MSH + UHN

ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

Q3 REPORT

FISCAL YEAR 2010 | 2011

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 Antimicrobial Stewardship Program (ASP) has been active at Mount Sinai Hospital (MSH) since February 2009, and at University Health Network (UHN) since December 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.

The following table summarizes the activities of the MSH-UHN ASP, recognizing that the ASP has had the benefit of collaborating with numerous colleagues:

MSH + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

SUMMARY OF CURRENT ASP ACTIVITIES AND RESULTS

LOCATION/ STAKEHOLDERS	METHODS	START DATE	HIGHLIGHTS
MSH Intensive Care Unit	Prospective audit and feedback	February 2009	ASP had its two year anniversary of working in the ICU on February 9, 2011. FY 10/11 Q3 YTD antimicrobial usage has decreased 24% and antimicrobial costs per 100 patient days has decreased 40% compared to before ASP started collaboration with the ICU. Pseudomonas susceptibility has increased over the past 2 years. Unadjusted mortality has dropped 14% over that same time period.
MSH Obstetrical Program	Quality initiative study	November 2009	The study of infections after c-section following implementation of a new surgical prophylaxis protocol has been completed. The infection rate in this study was 6.6%. Preliminary analysis indicates 46% of antibiotics were administered less than 15 min prior to surgery and 40% administered 16-30min prior to surgery.
MSH General Surgery	Prospective audit and feedback	March 2010	Antimicrobial consumption has been reduced since the introduction of the ASP by 22% and antimicrobial costs by 8% when comparing FY10/11 Q3 YTD to the same period last.
Outpatient Parental Antimicrobial Therapy (OPAT) Program	Capture-and-follow	December 2009	The OPAT program continues its expansion, providing outpatient care to an increasing number of patients at TGH and TWH. OPAT has seen rapid growth, with over 30 new patient referrals in the month of December. OPAT has implemented a variety of new practices to improve efficiency into their practice, including a new MS Access database that has significantly reduced the amount of manual data entry.
PMH 14A & 15B/ Leukemia and Immunocompro-mised Host Service	Prospective audit and feedback	February 2010	The ASP re-introduced its weekly prospective audit-and-feedback in December 2010. With a renewed mandate to improve antimicrobial care at PMH, the ASP hopes to build a healthy working relationship with the Leukemia service over time.
TWH Intensive Care Unit	Prospective audit and feedback	December 2009	Antimicrobial consumption has been reduced since the introduction of the ASP by approximately 20%. This has been accompanied by a 27% reduction in antimicrobial costs.

TGH Intensive Care Unit	Prospective audit and feedback	October 2010	Antimicrobial consumption has been reduced since the introduction of the ASP by approximately 33%. This has been accompanied by a 47% reduction in antimicrobial costs. A recently completed survey shows a high degree of staff physician satisfaction.
ASP Working Groups	Best practice collaboration	January 2011	The ASP has begun working groups with clinical colleagues at MSH and UHN on developing best practices regarding the diagnosis and treatment for VAP and a process to treat Sepsis/Septic Shock.
Greater Toronto Area/ Toronto Central LHIN, Teaching Hospitals,	Quarterly meetings; electronic communication	January 2010	There are now 12 hospitals that are members of the Toronto Antimicrobial Stewardship Corridor (TASC), chaired by members of the MSH-UHN ASP. This group has recently also created a TASC Research Sub-Committee, to advance the research scope of antimicrobial stewardship within TASC.
Hospital for Sick Children, MSH, St. Michael's, Sunnybrook Health Sciences Centre, UHN	Research collaboration	September 2010	The *Staphylococcus aureus* bacteremia (SAB) research study collaborative among TASC members is underway. This study will retrospectively analyze clinical features, diagnostic methods, clinical outcomes and resource utilization among over 1000 patients diagnosed with SAB. Its data will be used to plan for clinical trials and/or quality improvement projects in the future. An ASP in the ICU project will analyze the efficacy of an ASP in improving antimicrobial use and patient care among the MSH, TGH and TWH ICUs.
Toronto/ Healthcare professionals throughout Canada	Education Course on Antimicrobial Stewardship	April 2010	The 1st Toronto Course on Antimicrobial Stewardship will be held by the MSH-UHN ASP on June 2-4 2011. This course promises to help hospitals and their healthcare providers increase the capacity and efficacy of ASPs throughout Canada. Registration process has started.

LOOKING FORWARD

CLINICAL

The ASP has continued to rapidly grow, with the introduction of the ASP in the Intensive Care Unit at Toronto General Hospital, the re-introduction of the ASP on the Leukemia Service at Princess Margaret Hospital and preparing best practice guidelines for inter-hospital use.

In the final quarter of the 2010-11 fiscal year, we hope to strengthen our relationships with all of the clinical services we work with at MSH, PMH, TGH, and TWH. We have also begun developing best practices for ventilator-associated pneumonia, antimicrobial prophylaxis for chemotherapy-induced neutropenia, and the management of sepsis/septic shock presenting in the Emergency Departments.

We are eager to expand prospective audit-and-feedback to other services, which could include the cardiovascular ICU (TGH), coronary care unit (TGH), the general internal medicine services (MSH, TGH, TWH), all surgical floors, the obstetrical ward (MSH) and the stem cell transplantation program (PMH). Indeed, although we believe that there is a large role for antimicrobial stewardship in the prevention and control of *C. difficile* infection, we have been unable to participate because of workload constraints.

Solutions to our workload limitations are currently being explored.

RESEARCH

The ASP's research agenda continues to move forward. The positive outcomes from the C-section project at MSH have indicated a decrease in the c-section infection rate from 11.2% (Dr. Allison McGeer's 2008 study) to 6.6% (ASP 2010 study). The Neonatology Team confirmed that there were no cases of neonatal sepsis following changes for C-section prophylaxis, although we await their comprehensive view of the impact on both mothers and babies. Planning is underway for yearly infection rate audits and to optimize timing of antibiotics prior to incision.

Chart reviews for the *S. aureus* bacteremia project are underway and will continue over the next 3-6 months. This study promises to be the largest study of *Staph. aureus* bacteremia ever published.

An ASP in the ICU project—using a stepped wedge design—will analyze the efficacy of an ASP in improving antimicrobial use and patient care among the MSH, TGH and TWH ICUs. These two projects resulted in two submissions for resident research funding from PSI (Drs. Brian Minnema and Dan Ricciuto); funding results are pending.

An application was submitted in Oct 2010 for CIHR funding for a Delphi panel on antimicrobial stewardship measures and outcomes; decision notice is expected shortly.

Finally, there are new and ongoing student and resident research projects, involving the OPAT program, the ICU, the acute leukemia population, and renal transplant recipients.

EDUCATION

Registration is open for the 1st Toronto Course on Antimicrobial Stewardship, developed by the MSH-UHN ASP and being be held June 2-4, 2011. All members of the ASP are involved in other various aspects of education,

and will continue to do so. As of the publication of this report, 34 of the maximum 60 spots have been filled, after less than 3 weeks of advertisement.

ASP continues to use Huddle for sharing of information and best practice guidelines, and has been a major improvement in our content management. An ASP website is in the developmental stages, but will result in an online resource for physicians, pharmacists and other healthcare providers and administrators both nationally and internationally. We hope to have it up and running by the Summer of 2011.

MOUNT SINAI HOSPITAL (SUPPORTED BY PFIZER CANADA INC.)

INTENSIVE CARE UNIT

The Antimicrobial Stewardship Program (ASP) began working in the MSH ICU in February 2009 and thus had its two year anniversary on February 9, 2011. After asking for anonymous feedback from the ICU attending physicians in early February 2011, it was decided to decrease the number of ASP rounding days to 3 days a week (M/W/F), which began the week of February 7, 2011. As always, data will be collected and analyzed to see how if the decrease in rounding affects results.

Full results on data collected are in the Appendix, but are summarized below:

- Fiscal Year (FY) 2010/11 Q3 YTD antimicrobial usage per quarter (using defined daily doses (DDDs) per 100 patient days) has decreased by 24.4% compared to before the ASP started in the ICU. The decrease in usage was most substantial with systemic antifungals, where the usage/100 patient days decreased by 25.8%.

- Antimicrobial costs per 100 patient days have also continued to decrease since beginning the program and for FY 10/11 Q3 YTD have decreased by 40.3% compared to before the ASP was introduced in the ICU. Substantial decreases were seen with both systemic antifungals and systemic antibacterials, whereby the costs per patient day decreased by 35.1% and 43.7%, respectively.

- Antimicrobial costs for PMH patients continues to be monitored, and remains high, although there is a suggestion that antimicrobial utilization for PMH patients has diminished, with a cost reduction of approximately 20%. The antimicrobial cost for PMH patients is 53% of the total ICU costs in FY 09/10. PMH patients make up 12% of ICU visits, representing a cost per visit of $1,467 for PMH (vs $180 for MSH) and $201 per ICU day (vs $32 for MSH).

	2009/10 Total Cost	% of total	Total ICU Visits	Cost per visit	Total ICU Days	Cost per ICU day
Total All Antimicrobial Costs	$288,154		849	$ 339	4,962	$58
Non-PMH Patients	$134,140	47%	744	$ 180	4,194	$32
PMH Patients	$154,013	53%	105	$ 1,467	768	$201

- The number of cases of yeast isolated in blood so far in FY 10-11 has been 10, none of which has been resistant to fluconazole. In FY 09-10, the total number of cases was 8. Of interest, there has not been a case of Fluconazole resistant yeast isolated from blood since FY 07-08 (1 case of *Candida krusei*). **Use of antifungal agents other than fluconazole for empiric treatment of yeast is currently unnecessary based on this data.**

- *Pseudomonas aeruginosa* resistance rates are collected in 6 month periods. FY 10/11 Q3-Q4 resistance rates will be presented in the year end report. For April-September 2010 (as reported in the previous FY 10/11 Q2 Quarterly Report), Ps. aeruginosa susceptibilities were (with April-September 2009 shown in parentheses):

  ceftazidime 85% (78%)
  ciprofloxacin 70% (53%)
  meropenem 93% (69%)
  piperacillin-tazobactam 90% (98%)
  tobramycin 89% (97%)

The rise in ciprofloxacin susceptibility is particularly noteworthy and statistically significant; improvement in ceftazidime resistance approach (but does not meet) statistical significance.

CESAREAN SECTIONS

The ASP began working with Obstetrical Team at MSH in the fall of 2009 to change the timing of antibiotic prophylaxis for c-sections from post cord-clamping to pre-incision. Please refer to prior Quarterly Reports for more details. This was done in response to several published studies showing the decrease in infection rate in women after c-sections when timing was changed to pre-incision, as well as a study by Dr. Allison McGeer from July-October 2008 showing the infection rate was 11.2% at MSH with the current practices. Changing the surgical preparation from povidone-iodine to chlorhexidine occurred in March 2010. Ms. Jennifer Teng, a Pharmacy Resident supervised by the ASP team, carried out a similar survey study as Dr. McGeer's to assess the infection rate after making the change in timing of prophylaxis. The study is now complete and will be fully analyzed. Results indicate that the infection rate is 6.6%, although this number cannot be compared to the previous rate due to some differences in study methodology. A preliminary analysis on the timing of administering the antibiotics indicate that 46% were administered less than 15 min prior to surgery and 40% administered 16-30 min prior to surgery. Work had begun with Drs. Sermer, Seaward and Carvalho to continue yearly audits on infection rates and to optimize timing of antibiotics prior to incision. The obstetrical group has a goal to further decrease infection rates to 5% in 2011, and the ASP will be partnering with them.

GENERAL SURGERY (14TH FLOOR)

The ASP began working with the General Surgery Teams at MSH in March 2010. Sandra Nelson performs prospective audit and feedback, meeting with one or more surgical residents from each surgical team 2-3 times a week.

Outcome data are available in the Appendix, but are summarized below:

- 14th floor FY 10/11 Q3 YTD antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) has dropped by 22.3% compared to the same period last year, and is now at 51 DDD/100 patient-days.

- 14th floor FY 10/11 Q3 YTD antimicrobial costs per patient day have also decreased 8.0% compared to the same period last year, owed to a reduction in systemic antibacterial costs (which were partially offset by increased antifungal costs).

- The number of cases of yeast in the blood remains low. There has only been 1 case of yeast in the blood for FY 10/11 which is the same number for the entire FY 09-10. Of note, similar to the MSH ICU, not since FY 07-08 has there been a fluconazole-resistant yeast grown in the blood on 14th floor (*Candida krusei*).

OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY (OPAT) PROGRAM

EXECUTIVE SUMMARY

The OPAT service continues to consistently accrue patients at the rate of 20-30 per month since May 2010. As of December 31, 2010, OPAT had accrued 254 patients and was actively following 30. The medical diagnoses and services using OPAT are similar to the last report and are shown graphically in the Appendix.

The service has followed 86 patients discharged on intravenous vancomycin though December 31, 2010. **Mr. Ron Fung** has been diligently following these patients and only 1 required a brief hospital admission for nephrotoxicity. A total of 38 dose changes were made, 16 for increased vancomycin levels and 22 for increasing creatinine. It is safe to say that without close follow-up and proactive dose adjustment 4-5 patients might have required readmission for renal failure. Our experience suggests that the turnaround times for serum vancomycin levels done at community laboratories needs improvement.

OPAT was instrumental in improving patient relations and follow-up in 9 specific cases. Issues addressed included acceptance of treatment, safe monitoring, finding patients for follow-up and identification of critical events requiring emergency reassessment.

OPAT has worked to facilitate funding for several patients to receive support from the Exceptional Access Program of the Ministry of Health and Long Term Care. Patients have been hospitalized or had their stays prolonged due to the slow application processing. We are working with administration to approach the Ministry directly to see if the process can be improved.

A new Microsoft Access-based database, developed by the ASP's **Ms. Lopa Naik**, has the capability to auto-populate data directly from the Enterprise Data Warehouse (EDW). It has been rolled out, with continuous database training and support being provided by Ms. Naik. Even though it is still relatively new, the OPAT team has noticed a time savings with respect to improved efficiencies caused by reduced data entry. The new database will also serve as a more user friendly communication tool with various family and attending physicians in terms of generating follow-up letters. Furthermore, it will make it easier for the OPAT group to analyze data for reporting, continuous improvement, and research purposes.

PATIENT CARE ACTIVITIES

Patient Outcomes

The OPAT group decided to focus its initial outcome analysis on patients discharged on "high risk" antibiotics (e.g. vancomycin and aminoglycosides).

Aminoglycoside patients: 58% Cured, 14% Improved, 14% No Improvement, and 14% Failure (Progression).
Vancomycin patients: 77% Cured, 17% Improved, 0% No Improvement, and 6% Failure (Progression). More detailed breakdowns are shown in the Appendix.

Vancomycin nephrotoxicity: One of the original goals of the OPAT program was to provide close follow-up to pre-empt vancomycin nephrotoxicity. Based on the first 86 patient courses we were successful in that only 1 patient required readmission for this complication. The cause of the incident was a dose increase just before discharge and extremely slow turnaround times (TAT's) of 10-14 days for serum levels (this issue is discussed in more detail below).

Care of these patients involved monitoring serum creatinine and vancomycin levels. Vancomycin dose was changed 38 times – 16 for high drug levels and 22 for increasing creatinine. In 10 instances a critically high vancomycin level occurred; 4 of these were true, while 6 were due to sampling during the infusion.

Three private laboratories do vancomycin levels but results are delayed because the samples are sent out to hospital-affiliated labs. In one case this resulted in a TAT of 5-7 days while the other 2 lab providers have 1-2 day TATs. Test results can be obtained earlier by calling, but this is extremely time-consuming. As an OPAT initiative, we plan to get the labs to improve their performance. The single readmission occurred in a Northern hospital which had a TAT of 10-14 days. After we raised the issue, in-house testing was implemented at a local hospital and there have been no further problems.

In 13 of the 86 vancomycin cases we stopped the drug and changed to another for reasons other than nephrotoxicity including neutropenia, skin rash (not due to red man syndrome), and sufficiency of another antibiotic.

Patient Relations

Close follow-up by the OPAT team has maintained continuity of care in 9 cases. These were individuals who were non-compliant, were difficult to contact, or developed serious complications requiring reassessment on an emergency basis. In all cases intervention by OPAT resulted in improved patient care.

Patient Information

Ms. Brittany Weber, a pharmacy student at the University of Waterloo who did a four-month co-operative placement with the OPAT program supervised by **Mr. Fung**, has created an OPAT Patient Information Handout. This document has been approved by members of the UHN ASP, and is currently being reviewed by the Patient Education Network (PEN) at TGH. PEN will assist with the printing and translation of the handout. It is our goal that this handout will serve to enhance communication(s) with our very diverse and multilingual patient population at UHN, and with community service providers.

Ms. Amy Dresser, a pharmacy student at the University of Toronto working with the OPAT program and supervised by **Mr. Fung**, is developing Medication Information pamphlets to supplement the OPAT Patient Information Handout mentioned above. Upon completion, they will be circulated to members of the UHN ASP for review.

Ms. Pauline Feng, a current Grade 11 honours high school student has secured a summer volunteer position with the OPAT program. She will commence her volunteer position later this summer (July).

EARLY HOSPITAL DISCHARGE

Dr. James Brunton and **Mr. Fung** have worked closely with other Infectious Disease Physicians and the Admitting Hospital Service to help facilitate accelerated and safe hospital discharge. This includes working closely with the Ministry of Health and Long Term Care (MOHLTC) Exceptional Access Program to procure access for formerly non-funded medications. The OPAT team has been successful in obtaining MOHLTC approval for both tigecycline (disseminated *Mycobacterium abscessus* infection) and daptomycin (Methicillin-

resistant *Staphylococcus aureus* osteomyelitis with a vancomycin MIC of 2 mg/L) under the Compassionate Review Program, neither of which have been previously funded. This has resulted in cost savings to the hospital in terms of earlier discharge.

It has become evident that the drug review process is extremely inefficient. We therefore plan to propose criteria to the MOHLTC which might speed up the process without dramatically increasing the use of expensive antibiotics.

The OPAT team will also be working with various pharmaceutical manufacturers to support their submissions for MOHLTC funding and possible research collaboration.

OPERATIONAL EFFICIENCY

Dr. Brunton, **Mr. Fung**, **Ms. Naik**, and **Mr. Thung** met to discuss and document the OPAT workflow. Several operational issues were identified which have contributed to the ever-increasing workload on the OPAT pharmacist. With planned expansion to Mount Sinai Hospital, and the desire for increased presence in the Emergency Department, the need for additional clerical support has never been greater. This would offload some of the responsibilities currently undertaken by the OPAT pharmacist allowing for that individual to focus on more direct patient care activities and other antimicrobial stewardship initiatives. Currently these duties include faxing lab requisitions and CCAC orders as well as finding lab results so they can be reviewed and acted on by pharmacist and physician.

OPAT has secured clearance for a pharmacist to view and edit discharge information in the Resource Matching & Referral (RM&R) homecare order instrument. **Mr. Fung** has been using this tool as a way to help triage eligible patients as well as to ensure accuracy and appropriateness of antimicrobial therapy and vascular access device flush orders. The pharmacist has also set up access to patient lab results electronically, where available, from private labs.

OPAT has met with the Toronto Central Community Care Access Centre (TOCCAC) to improve the process of communication; TOCCAC's own procedures necessitate exclusive fax-based communication. The process has been made more efficient with the acquisition of a dedicated OPAT fax line and accessing the TOCCAC's computer-fax technology so that faxes can be sent directly from a computer: saving paper, time, and providing an audit trail. As a follow-up, TOCCAC invited members of the OPAT program to its bi-monthly meeting with their nursing service providers. The goal of that meeting was to share best practices and further improve communications and efficiencies across the two organizations. At this meeting, **Dr. Brunton** gave an overview of the OPAT program and suggestions for system improvement.

An OPAT reference code has been created by the TOCCAC which can readily identify OPAT patients and improve communication infrastructures between all involved care providers. Training sessions are being organized by TOCCAC to educate in-hospital coordinators. Using this reference code, it will be possible to run reports through the TOCCAC internal electronic charting system on clients identified as OPAT for audits and quality monitoring purposes. A list of all OPAT patients has been compiled and submitted to the TOCCAC.

OPAT also met with Calea Ltd, the pharmacy service provider for intravenous admixtures in the Greater Toronto Area, to gain a better understanding of their workflow processes. At this meeting, **Mr. Fung** provided an overview of the OPAT program and a discussion followed regarding collaborative research opportunities. **Mr. Fung** has contacted Calea Ltd to inquire as to what data elements are contained within their internal database and the possibility of data sharing. A follow-up meeting is planned for March 2011 to further discuss this collaboration. **Dr. Chaim Bell**, **Dr. Nick Daneman** (a TASC member), **Mr. Fung**, and **Ms. Naik** are scheduled to represent OPAT at this meeting. The goal is to bring this information to the Institute

for Clinical Evaluative Sciences (ICES) to help advocate for improvement in ambulatory antimicrobial health care delivery in Ontario.

ELECTRONIC RECORD TO SUPPORT

Dr. Brunton, **Mr. Fung**, and **Mr. Thung** have also met with representatives from SIMS to discuss the Practice Solution Software (PSS) being implemented as part of the TWH Family Health Clinic EMR. This system integrates both the clinical and administrative aspects of a patient's care. Although still in its early phase of development, once fully functional, this system will have the capability to generate prescriptions electronically, and retrieve and store blood work results directly from private lab service providers. The system will also receive reports from the UHN EPR. We are currently determining whether and how this system could be implemented to support the OPAT program.

DATABASE

Led by **Ms. Naik,** with input from **Dr. Brunton**, **Mr. Fung**, and **Mr. Thung**, a new and improved MS Access-based database has been successfully created. This was truly a team-based effort and required multiple meetings with many of the Information Technology departments affiliated with UHN over several months. Being a relational database, this will enable us to store all patient health records in normalized format. **Mr. Fung** has been diligently beta-testing the new database and deems the accuracy of the transferred data to be nearly 100% accurate. **Ms. Dresser**, under the guidance of **Mr. Fung**, has been assisting with the transfer of patient data from the old Excel-based database into the current one.

Previously, a major limitation to the expansion of the OPAT program was the labour-intensive nature of the data entry required by the clinical team members. One significant upgrade with the new database is that the majority of the information can now be auto-populated from the Enterprise Data Warehouse (EDW) and the Non-operational Data Repository (NODR). With the expertise of **Ms. Naik**, a connection between our new OPAT database and EDW/NODR has been created which acts an interface allowing data extraction within 24 hours of an OPAT consultation being placed in EPR. This upgrade in functionality will help to reduce the amount of clerical work required by clinical team members. **Mr. Fung** and **Ms. Naik** are working on creating a concise, printable patient profile which will help the clinical team members care for patients when they are seen in the OPAT clinic. Furthermore, the new database will also be helpful in generating introductory and follow-up physician letters directly from the data contained within.

Moving forward, we will be investigating the possibility of changing the database platform from MS Access to Oracle® to minimize the number of connections required to directly extract the patient data and to improve its overall robustness in terms of data, outcome analysis, and performance.

VOLUNTEER PROGRAM

Led by **Dr. Brunton**, the OPAT group is experimenting with the possibility of having a "continuously rotating" talent of volunteers throughout the year in order to generate more value to the program while respecting the financial restrictions that we have to work with. It is our hope to have a steady pool of high quality volunteers who would be able to do some of the administrative work (i.e. face-to-face / telephone surveys) which would enable us to further improve our services and at the same time provide volunteers who are interested in pursuing a career in healthcare a valuable work experience. We believe that our volunteer program is a "win-win" initiative that will benefit both OPAT and our volunteers.

PRINCESS MARGARET HOSPITAL

LEUKAEMIA SERVICE

The Antimicrobial Stewardship Program (ASP) re-introduced thrice-weekly (Mon, Wed, Fri) rounds with the **clinical associates** and **other key members of the Leukemia service (attending physicians, pharmacists,** and **nursing unit administrators)** to review patients not being followed by the Immunocompromised Host Infectious Diseases Consultation Service on December 6, 2010. The chief of service, **Dr. Andre Schuh**, also attends regularly.

Based on microbiological data, the empiric regimen for febrile patients with chemotherapy-induced neutropenia has been switched to piperacillin-tazobactam and gentamicin. The ASP has also worked with the Immunocompromised Host Service (**Drs. Coleman Rotstein and Shahid Husain**) to identify areas for standardization. This has included avoiding unnecessary metronidazole (if a patient is already on an antibacterial with anaerobic activity), and treating Gram-negative infections with single agents once susceptibilities are known.

In the coming months, the ASP hopes to continue improving the process of care, including standardizing current practices such as blood culture techniques (which have an impact on antimicrobial utilization).

Results of the first two months of (returned) work on the Leukaemia service—December 2010 and January 2011—are in the Appendix, and show increased utilization. The reasons for this are unclear, but may include the fact that there was a concern of ESBL organisms on the Leukemia service, and so all patients were treated empirically with meropenem—substantially raising the costs of antibacterial agents.

For the next Quarterly Report, we will be able to present patient-related outcomes such as mortality, transfers to the ICU and length of stay.

TORONTO WESTERN HOSPITAL

MEDICAL-SURGICAL INTENSIVE CARE UNIT

The ASP group continues to round with the ICU team on a regular basis. (Of note, audit-and-feedback with the TWH ICU started almost 1 year ago.) Dr. Dresser rounds with the ICU team on weekdays at noon and also gives a noon-hour teaching session to the ICU team on Fridays; Dr. Morris is present for ASP rounds on Mondays and Thursdays. Rounds take approximately 10 minutes. Full results are in the Appendix, but are summarized below:

- January-December 2010 antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) has decreased by 20% compared to January-December 2009, and is currently at 78 DDD/100 patient days.
- Antimicrobial costs have also decreased since beginning the program and January-December 2010, and are $11.28/patient day, representing a 28% year-over-year reduction in costs. This represents an approximately $34K annual cost savings, or roughly $2 667/month.

TORONTO GENERAL HOSPITAL

MEDICAL-SURGICAL INTENSIVE CARE UNIT

The ASP started collaborating with the TGH Medical-Surgical ICU in October 2010. Drs. Dresser and Morris have been rounding with the ICU team on weekday mornings, starting at 9:00. The process generally takes approximately 20 minutes to complete. As with the other areas where the ASP collaborates using prospective audit and feedback methodology, the ASP does not offer advice on patients being followed by the Infectious Diseases or Immunocompromised Host services. This results in approximately in the ASP providing feedback on approximately 60% of the patients in the ICU. Preliminary results have shown very positive outcomes, both in reduction of antimicrobial usage (33% reduction) as well as costs (47% reduction). It is estimated that the first 4 months of intervention at TGH has resulted in direct savings of $147K. It is too early to present the results in this report, but there are suggestions that we are seeing the emergence of reduced antimicrobial resistance and reduced candidemia in the TGH ICU following the start of ASP collaboration with the ICU. ICU mortality is not higher than a comparable period 1 year earlier. (We will have this data available for the next Quarterly Report.)

SATISFACTION SURVEY

A recently completed survey (71% response rate) shows a high degree of attending physicians' satisfaction along with some recommendations to improve upon our current practice.

Attending physicians:

100% - Antibiotic rounds are appropriately focused on patient care
80% – Review sessions are useful to their practice (20% - feels neutral about this)
80% - ASP has not affected their autonomy in a negative manner (20% - feels neutral about this)

Comments (unedited):

1) Very much so! (Are the review sessions useful to your practice?)
2) I like the after [rounds] review time at TWH better.
3) I would like to see the inclusion of the immunocompromised service at the AM meetings
4) I would like to have more clinical, bedside discussion about the patients (not all of them) on rounds with the ASP team. I would also like to be able to [see] an elective period with the ASP team to the … fellows who have universally shown interest and support for the concept, and enjoyed the educational opportunity. (Slightly edited to maintain anonymity.)
5) Don't like the reliance on positive cultures alone-feel greater benefit would be derived if saw the patient, did physical exam- often cultures alone seem to be basis of decision making.
6) I feel this has been an extremely valuable intervention. It is educational for all members of the team.
7) Move towards including all patients in the discussion

ASP WORKING GROUPS

In addition to prospective audit and feedback, the ASP believes that reducing variation in practice when there is no clear clinical or evidence based explanation for the variation will improve patient outcomes. Accordingly, the ASP has begun collaborations

with various stakeholders to develop working groups to improve care by reducing variation. The first such working group is the Ventilator-Associated Pneumonia (VAP) Working Group, which includes Pharmacists, Physicians, and Respiratory Therapists. This group will work together to develop a standardized approach to the investigation and management of VAP. Working on a tight time-schedule, this group will review evidence, discuss feasibility of different approaches, and will use Huddle to do some of the collaboration on-line using wikis to supplement in-person meetings.

TORONTO ANTIMICROBIAL STEWARDSHIP CORRIDOR

The Toronto Antimicrobial Stewardship Corridor (TASC) is a relatively new collaboration between the ASP and like-minded individuals in around the Greater Toronto Area. The group currently includes antimicrobial stewardship representatives from 12 hospitals, including: Hospital for Sick Children, North York General Hospital, St. John's Rehab, St. Joseph's Health Centre, St. Michael's, Sunnybrook Health Sciences Centre, The Scarborough Hospital, Toronto East General Hospital, Trillium Health Centre and William Osler Health Centre. Chaired by **Drs. Andrew Morris** and **Sandra Nelson**, TASC aims to share best practices and educational tools, while developing a research agenda. Each of these hospitals either has the beginnings of an ASP or will be starting one up shortly. We feel strongly that the MSH-UHN ASP needs to help these programs in whatever manner possible to be strong and successful, which will help all hospitals in the long run.

The TASC group continues to use Huddle™ to share documents/resources and collaborate online. The Huddle™ solution was purchased with a portion of the generous donation from Pfizer Canada.

A TASC Research Sub-committee has been created, chaired by **Dr. Chaim Bell** to move forward the research agenda, while collaborating with other hospitals in the Greater Toronto Area. A TASC hospital inventory of ASP practices and hospital stats is currently being collected and collated.

ANTIMICROBIAL STEWARDSHIP PROGRAM RESEARCH

From the time the ASP was initiated, it has pursued 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 above.

ANTIMICROBIAL STEWARDSHIP IN THE ICU

The first research project will be using the data accrued from the clinical activities of the ASP (**Drs. Dresser, Morris and Nelson**). Supported by **Dr. Morris**, Infectious Diseases and Critical Care fellow **Dr. Brian Minnema** will be looking at clinical, microbiological and antimicrobial utilization outcomes in a "step-wedge" trial design. Much of the data has already been collected, although the study will be looking at data from all ICUs as far back as 2007, and following it forward to 2012.

OPAT PRE- AND POST-IMPLEMENTATION

Ms. Anjie Yang, a UHN Pharmacy Resident supervised by **Mr. Fung** with valuable input from other members of the MSH-UHN ASP team (primarily **Drs. Brunton** and **Dresser**), is conducting a residency project looking at the clinical impact of the OPAT program. The main goal of the study will be to compare the clinical

outcomes of patients discharged under the care of the OPAT team (intervention group) versus patients discharged with the standard of care prior to OPAT implementation in February 2010 (control group). The study population will consist of patients referred to the four main surgical services at UHN (namely cardiovascular, neurosurgery, orthopedics and vascular). The methodology is a retrospective pre-post study design looking at the primary endpoint of cure rate, and a composite of secondary endpoints (treatment-related adverse effects, re-hospitalizations, vascular access device complications). The study protocol was approved by the UHN REB in December 2010, and data collection is currently ongoing.

STAPHYLOCOCCUS AUREUS BACTERAEMIA

The second such project involves examining the management and outcomes of patients with S. *aureus* bacteraemia at several TASC member hospitals. It is an ambitious project hoping to capture approximately 1000 episodes of S. *aureus* bacteraemia at the teaching hospitals. It will look at how patients are investigated and managed (including resource utilization such as echocardiography and length of stay), and will also be examining outcomes. Because S. *aureus* bacteraemia is such an important disease, the ASP hopes to use this study to springboard clinical trials and quality improvement projects into the best management of S. *aureus* bacteraemia. The study is anticipated to take 15-18 months to complete. An infectious diseases fellow **(Dr. Dan Ricciuto)** and two medical residents **(Drs. Bryan Coburn and Adrienne Showler) have contributed significantly in the development of this project. In addition, they** will each be conducting sub-projects as their major research projects for their 2010-11 residency research blocks. **Lopa Naik** has been instrumental in the development of the electronic database to support this project.

The study protocol and data collection forms have been submitted to the respective Research Ethics Boards for approval, and Drs. Coburn (Supervisor: **Dr. Matt Muller,** St. Michael's) and Showler (Supervisor: Dr. Andrew Morris) have had their research blocks approved for this coming academic year.

DELPHI PANEL

A Meeting Grant application was submitted to the Canadian Institute of Health Research (CIHR) for funding to organize an expert Delphi consensus panel focused on defining indicators for antimicrobial stewardship in acute care settings. The focus will be to determine the most appropriate measures used for evaluating antimicrobial stewardship initiatives. Knowledge generated during this process is planned to be shared with Accreditation Canada, Ontario Ministry of Health and Long-Term Care, ISMP Canada, AMMI Canada and Public Health Agency of Canada.

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.

TORONTO COURSE ON ANTIMICROBIAL STEWARDSHIP

"TAKING IT TO THE NEXT LEVEL"

Members of the ASP (**Tanaz Khory**, **Linda Dresser**, **Sandra Nelson**, **Melanie Thomson**, **Lucas Thung, Lopa Naik, Andrew Morris**) continue developing this course, slated for June 2-4, 2011. This course will be the first of its kind in Canada. It will be geared to physicians, pharmacists, infection control practitioners, and

hospital leaders to help them create a hospital culture of appropriate antimicrobial use. This course will include interactive education featuring leaders in the field, small-group case-based learning, dynamic lectures, and keynote addresses, highlighting the **MSH-UHN ASP**. This course will be accredited by the University of Toronto's Continuing Education and Professional Development.

Registration for this course has commenced.

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).

NEXT QUARTERLY REPORT

The next quarterly report, for the end of the 2010/11 Fiscal Year, is expected early June 2011.

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.

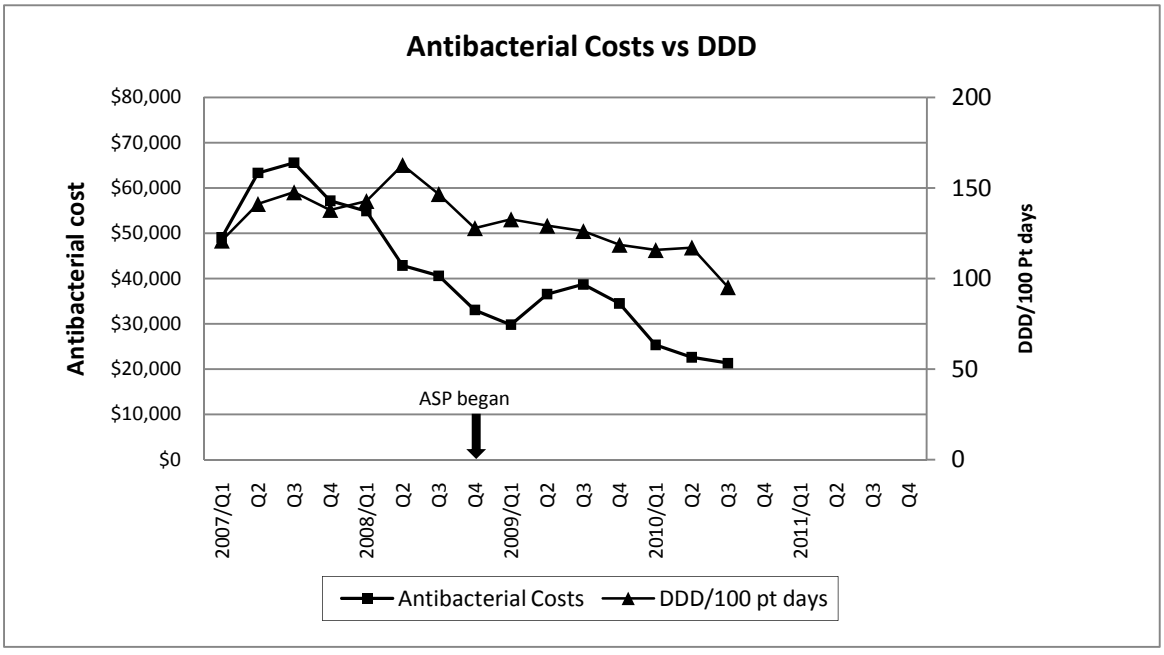
Key Performance Indicator	FY 08/09	FY 09/10	FY 10/11 YTD (Q1-Q3)	% Change (10/11 Q1-Q3 YTD)	
				Compared to Same Period Last Year (Q1-Q3)	Compared to before ASP in ICU (FY 08/09)
Antimicrobial Usage and Costs					
Total Antimicrobial DDDs*/100 Patient Days	180	164	136	-20.0%	-24.4%
Systemic Antibacterial DDDs/100 Patient Days	145	126	109	-15.5%	-24.8%
Systemic Antifungal DDDs/100 Patient Days	31	28	23	-20.7%	-25.8%
Total Antimicrobial Costs	$332,731	$285,931	$141,133	-33.6%	-
Total Antimicrobial Costs/100 Patient Days	$6,939	$5,922	$4,140	-30.5%	-40.3%
Systemic Antibacterial Costs	$173,082	$140,022	$69,329	-34.1%	-
Systemic Antibacterial Costs/Patient Day	$36.10	$29.00	$20.34	-30.9%	-43.7%
Systemic Antifungal Costs	$143,019	$132,475	$66,037	-31.3%	-
Systemic Antifungal Costs/Patient Day	$29.83	$27.44	$19.37	-28.1%	-35.1%
Patient Care Indicators					
ICU Average Length of Stay (days)	5.81	5.57	5.56	2.7%	-4.2%
ICU Mortality Rate	19.9%	17.5%	17.1%	-2.8%	-14.2%
ICU Readmission Rate	3.2%	2.9%	2.5%	8.1%	-22.0%
ICU Ventilator Days	N/A	3285	2007	-20.0%	N/A

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

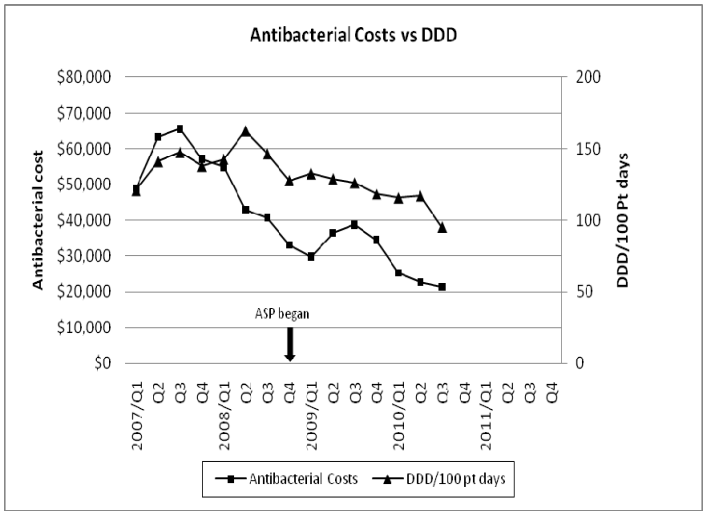
Antimicrobial Costs in MSH ICU FY 09/10 Q1-Q3 vs FY 10/11 Q1-Q3, according to PMH or non-PMH origin* (preliminary data for Q3 2010)

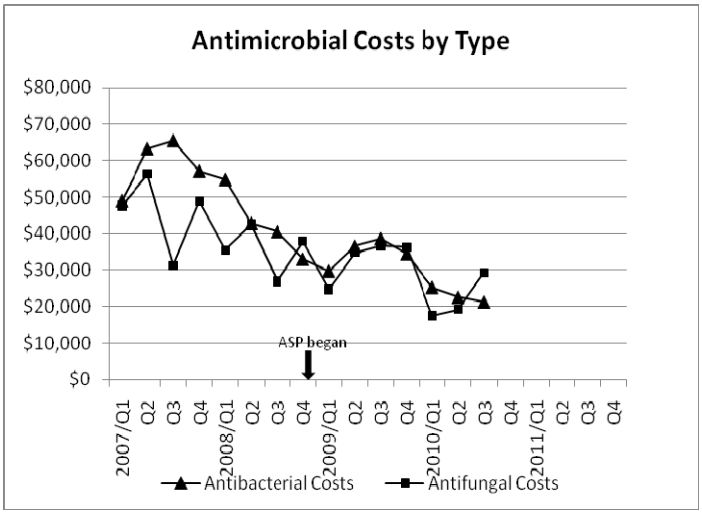
	Q1-3 2009-10	Q1-3 2010-11	% Change Q1-3 10/11 vs 09/10	$ Change Q1-3 10/11 vs 09/10
Total Antibacterial Costs	$105,145	$69,329	-34.06%	-$35,816
Non-PMH Patients	$63,153	$41,076	-34.96%	-$22,078
PMH Patients	$41,992	$28,253	-32.72%	-$13,739
Total Antifungal Costs	$96,173	$66,037	-31.34%	-$30,136
Non-PMH Patients	$42,724	$18,761	-56.09%	-$23,963
PMH Patients	$53,449	$47,276	-11.55%	-$6,173
Total All Antimicrobial Costs (antibacterial + antifungal + antiviral)	$212,629	$141,133	-33.63%	-$71,497
Non-PMH Patients	$111,838	$60,861	-45.58%	-$50,977
PMH Patients	$100,791	$80,272	-20.36%	-$20,519

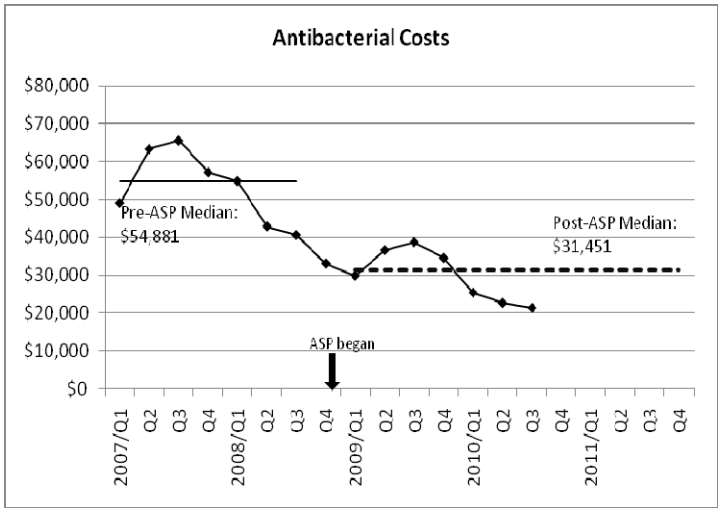
*December Inpatient Discharge Abstract Database not complete at time of reporting therefore identification of PMH patients not finalized, therefore totals subject to change.

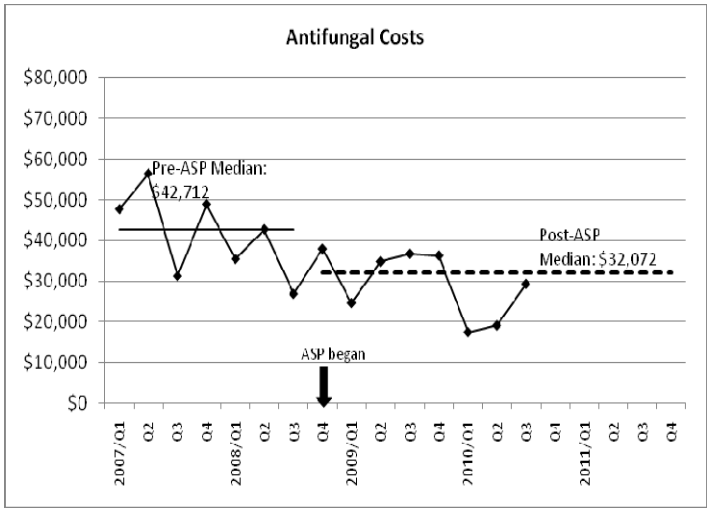


MSH ICU Antimicrobial Costs and Usage



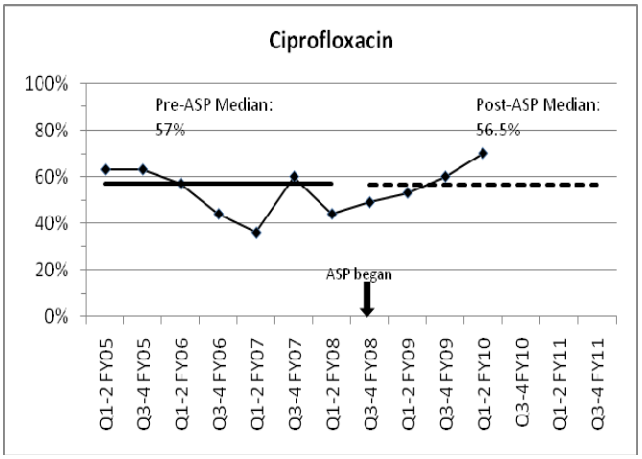


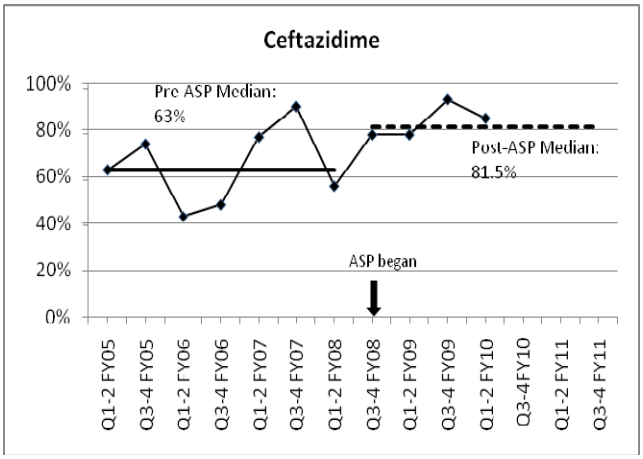


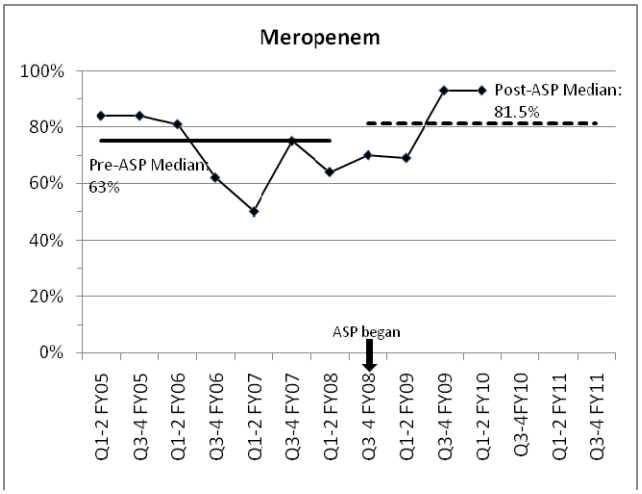


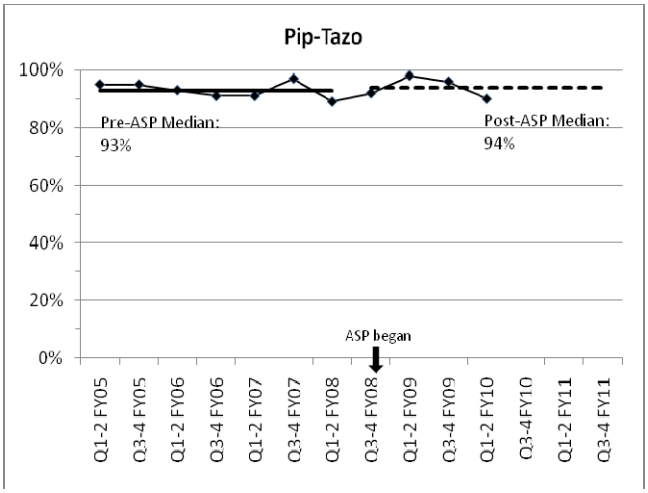
Antimicrobial Susceptibility and Pathogen Surveillance

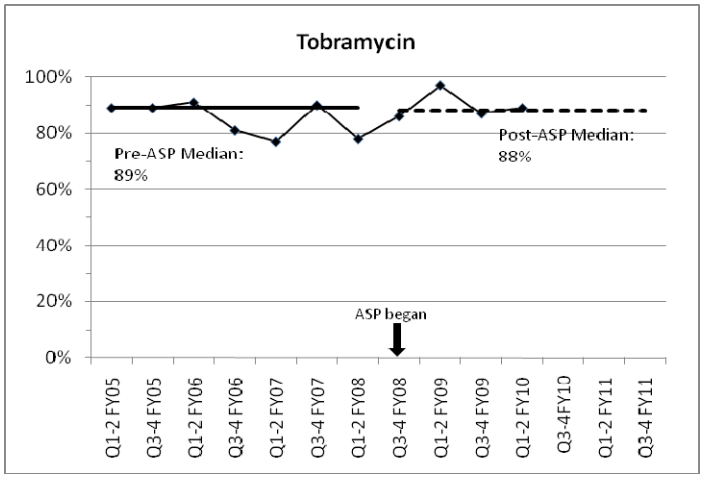
Pseudomonas Susceptibility – MSH ICU



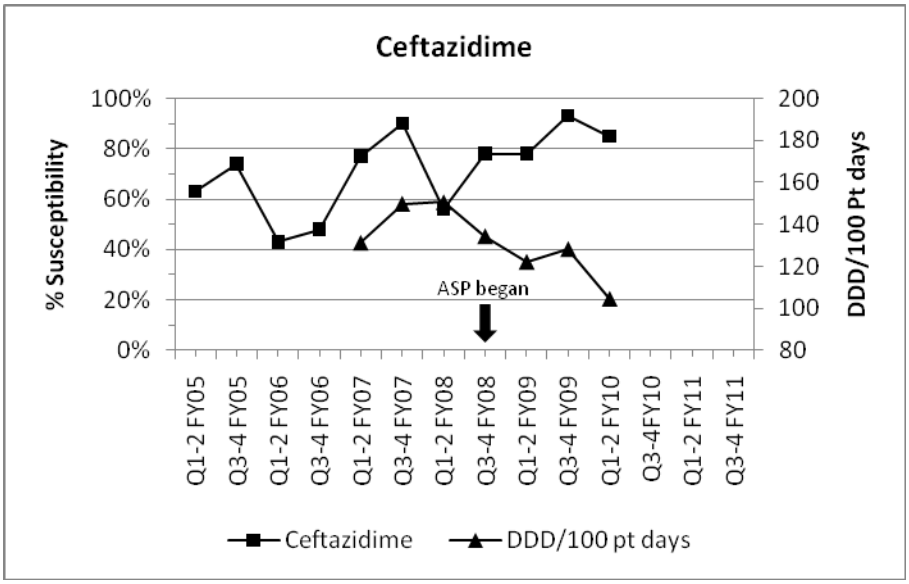


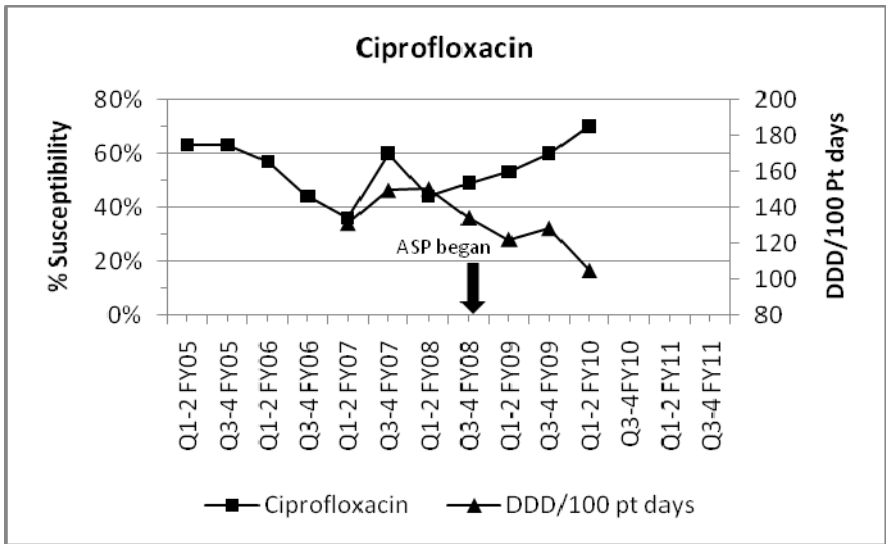






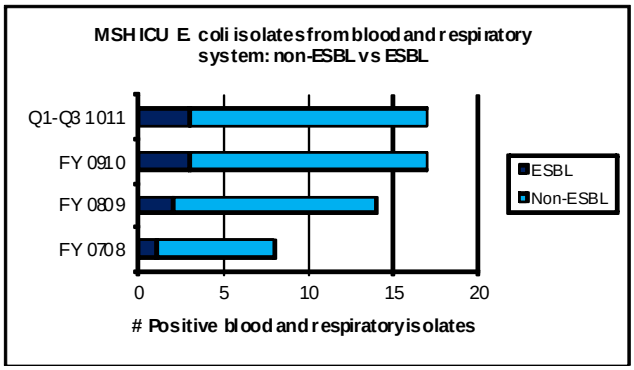
Pseudomonas Susceptibility Further Analysis: Compared with DDD per 100 Patient days – MSH ICU

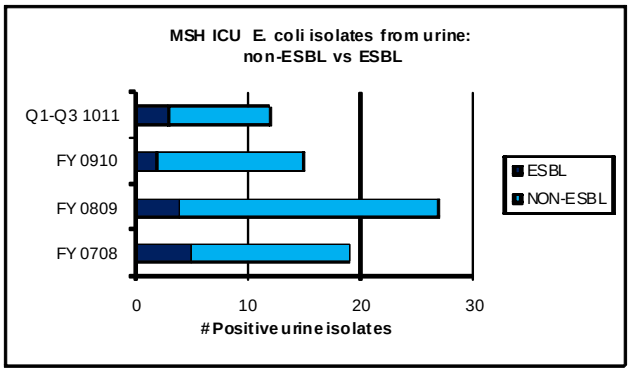




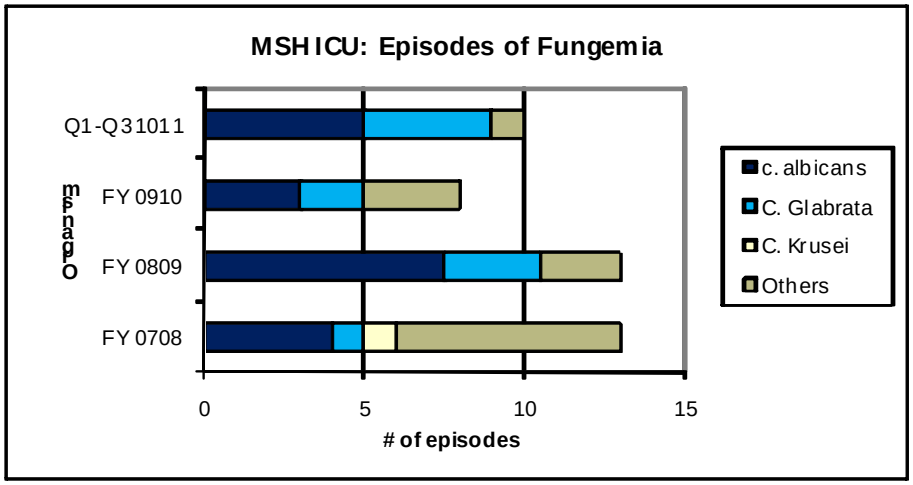
Antimicrobial Susceptibility and Pathogen Surveillance cont.

E. Coli isolates: Blood, Respiratory, Urine





Yeast Species Isolated in Blood – MSH ICU



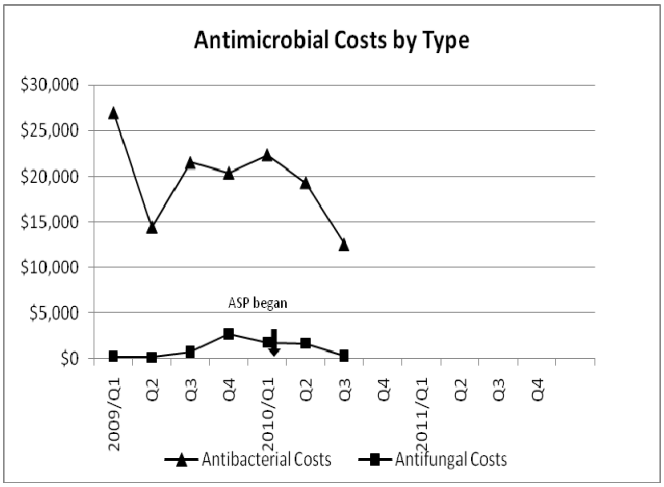
14th Floor

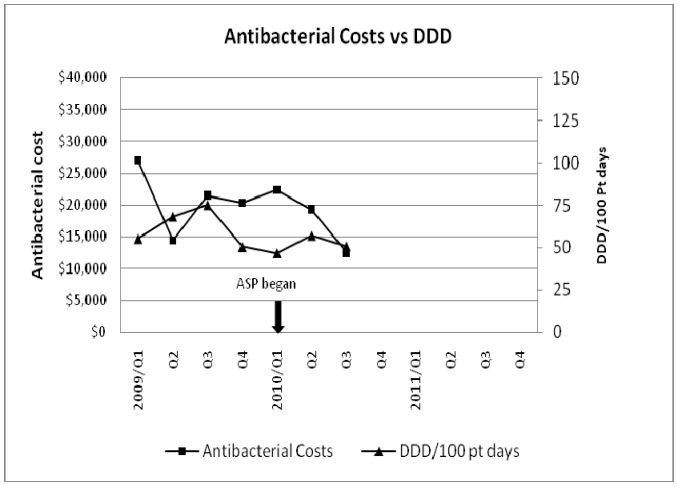
Mount Sinai Hospital 14th Floor Antimicrobial Usage and Costs

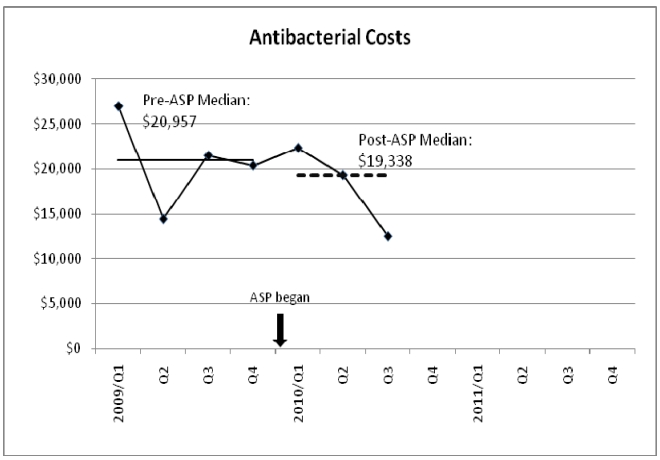
Key Performance Indicator	FY 09/10	FY 10/11 YTD (Q1-Q3)	% Change (10/11 Q1-Q3 YTD)	
			Compared to Same Period Last Year (Q1-Q3)	Compared to before ASP started on 14** (FY 09/10)
Antimicrobial Usage and Costs				
Total Antimicrobial DDDs*/100 Patient Days	62.0	51.3	-22.3%	-
Systemic Antibacterial DDDs/100 Patient Days	59.9	49.0	-23.6%	-
Systemic Antifungal DDDs/100 Patient Days	1.1	2.2	117.5%	-
Total Antimicrobial Costs	$89,053	$58,105	-10.9%	-
Total Antimicrobial Costs/100 Patient Days	$469.46	$428.57	-8.0%	-
Systemic Antibacterial Costs	$83,359	$54,265	-13.8%	-
Systemic Antibacterial Costs/Patient Day	$4.39	$4.00	-10.9%	-
Systemic Antifungal Costs	$3,853	$3,685	219.2%	-
Systemic Antifungal Costs/Patient Day	$0.20	$0.27	229.8%	-
Patient Care Indicators				
14th floor Average Length of Stay (days)	6.4	6.3	1.6%	-
14th floor Mortality Rate	0.7%	0.5%	-16.7%	
14th floor Readmission Rate	0.3%	0.3%	0.0%	
14th floor Isolation Days	n/a	n/a	n/a	

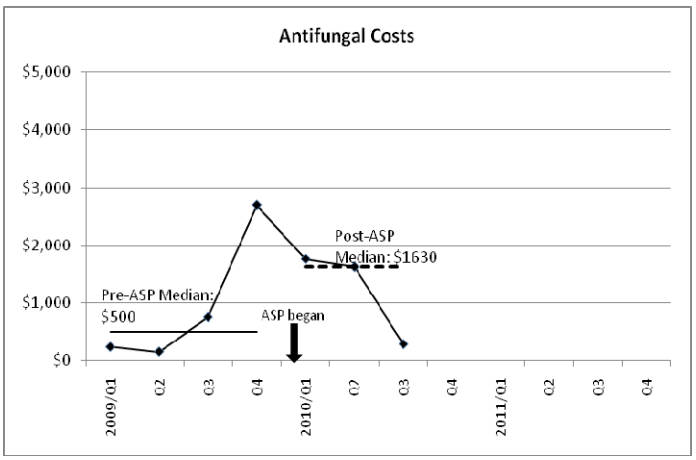
Total Antimicrobials is the sum of systemic antibacterial + systemic antifungal + systemic antivirals; non-systemic antimicrobials are excluded
*DDD = Defined Daily Dose
** ASP started on 14th level in March 2010; data will be populated for this indicator beginning Q1 2011/12
Note: for FY 10/11, one patient accounted for nearly all antifungal costs ($1554) for the month of April, contributing significantly to the 200% increase for Q1-Q3 vs. same period last year.

Mount Sinai Hospital 14th Floor Antimicrobial Usage and Costs cont.



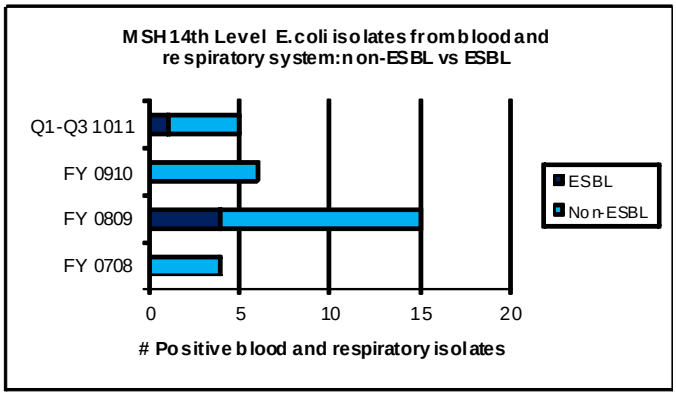


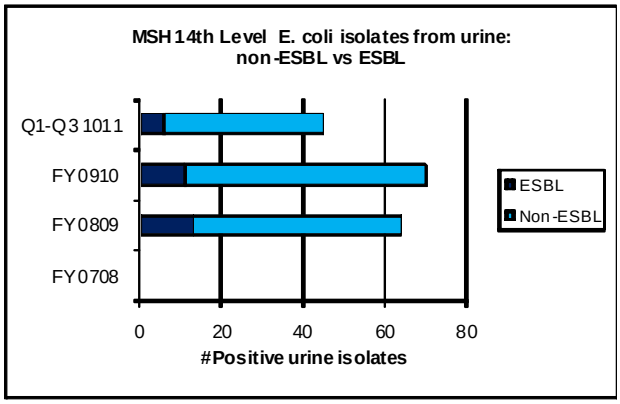




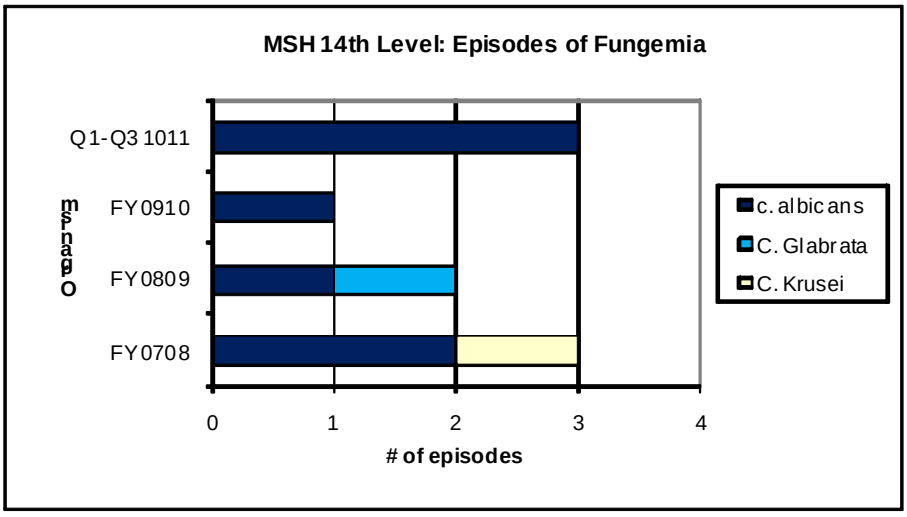
Antimicrobial Susceptibility and Pathogen Surveillance cont.

E. Coli isolates: Blood, Respiratory, Urine





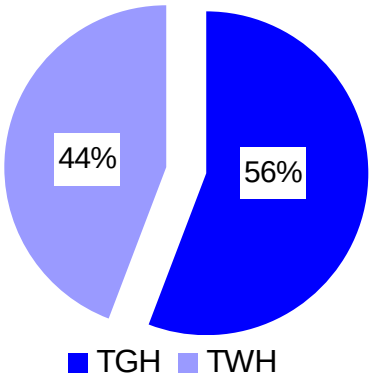
Yeast Species Isolated in Blood – MSH 14th Level



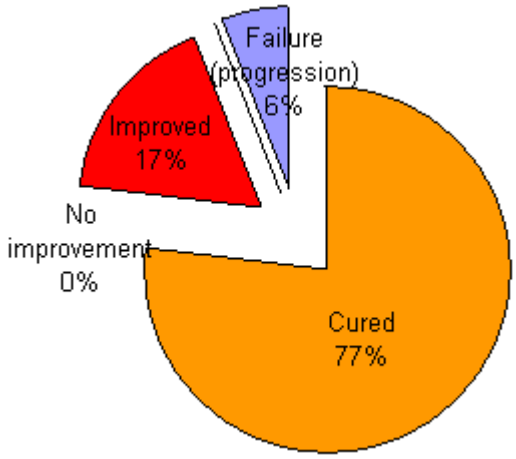
Outpatient Parenteral Antimicrobial Therapy (OPAT) Program

Vancomycin patients

Patient Distribution



Outcomes distribution



TGH	Total	Cured	Improved	No improvement	Failure (progression)
Cardiology Program	7	7	0	0	0
CV Surgery Program	9	8	1	0	0
Emergency Department	1	1	0	0	0
General Surgery Program	3	2	1	0	0
Internal Medicine Program	13	12	1	0	0
Orthopedics Program	3	3	0	0	0
Thoracic Surgery Program	3	2	1	0	0
Urology	1	1	0	0	0
Vascular Surgery Program	8	2	3	0	3
Total	**48**	**38**	**7**	**0**	**3**

TWH	Total	Cured	Improved	No improvement	Failure (progression)
CV Surgery Program	1	0	1	0	0
Internal Medicine Program	3	1	1	0	1
Neurosurgery Program	15	12	3	0	0
Orthopedics Program	17	13	3	0	1
Rheumatology	1	1	0	0	0
Spinal Program	1	1	0	0	0
Total	**38**	**28**	**8**	**0**	**2**

Outpatient Parenteral Antimicrobial Therapy (OPAT) Program

Statistics

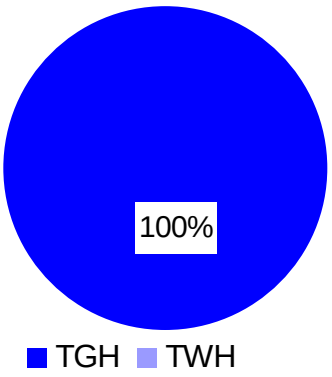
Total number of Vancomycin days	**2076**
Median	**20**
Average	**22.81**

Dose or medication changes	**51**
Dose change due to elevated SCr	**22**
Dose change due to elevated drug level	**16**
Critical result (> 30 mg/L)	**10**
Vancomycin D/C and changed	**13**

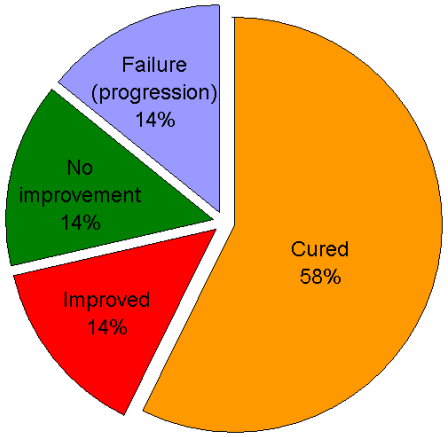
Number of Vancomycin readmissions	**1**
Total readmissions	**21**

Aminoglycoside patients

Patient Distribution



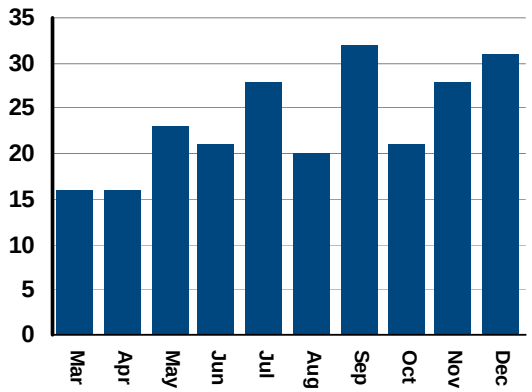
Outcomes distribution



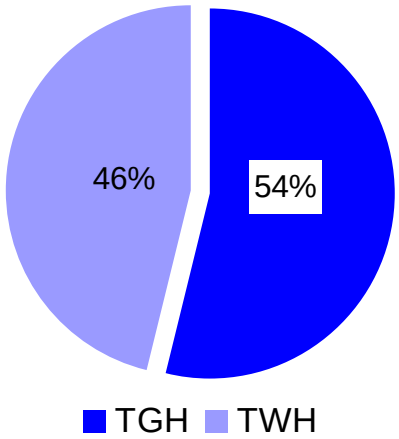
TGH	Total	Cured	Improved	No improvement	Failure (progression)
CV Surgery Program	4	3	0	1	0
Internal Medicine Program	2	1	1	0	0
Vascular Surgery Program	1	0	0	0	1
Total	**7**	**4**	**1**	**1**	**1**

Outpatient Parenteral Antimicrobial Therapy (OPAT) Program

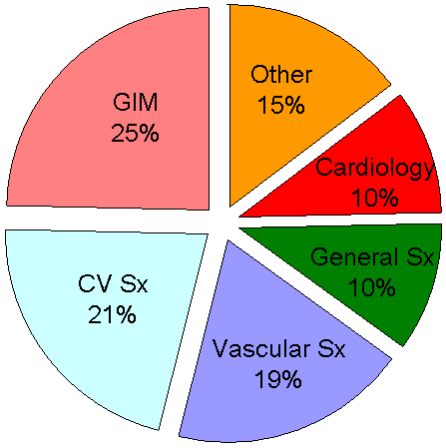
New Referrals to OPAT, by Month



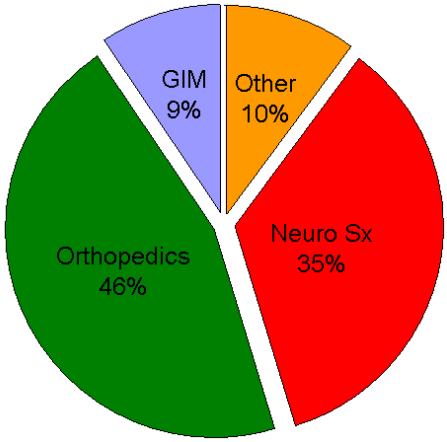
Patient Distribution



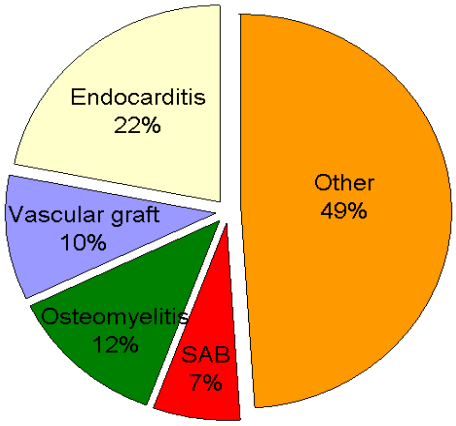
Referring Service, TGH



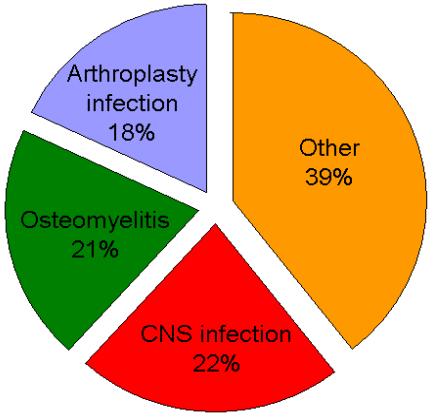
Referring Service, TWH



OPAT Diagnosis, TGH



OPAT Diagnosis, TWH



PMH I4A & 15B Antimicrobial Usage and Costs

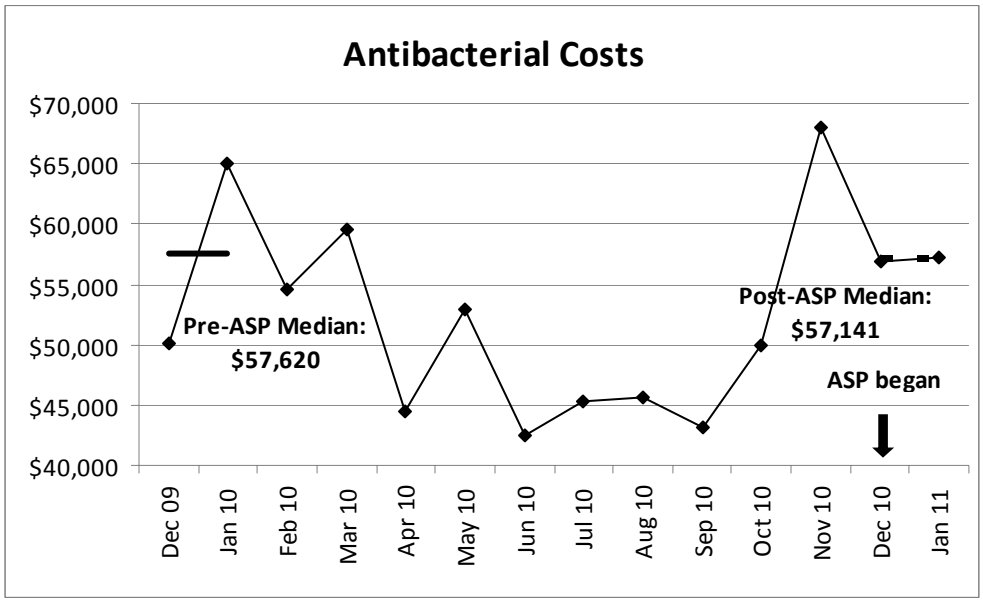
Key Performance Indicator	FY 09/10 (Apr - Mar)	FY 10/11 (Apr - Jan)	Difference	
			% Change	Numerical Change
Antimicrobial Usage and Costs				
Total Antimicrobial DDDs*/100 Patient Days	295.2	277.7	-5.9%	-17.5
Systemic Antibacterial DDDs/100 Patient Days	190.8	170.9	-10.4%	-19.9
Systemic Antifungal DDDs/100 Patient Days	104.4	106.8	2.3%	2.4
Total Antimicrobial Costs	$1,768,317	$1,369,407	-22.6%	-$398,911
Total Antimicrobial Costs/Patient Day	$167.12	$154.56	-7.5%	-$12.56
Systemic Antibacterial Costs	$659,034	$506,265	-23.2%	-$152,769
Systemic Antibacterial Costs/Patient Day	$62.28	$57.14	-8.3%	-$5.14
Systemic Antifungal Costs	$1,109,283	$863,141	-22.2%	-$246,142
Systemic Antifungal Costs/Patient Day	$104.84	$97.42	-7.1%	-$7.42

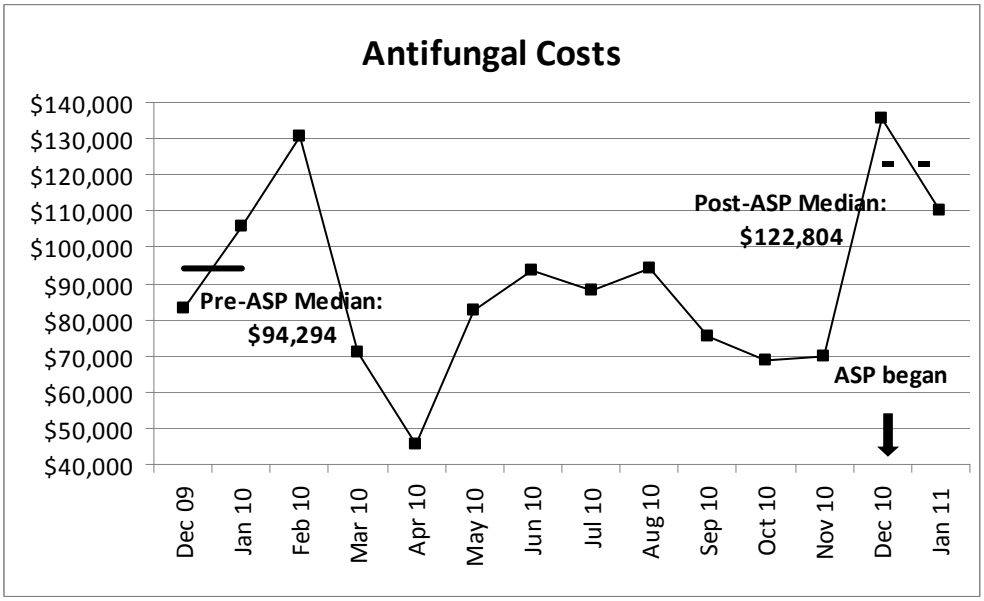
Note:
* DDD = Defined Daily Dose
** ASP restarted at PMH 14A & 15B in December 2010

PMH 14A & 15B	Pre-ASP (Dec 09 to Jan 10)	Post-ASP (Dec 10 to Jan 11)
Actual Antimicrobial Costs	$303,829	$359,889
Patient Days	1768	1891
Actual Antimicrobial Costs/Patient Day	$171.85	$190.32

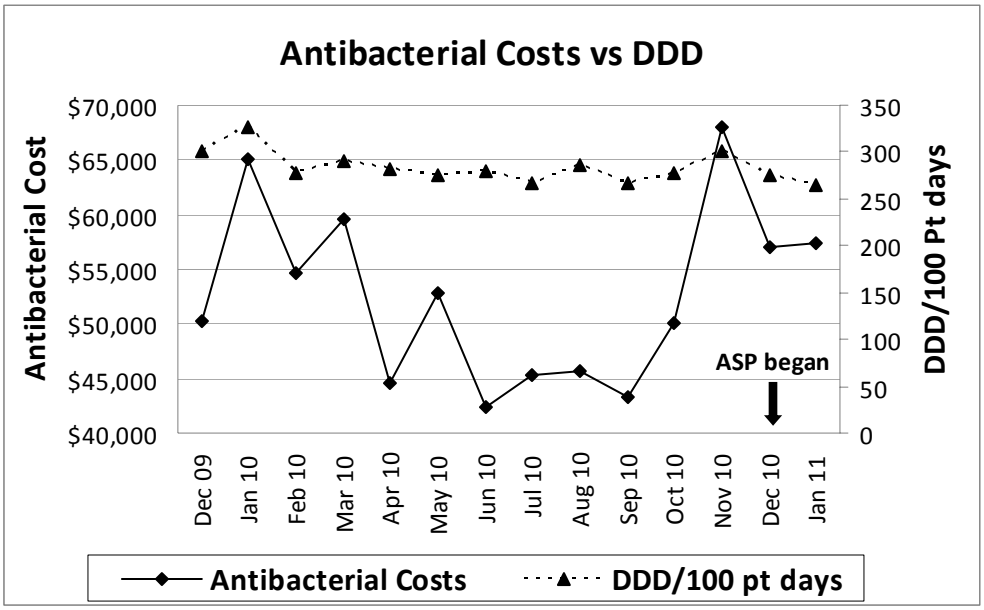
Post-ASP savings (adjusted for altered bed utilization)
= [(Pre-ASP cost/patient day) x (Post-ASP patient days)] - Actual cost Post-ASP
= ($171.85 x 1891) - $359,889
= - $34,921

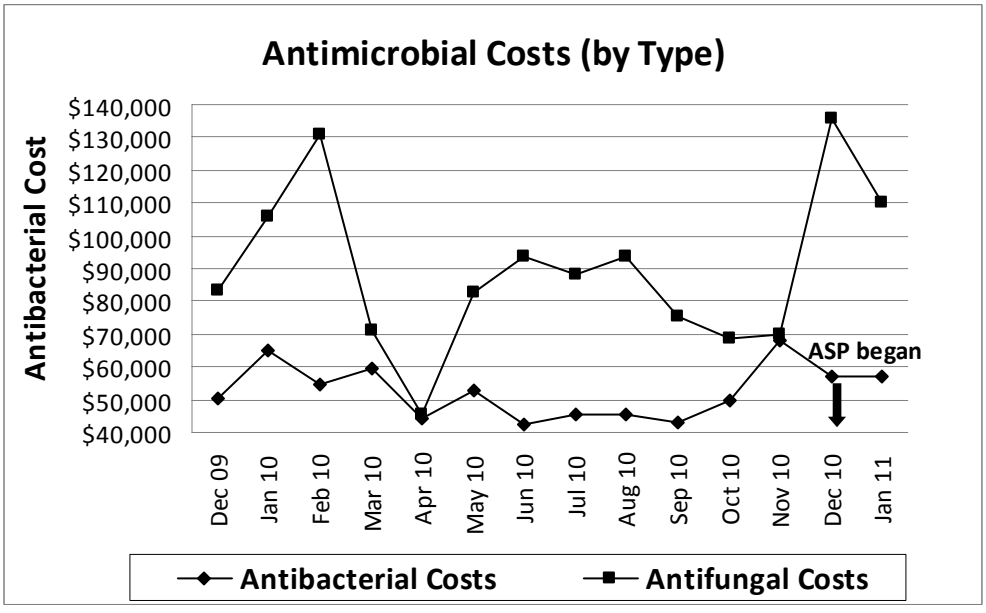
PMH I4A & 15B Antimicrobial Usage and Costs





PMH I4A & 15B Antimicrobial Usage and Costs





TGH ICU Antimicrobial Usage and Costs

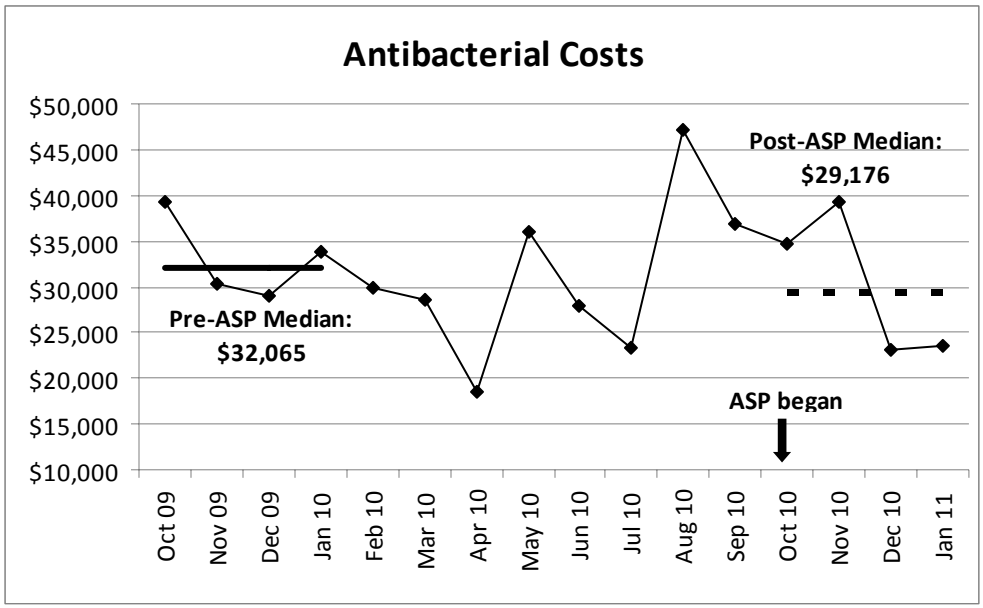
Key Performance Indicator	FY 09/10 (Oct - Jan)	FY 10/11 (Oct - Jan)	Difference	
			% Change	Numerical Change
Antimicrobial Usage and Costs				
Total Antimicrobial DDDs*/100 Patient Days	285.0	191.7	-32.7%	-93.3
Systemic Antibacterial DDDs/100 Patient Days	195.6	151.1	-22.8%	-44.5
Systemic Antifungal DDDs/100 Patient Days	89.5	40.6	-54.6%	-48.8
Total Antimicrobial Costs	$272,817	$167,437	-38.6%	-$105,379
Total Antimicrobial Costs/Patient Day	$120.77	$64.35	-46.7%	-$56.42
Systemic Antibacterial Costs	$132,484	$120,714	-8.9%	-$11,769
Systemic Antibacterial Costs/Patient Day	$58.65	$46.39	-20.9%	-$12.25
Systemic Antifungal Costs	$140,333	$46,723	-66.7%	-$93,610
Systemic Antifungal Costs/Patient Day	$62.12	$17.96	-71.1%	-$44.17
Patient Care Indicators * **				
TGH ICU Average Length of Stay (days)	10.8	8.2	-24.1%	-2.6
TGH ICU Mortality Rate	18.2%	17.3%	-5.1%	-0.9%
TGH ICU Bed Occupancy	17.91	20.70	15.6%	2.8
TGH ICU Vent Days	1321	1633	23.6%	312

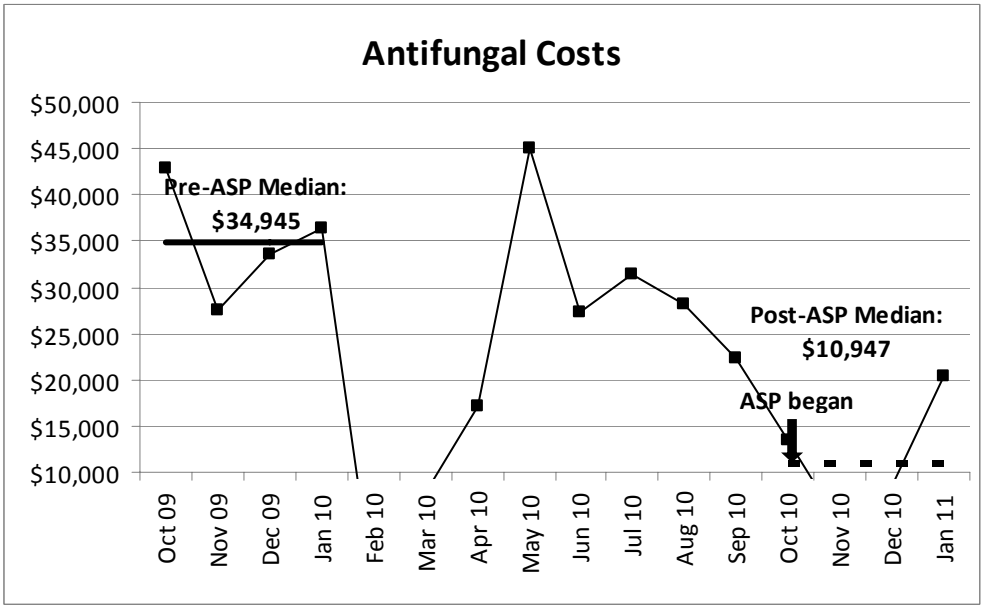
Note:
* DDD = Defined Daily Dose
** ASP started at TGH ICU in October 2010
*** Comparing Oct to Dec 2009 vs. Oct to Dec 2010

TGH ICU	Pre-ASP (Oct 09 to Jan 10)	Post-ASP (Oct 10 to Jan 11)
Actual Antimicrobial Costs	$272,817	$167,437
Patient Days	2259	2602
Actual Antimicrobial Costs/Patient Day	$120.77	$64.35

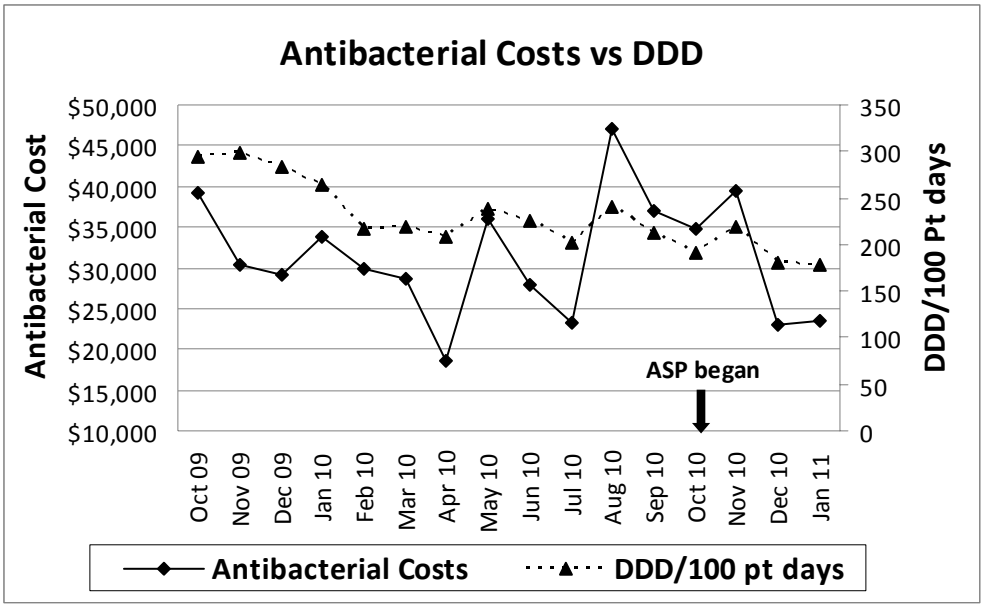
Post-ASP savings (adjusted for altered bed utilization)
= [(Pre-ASP cost/patient day) x (Post-ASP patient days)] - Actual cost Post-ASP
= ($120.77 x 2602) - $167,437
= $146,807

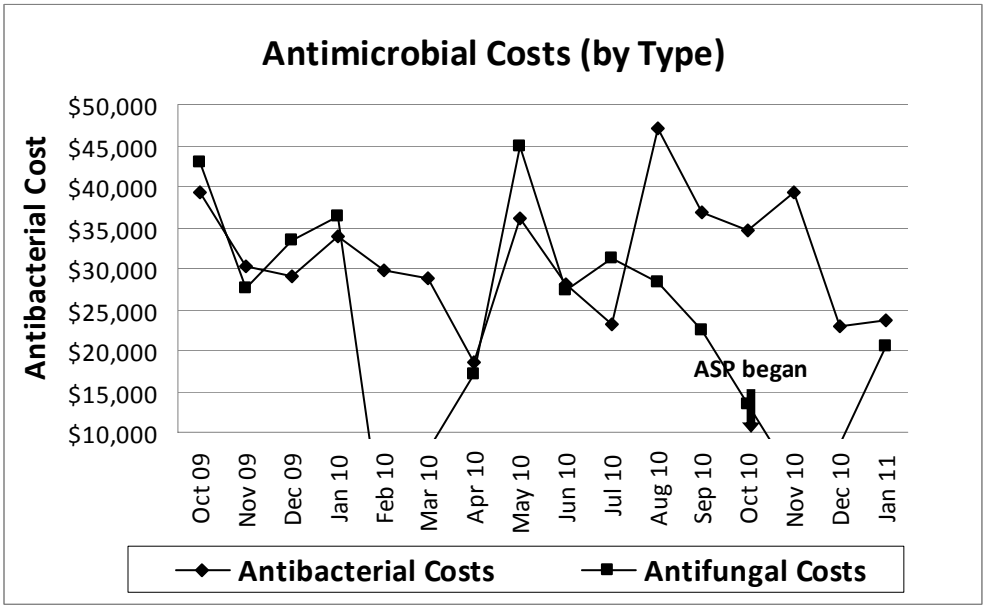
TGH ICU Antimicrobial Usage and Costs





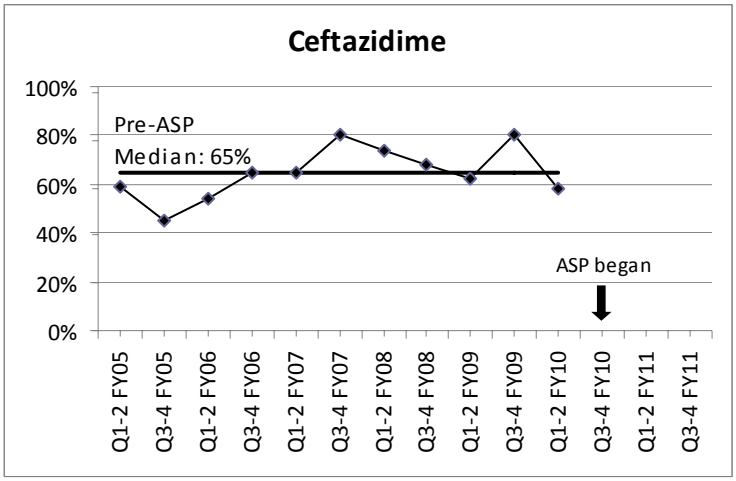
TGH ICU Antimicrobial Usage and Costs

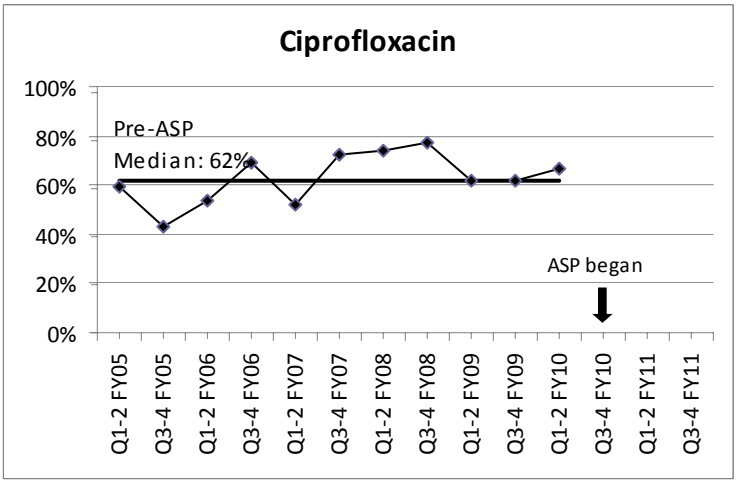


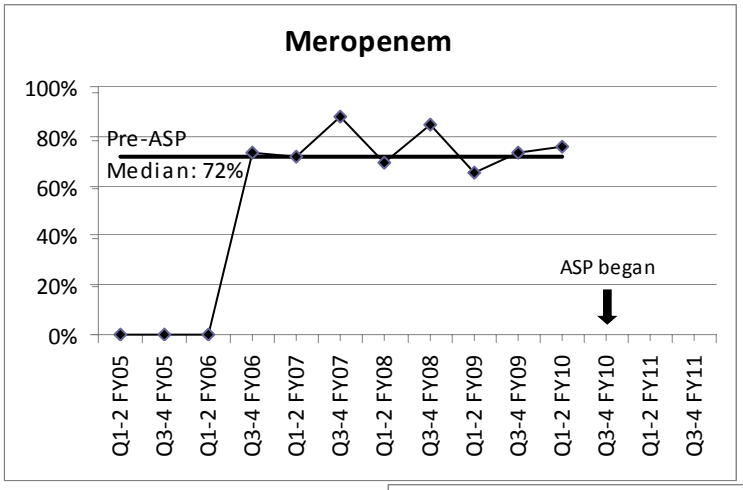


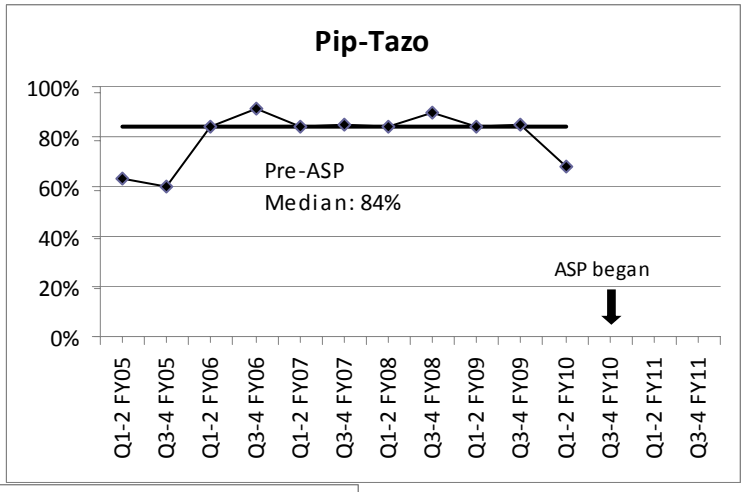
Antimicrobial Susceptibility and Pathogen Surveillance

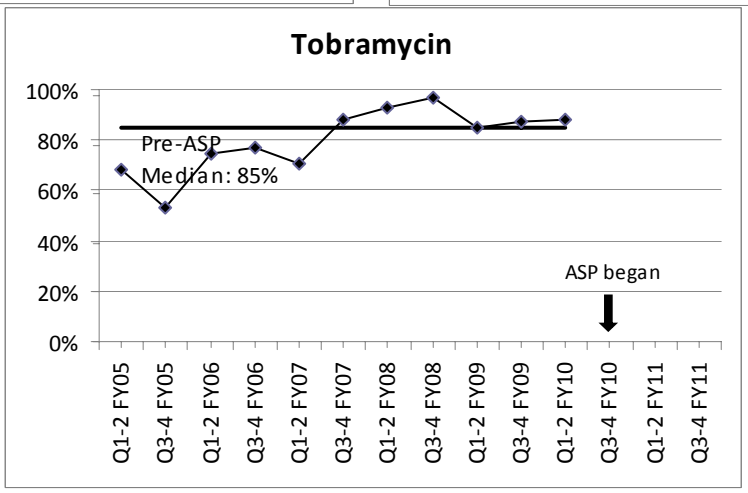
Pseudomonas Susceptibility – TGH ICU











TWH ICU Antimicrobial Usage and Costs

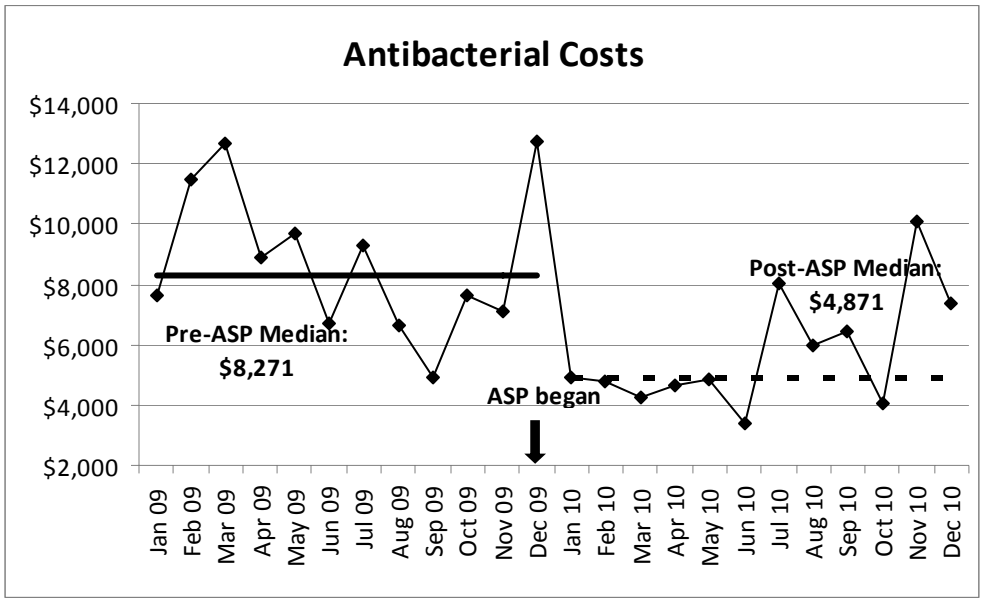
Key Performance Indicator	Jan - Dec 2009	Jan - Dec 2010	Difference	
			% Change	Numerical Change
Antimicrobial Usage and Costs				
Total Antimicrobial DDDs*/100 Patient Days	97.2	77.8	-19.9%	-19.4
Systemic Antibacterial DDDs/100 Patient Days	87.3	71.3	-18.3%	-16.0
Systemic Antifungal DDDs/100 Patient Days	9.9	6.5	-34.4%	-3.4
Total Antimicrobial Costs	$118,257	$86,154	-27.1%	-$32,103
Total Antimicrobial Costs/Patient Day	$15.74	$11.28	-28.4%	-$4.47
Systemic Antibacterial Costs	$105,418	$68,788	-34.7%	-$36,629
Systemic Antibacterial Costs/Patient Day	$14.03	$9.00	-35.8%	-$5.03
Systemic Antifungal Costs	$12,839	$17,366	35.3%	$4,527
Systemic Antifungal Costs/Patient Day	$1.71	$2.27	33.0%	$0.56
Patient Care Indicators				
TWH ICU Average Length of Stay (days)	7.92	8.40	6.0%	0.48
TWH ICU Mortality Rate	19.7%	18.3%	-6.7%	-1.3%
TWH ICU Patients Vented	77.5%	72.3%	-6.7%	-5.2%

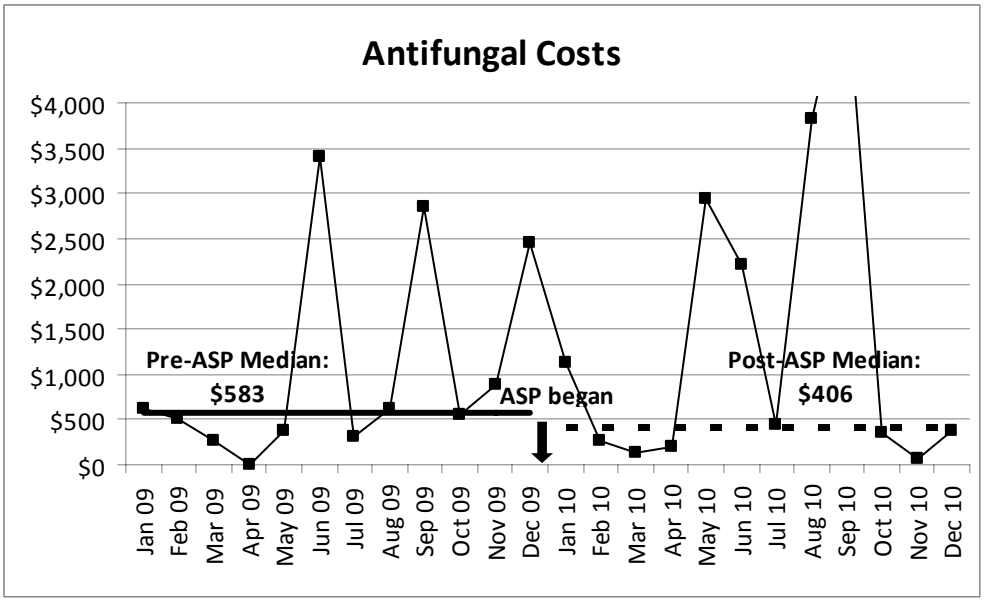
Note:
* DDD = Defined Daily Dose
** ASP started at TWH ICU in December 2009

TWH ICU	Pre-ASP (Jan 09 to Dec 09)	Post-ASP (Jan 10 to Dec 10)
Actual Antimicrobial Costs	$118,257	$86,154
Patient Days	7512	7640
Actual Antimicrobial Costs/Patient Day	$15.74	$11.28

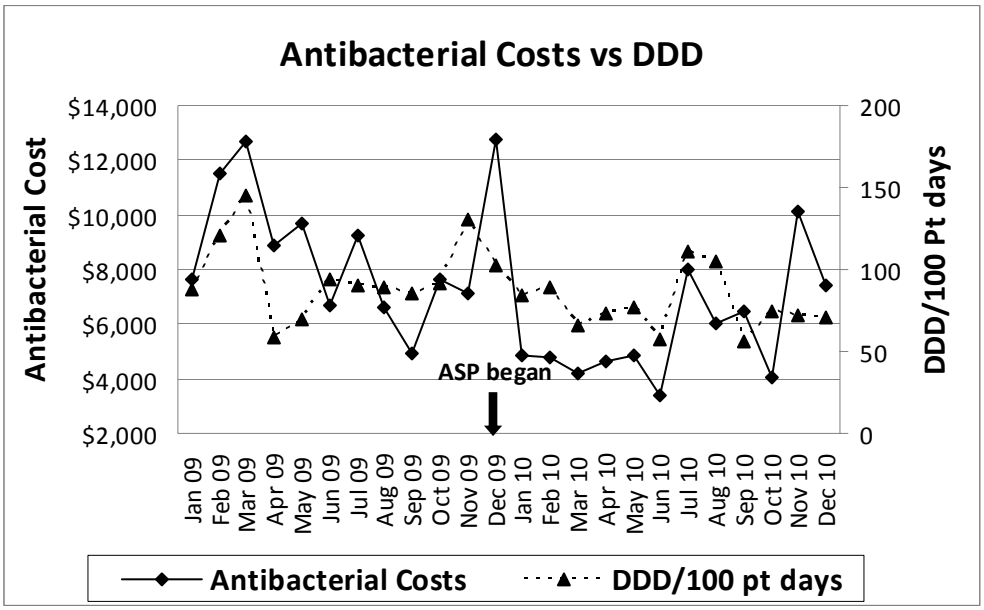
Post-ASP savings (adjusted for altered bed utilization)
= [(Pre-ASP cost/patient day) x (Post-ASP patient days)] - Actual cost Post-ASP
= ($15.74 x 7640) - $86,154
= $34,100

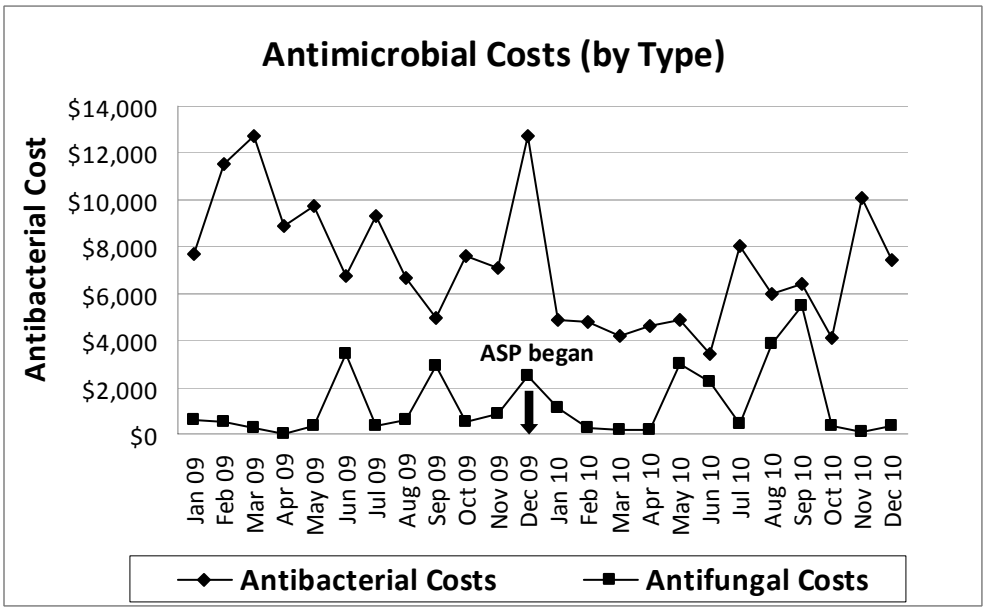
TWH ICU Antimicrobial Usage and Costs





TWH ICU Antimicrobial Usage and Costs





Antimicrobial Susceptibility and Pathogen Surveillance

Pseudomonas Susceptibility – TWH ICU