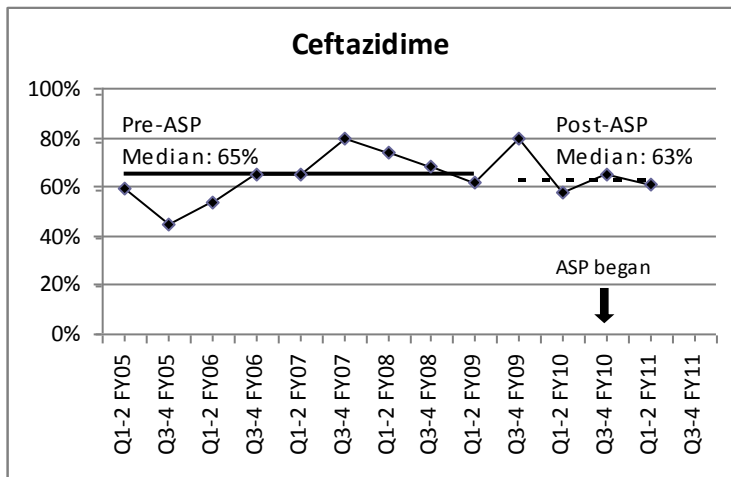


TGH ICU Antimicrobial Usage and Costs



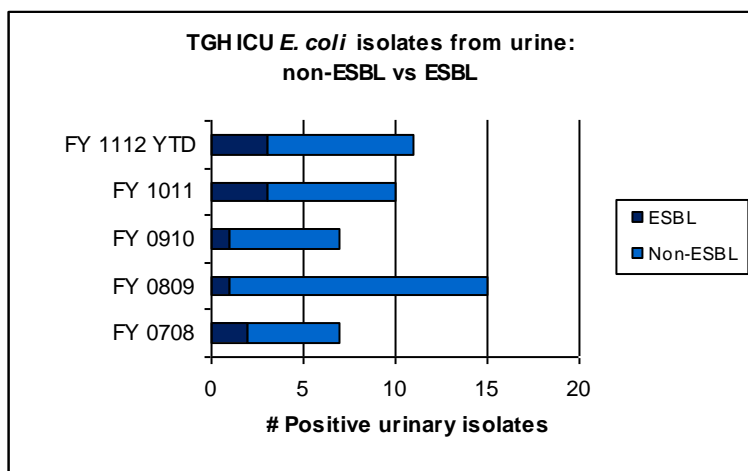
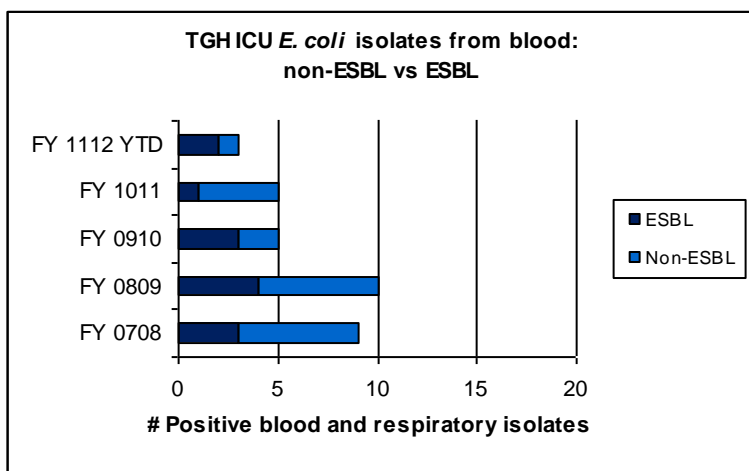
Antimicrobial Susceptibility and Pathogen Surveillance

Pseudomonas Susceptibility - TGH ICU

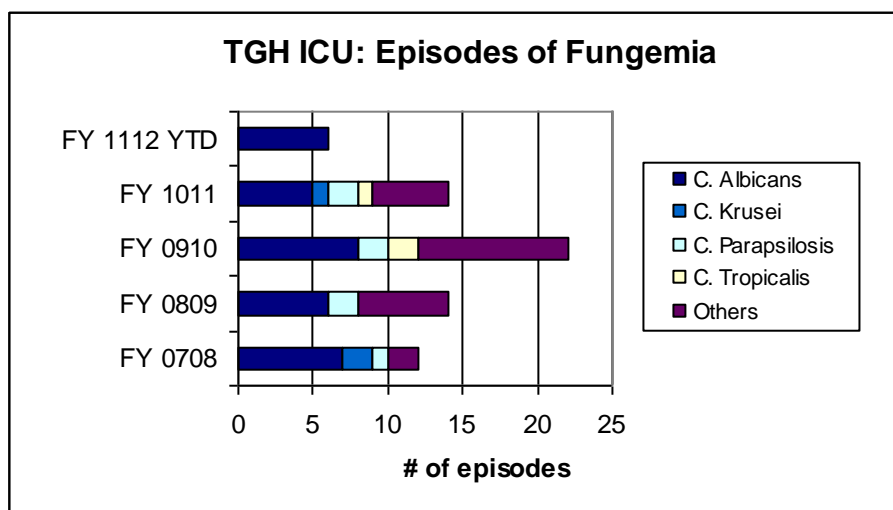


Antimicrobial Susceptibility and Pathogen Surveillance cont.

E.Coli isolates: Blood, Urine



Yeast Species Isolated in Blood - TGH ICU



TORONTO WESTERN HOSPITAL
TWH ICU Antimicrobial Usage and Costs

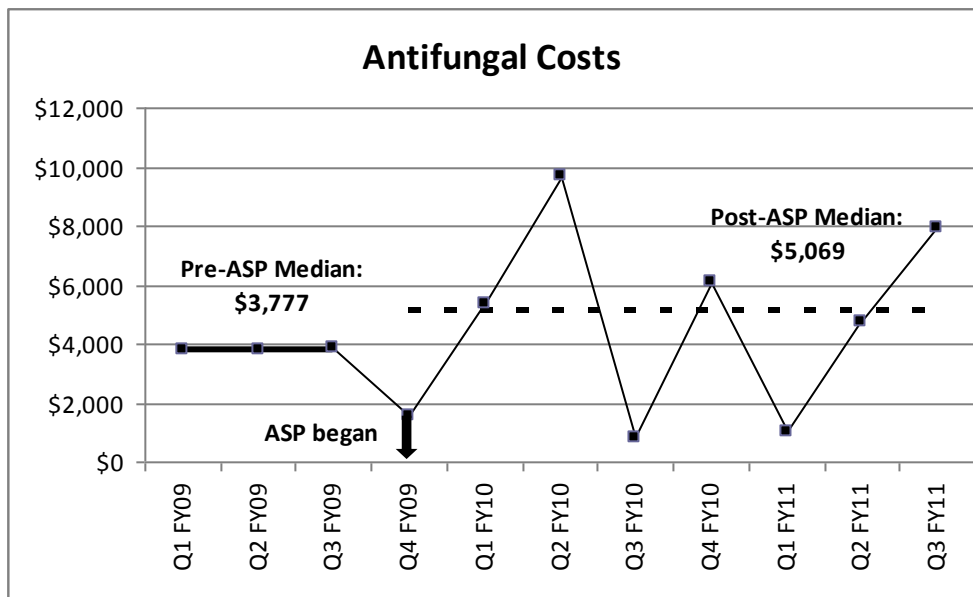
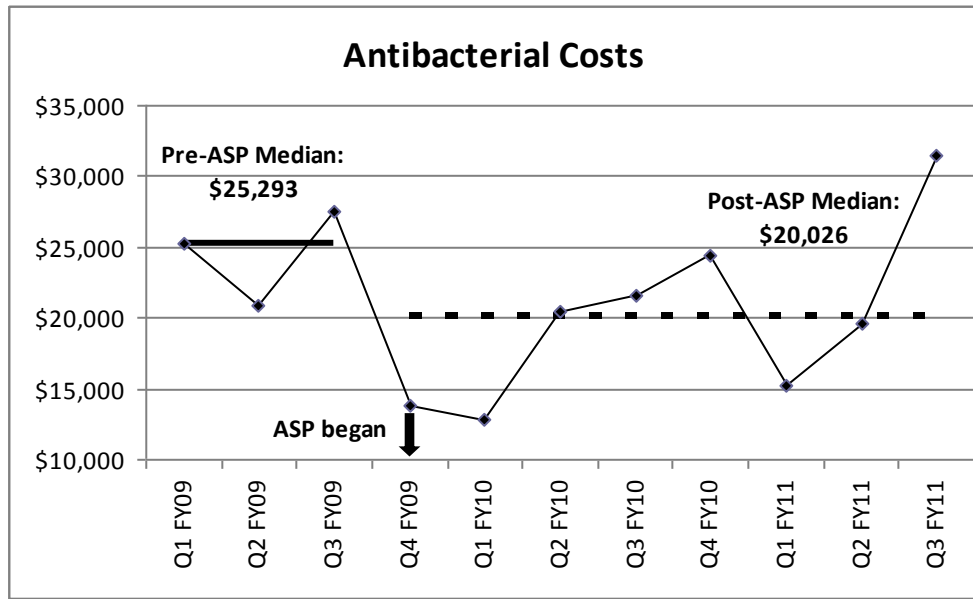
Key Performance Indicator	FY 09/10	FY 10/11	FY 11/12 Q1-Q3	% Change	
				FY 11/12 Q3 compared to FY 10/11 Q3	FY 11/12 YTD compared to FY 09/10 Q1-Q3 (Before ASP **)
Antimicrobial Usage and Costs					
Total Antimicrobial DDDs*/100 Patient Days	87.6	79.2	134.4	43.2%	48.8%
Systemic Antibacterial DDDs/100 Patient Days	77.8	73.5	124.6	40.5%	56.5%
Systemic Antifungal DDDs/100 Patient Days	9.8	5.7	9.9	86.8%	-8.1%
Total Antimicrobial Costs	\$100,408	\$101,191	\$80,071	76.6%	-5.8%
Total Antimicrobial Costs/Patient Day	\$13.24	\$13.17	\$13.80	69.5%	-7.6%
Systemic Antibacterial Costs	\$87,445	\$79,280	\$66,303	46.1%	-9.9%
Systemic Antibacterial Costs/Patient Day	\$11.53	\$10.32	\$11.43	40.2%	-11.5%
Systemic Antifungal Costs	\$12,963	\$21,911	\$13,768	917.0%	20.4%
Systemic Antifungal Costs/Patient Day	\$1.71	\$2.85	\$2.37	876.3%	18.2%
Patient Care Indicators					
TWH ICU Average Length of Stay (days)	7.44	10.68	10.38	64.1%	39.8%
TWH ICU Mortality Rate	19.9%	18.1%	16.6%	-10.7%	-14.2%
TWH ICU Readmissions within 48 hours	4.7%	4.9%	3.3%	-30.5%	-32.2%
TWH ICU Ventilation Days	6305	5960	1388	-4.6%	-12.7%

Note:

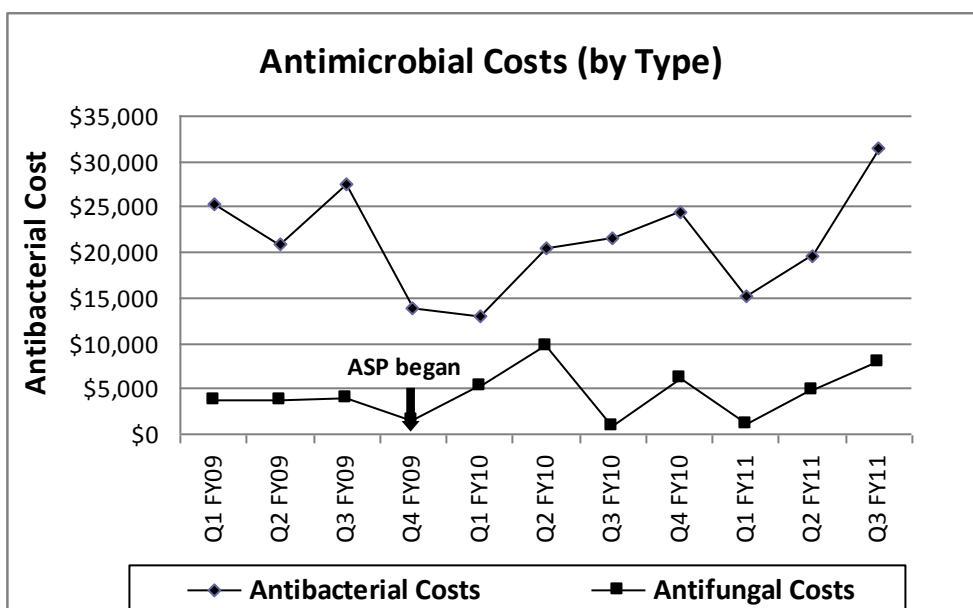
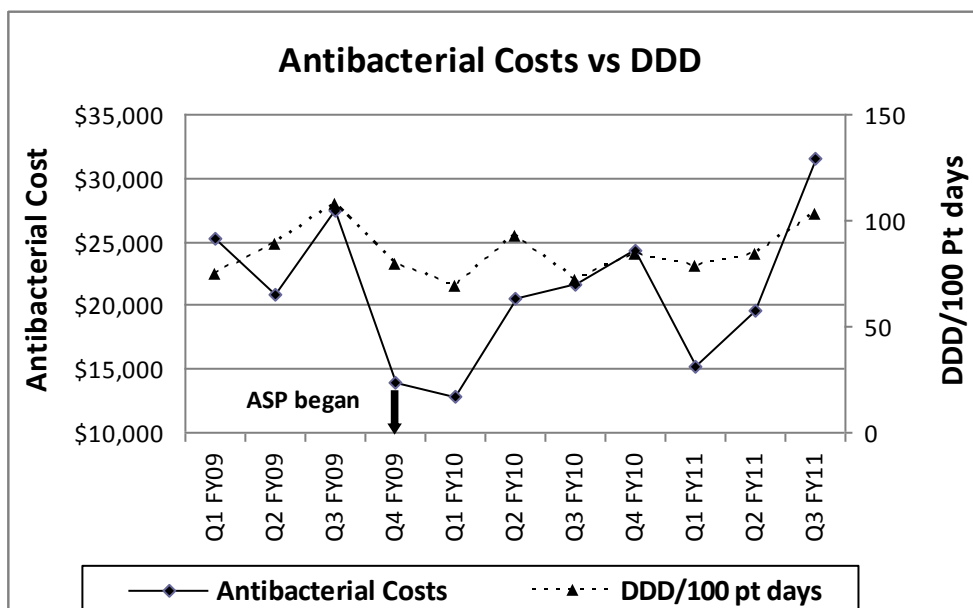
* DDD = Defined Daily Dose

** ASP started at TWH ICU in December 2009 (~ FY 09/10 Q4)

TWH ICU Antimicrobial Usage and Costs

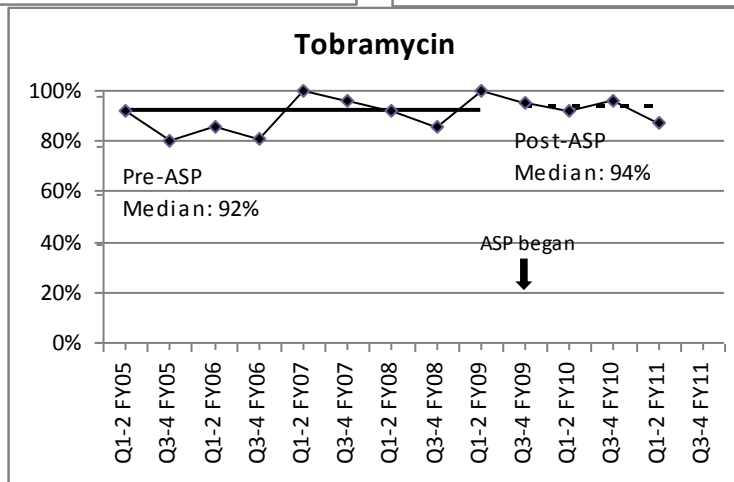
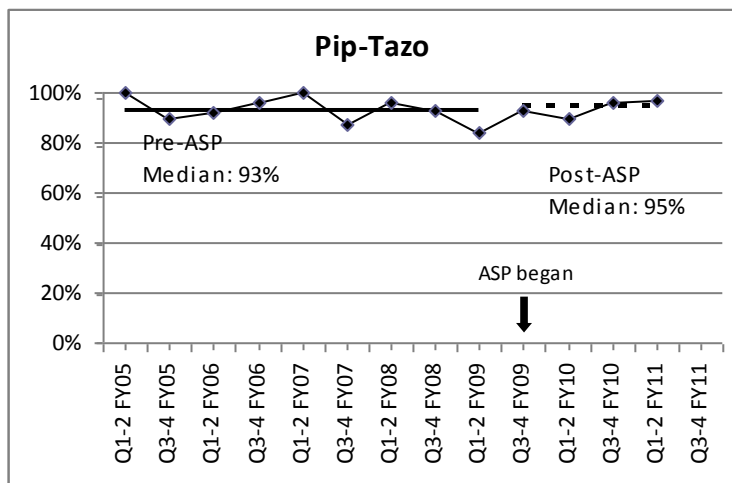
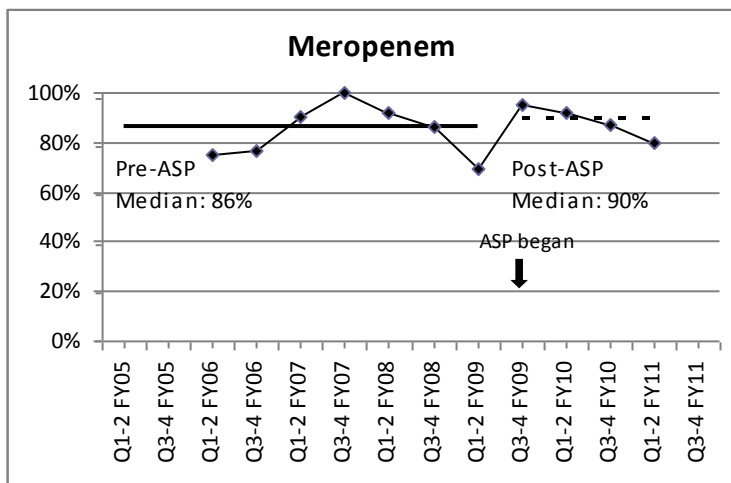
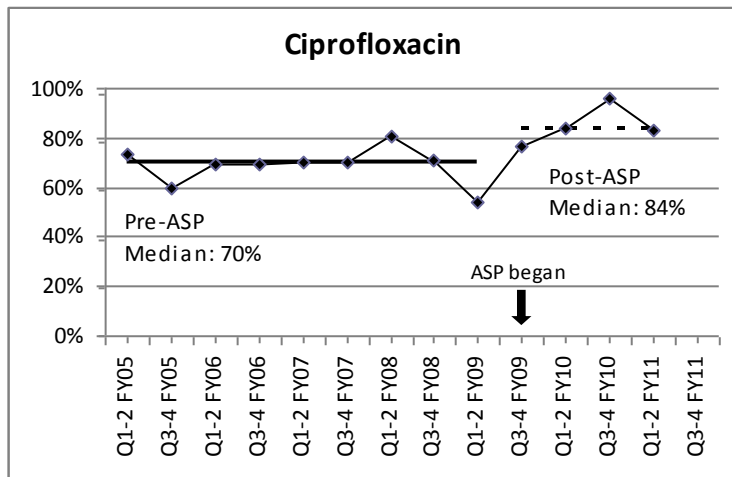
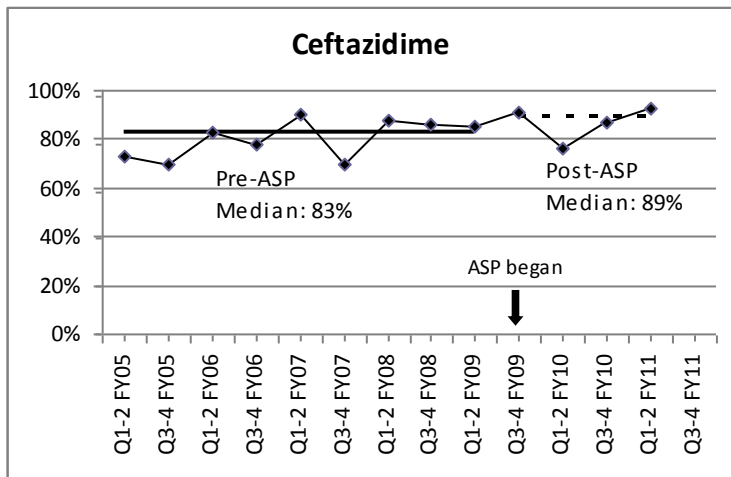


TWH ICU Antimicrobial Usage and Costs



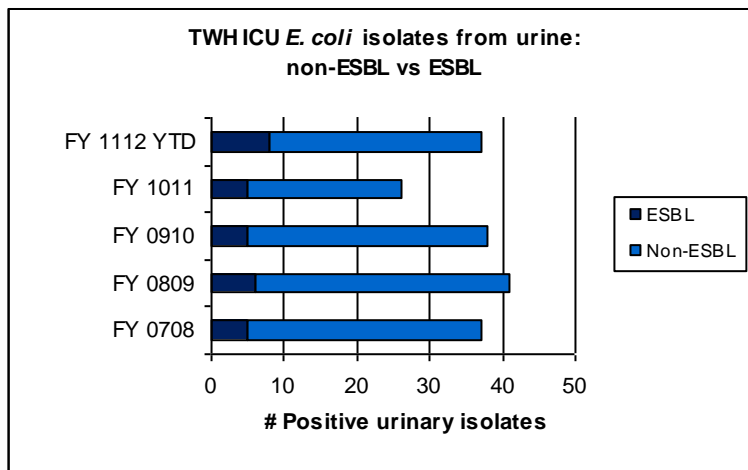
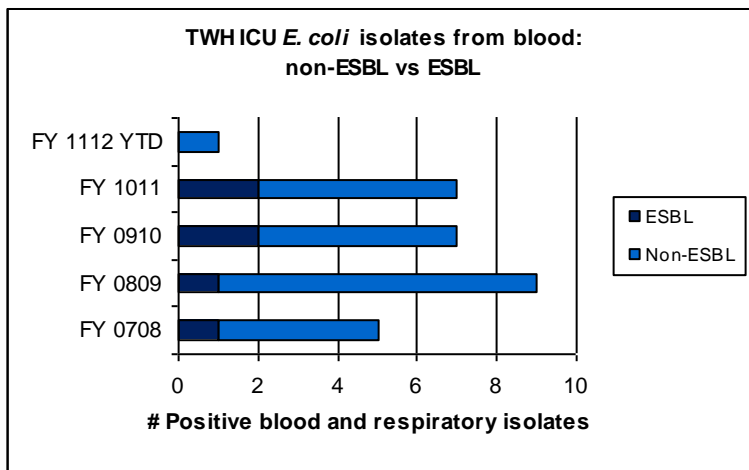
Antimicrobial Susceptibility and Pathogen Surveillance

Pseudomonas Susceptibility - TWH ICU



Antimicrobial Susceptibility and Pathogen Surveillance cont.

E.Coli isolates: Blood, Urine



Yeast Species Isolated in Blood - TWH ICU

