

MSH + UHN

ASP

ANTIMICROBIAL
STEWARDSHIP
PROGRAM



Q3 REPORT:

FISCAL YEAR 2013 | 2014

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

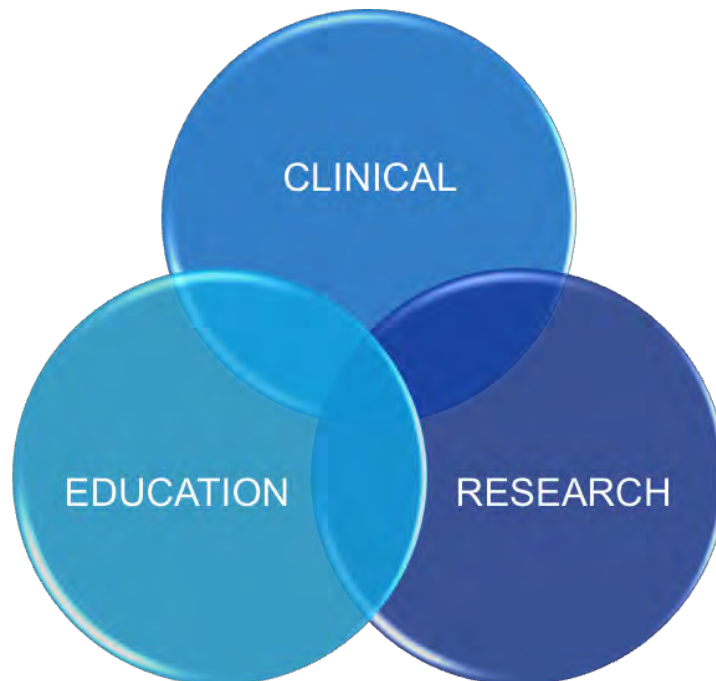


UHN Toronto General
Toronto Western
Princess Margaret
Toronto Rehab
COURAGE LIVES HERE

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

EXECUTIVE SUMMARY

The Mount Sinai Hospital-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 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, alongside clinical care, to take a leadership role in increasing antimicrobial stewardship capacity and improving the quality of health care.

THE MSH-UHN ANTIMICROBIAL STEWARDSHIP TEAM

The MSH-UHN ASP team is a multi-disciplinary group comprised of physicians, pharmacists, microbiologists, project managers, data analysts and research coordinators.

PHYSICIAN TEAM

Andrew Morris, MD, SM, FRCPC

Medical Director, Antimicrobial Stewardship Program
Mount Sinai Hospital/University Health Network
Associate Professor, Department of Medicine
University of Toronto

Shahid Husain, MD, MS

Director, Transplant Infectious Diseases
Division of Infectious Diseases and Multi-Organ Transplantation
University Health Network
Associate Professor, Department of Medicine
University of Toronto

Chaim Bell, MD, PhD, FRCPC

CIHR/CPSI Chair in Patient Safety & Continuity of Care
Mount Sinai Hospital
Associate Professor, Institute of Health Policy, Management, & Evaluation
University of Toronto

Paul E. Bunce, MA, MD, FRCPC

Infectious Diseases and Internal Medicine
University Health Network
Assistant Professor, Department of Medicine
University of Toronto

PHARMACIST TEAM

Olavo Fernandes, PharmD

Clinical Director, Antimicrobial Stewardship Program
University Health Network
Assistant Professor (Status), Leslie Dan Faculty of Pharmacy
University of Toronto

Monique Pitre, B.Sc. Pharm, R.Ph., FCSHP

Manager, Pharmacy Clinical Informatics
Infectious Disease Pharmacist
University Health Network

Linda Dresser, PharmD, FCSHP

Pharmacotherapy Specialist – Antimicrobial Stewardship
University Health Network
Assistant Professor, Leslie Dan Faculty of Pharmacy
University of Toronto

Sandra Nelson, PharmD

Clinical Practice Leader – Infectious Diseases & Antimicrobial Stewardship
Mount Sinai Hospital

Kevin Duplisea, PharmD

Pharmacotherapy Specialist – Antimicrobial Stewardship
University Health Network

Miranda So, PharmD

Pharmacotherapy Specialist – Antimicrobial Stewardship
University Health Network
Assistant Professor (Status), Leslie Dan Faculty of Pharmacy,
University of Toronto.

OPERATIONS TEAM

Josie Hughes, BSc, MRM, PhD, Post-Doctoral Fellow

Researcher, Antimicrobial Stewardship Program
Mount Sinai Hospital and York University

Stephanie Olegario

Administrative Assistant, Antimicrobial Stewardship Program
University Health Network

Tanaz Jivraj, RN, BScN, MBA

Project Manager, Antimicrobial Stewardship Program
Mount Sinai Hospital/University Health Network

Marilyn Steinberg, RN

Research Coordinator, Antimicrobial Stewardship Program
Mount Sinai Hospital

Lopa Naik, BSc, MCA

Technical Analyst, Antimicrobial Stewardship Program
University Health Network

Melanie Thomson, BA, CHIM

Data Analyst, Antimicrobial Stewardship Program
Mount Sinai Hospital

Yoshiko Nakamachi, RN, BScN, BA

Project Manager, CAHO Project
Mount Sinai Hospital

Sarah West, RN

Consultant, Antimicrobial Stewardship Program
Mount Sinai Hospital

KEY HIGHLIGHTS

+ ANTIMICROBIAL CONSUMPTION AND COSTS:

The ASP continues to work with clinical teams across all four hospitals. Antimicrobial consumption and costs by site are included below. Detailed tables and graphs are appended. We have noticed a trend to increased use and expenditures for antimicrobials in all adult intensive care units, necessitating a more thorough review of the factors involved.

MOUNT SINAI HOSPITAL ICU

The ASP continues to work with the Mount Sinai Hospital (MSH) Intensive Care Unit (ICU), having started February 2009. FY 13/14 YTD highlights include:

- o Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 6% compared to YTD last year
- o Antimicrobial costs per patient day increased (↑) by 28% compared to YTD last year.
- o Princess Margaret patients accounted for 20% of patient visits and 68% of the antimicrobial costs.

PRINCESS MARGARET CANCER CENTRE: LEUKEMIA SERVICE

The ASP continues to work with the Princess Margaret Leukemia Service (14A, 15A, 15B). FY 13/14 YTD highlights include:

- o Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) increased by 4% compared to YTD last year
- o Antimicrobial costs per patient day decreased by 3% compared to YTD last year.

REACH/Transfusion Clinic:

- o ASP case rounds at REACH and Transfusion Clinic (TFC) are very well received by all Nurse Practitioners. Topics and cases are suggested by Nurse Practitioners stemming their practice. Dr. Husain and Miranda So continue to meet with them every two weeks.
- o The quality improvement initiative to study antimicrobial prescribing pattern in leukemia patients at REACH/TFC is currently in data collection phase.

TORONTO GENERAL HOSPITAL CARDIOVASCULAR ICU

The ASP continues to work with the Toronto General Hospital CVICU. FY 13/14 YTD highlights include:

- o Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) decreased (↓) by 10% compared to YTD last year
- o Antimicrobial costs per patient day increased (↑) by 9% compared to YTD last year.

TORONTO GENERAL HOSPITAL MEDICAL SURGICAL ICU

The ASP continues to work with the Toronto General Hospital MSICU. FY 13/14 YTD highlights include:

- o Antimicrobial usage (using defined daily doses (DDDs) per 100 patient days) increased (↑) by 8% compared to YTD last year.
- o Antimicrobial costs per patient day increased (↑) by 18% compared to YTD last year.
- o The trend to increases in consumption and costs has been observed in all 3 Quarters of 13/14; to date the antifungal consumption exceeds total antifungal use of FY12/13 in the MSICU.
- o Ciprofloxacin appears for the first time among the top 5 antibacterials by usage.

MOUNT SINAI HOSPITAL NEONATAL ICU

The ASP initiative in the Neonatal Intensive Care Unit (NICU) was started in October 2012 with strong support from the neonatology group. We have collected days of therapy (DOT) as the metric for antimicrobial consumption, which is considered to be the standard for neonates. FY 13/14 YTD highlights include:

- o Antimicrobial days of therapy (DOT) per 100 patient days decreased (↓) by 12% compared to YTD last year.
- o Antimicrobial costs per patient day have increased (↑) by 70% compared to YTD last year (\$1.30 to \$2.21), but results in overall marginal increases in costs because of the dosing used in neonates.

TORONTO WESTERN HOSPITAL ICU

The ASP continues to work with the Toronto Western Hospital ICU. FY 13/14 YTD highlights include:

- Antimicrobial usage (using defined daily doses per 100 patient days) increased (↑) 16% compared to YTD last year.
- Antimicrobial costs per patient day increased (↑) 40% compared to YTD last year.

✦ BEST PRACTICE GUIDELINES & ALGORITHMS:

- High Risk Febrile Neutropenia Protocol for Patients with Malignant Haematological Diseases has been developed and presented to key stakeholder groups across the hospital. Hosting sites: the protocol will be found on the UHN Intranet, ED intranet page and MSH Clinical Tools page, in addition to being accessible at the MSH-UHN Antimicrobial Stewardship Program website www.antimicrobialstewardship.com under "Best Practices".
- Development of the Pulmonary Infiltrate Protocol is underway, with the final draft expected to be by mid-February, with the first round of external review at UHN and MSH to follow shortly. Dr. Husain and Miranda So are grateful for the time and expertise provided by the Pulmonary Infiltrate Protocol Working Group.
- Febrile Neutropenia Protocol for Solid Tumor and Lymphoma Patients is under development to complement the High Risk Protocol.
- Clinical summaries have been developed and are available on the ASP website for a series of common and important conditions. These were developed in collaboration with various stakeholders, including Infectious Diseases, Pharmacy, Infection Prevention and Control, and Microbiology <http://www.antimicrobialstewardship.com/antimicrobial-stewardship-clinical-summaries>. The ASP has now started working to develop the clinical summaries into best practice guidelines through interdisciplinary working groups, especially involving General Internal Medicine and Emergency Medicine.
- The ASP Team is working with the MSH Emergency Department and other stakeholders to implement a triage-based sepsis recognition and management algorithm in order to identify patients earlier and manage these patients more effectively, with the objective of improving patient outcomes. Implementation is anticipated in Q2 2014-15.
- The ASP is collaborating with multiple key stakeholders across MSH and UHN to standardize the diagnosis and management of patients with *C. difficile*. The project charter has been developed that outlines the project rationale and deliverables, and a kick-off meeting is anticipated in Q1 2014-15.
- A VAP algorithm has been in use at MSH ICU since November 2011, TGH MSICU since June 2012, TWH ICU since July 2012 and TGH CVICU since October 2012.

✦ RESEARCH:

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

The following manuscript has been submitted:

- Usefulness of screening for methicillin-resistant *Staphylococcus aureus* in guiding empiric therapy for *S. aureus* bacteremia

The following manuscripts are currently in preparation for submission:

- Antimicrobial stewardship using prospective audit and feedback in tertiary intensive care units: a multi-site prospective study
- A Point Prevalence Study to Evaluate Clinical Compliance with an Interdisciplinary Ventilator-Associated Pneumonia Algorithm in the Intensive Care Unit
- *Staphylococcus aureus* bacteremia in patients with chronic kidney disease not treated with dialysis: a retrospective study

The following projects are currently undergoing the final stages of data analysis:

- Analysis of Investigations, Treatments and Outcomes associated with Staphylococcus aureus Bacteremia in the Greater Toronto Area
 - Analysis of Investigations, Antifungal Treatments, and Outcomes Associated with Patients with Acute Myeloid Leukemia Undergoing First Remission-Induction Chemotherapy at Princess Margaret Hospital
- Q3 Posters Presented
- Cost-of-illness Analysis of *Staphylococcus aureus* Bacteremia. Nisha Thampi MD, MSc, Adrienne Showler MD, Lisa Burry PharmD, Anthony Bai BHSc, Marilyn Steinberg RN, Chaim Bell MD PhD, Andrew Morris MD SM. Poster presentation to IDSA Annual Meeting, San Francisco, CA; October 2-6, 2013
 - A National Survey of Critical Care Physicians' Knowledge, Attitudes and Perceptions of Antimicrobial Stewardship Programs. Marilyn Steinberg RN, Linda Dresser PharmD, Nicole Marinoff RN, Andrea Matte RRT, Orla Smith MScN, Nick Daneman MD MSc, Chaim M. Bell MD PhD, Andrew M. Morris MD SM. Poster presentation to the Critical Care Canada Forum. Toronto, ON; November 10-12, 2013.
Winner: „Best Scientific Poster’ Award
- Q3 Grant Awards received by members of our program:
- 2013-2014 Evaluating the Impact of Antimicrobial Stewardship Prospective Audit-and-Feedback Intervention in Patients with Malignant Haematological Diseases. Canadian Society of Hospital Pharmacists Research Grant. Principal Applicant: Miranda So. Collaborators: Shahid Husain, MD; Andre Schuh, John Kuruvilla, Mark Minden, MD, Muhammad Mamdani, PharmD, Sue Poutanen, MD, Marilyn Steinberg, RN, Chaim Bell, MD, Andrew Morris, MD. \$4130 CAD
- As a result of a previous awarded CIHR Dissemination Grant (Principal Applicant- Dr. Andrew Morris) to share “Early Results and Lessons Learned from Ontario’s Roll-out of Antimicrobial Stewardship Programs”, a half-day ASP program was held at the Critical Care Canada Forum in Toronto on November 12, 2013.



| ASP PROGRAM HIGHLIGHTS | | |
|--|---------------------|---|
| Tuesday November 12th, 2013 | | |
| Antimicrobial Stewardship - Part 1 ~ Moderators: S. Mehta / A. Morris | | |
| 8:30-8:50 | Z. Austin | Changing Clinician Behaviour: Can We All Play Nicely in the Same Sandbox? |
| 8:50-9:10 | A. Morris | Assessing Site Readiness |
| 9:10-9:30 | L. Taggart | Prospective Audit & Feedback - How to Do It |
| 9:30-9:50 | Y. Nakamachi | The Power of Data - Collecting It and Using It |
| 9:50-10:00 | | Discussion |
| Antimicrobial Stewardship - Part 2 ~ Moderators: J. Singh / P. Murphy | | |
| 10:30-10:45 | S. Elsayed | Implementing ASP - Experiences in Large Hospital |
| 10:45-11:00 | R. Sandre | Implementing ASP - Experiences in Small Hospital |
| 11:00-11:20 | N. Thampi | Province-Wide CAHO - What Do the Data Say? |
| 11:20-11:35 | G. Evans | ASP Approach - Restricted is Best |
| 11:35-11:50 | A. Morris | ASP Approach - PG (Parental Guidance) Works Better |
| 11:50-12:00 | | Discussion |

✦ EDUCATION:

The ASP team has been providing ongoing education and skills training related to stewardship principles to General Internal Medicine Pharmacists at both MSH and UHN. This is part of our General Internal Medicine initiative. Education has been provided by the ASP team to physicians and medical trainees through several forums, including ASP/ID noon rounds which provide case-based education, ASP pocket cards developed as a tool for medical trainees and a mobile online resource to provide efficient access to resources. ASP team members are also involved with course development and lectures with University of Toronto's Faculty of Medicine, Leslie Dan Faculty of Pharmacy and Lawrence S. Bloomberg Faculty of Nursing.

A Canadian Society of Hospital Pharmacists grant, Developing and Evaluating an Educational Intervention to Guide the Implementation of Antimicrobial Stewardship Programs in Community Hospitals Across Ontario, was

awarded to Linda Dresser to develop education modules for community hospitals regarding antimicrobial stewardship. There are 13 sites across Ontario recruited to the grant; there will be a series of lectures on stewardship principles and therapeutic topics over a 6-month period and each site will gather and report baseline and ongoing antimicrobial consumption data. Impact of the program at each site will be measured by antimicrobial consumption and a series of surveys among users and frontline clinicians. Clinical team members are recording presentations as part of the dissemination of education. As well, a medical animation series related to antimicrobial stewardship is underway. The first medical animation module related to the importance of antimicrobial stewardship, and is featured on the ASP website and ASP YouTube page. This has also been featured by AMMI Canada and Canadian Healthcare News. Link to the Medical Animation Video on the ASP YouTube site: <http://www.youtube.com/user/TorontoASP>

The ASP is involved in developing the next generation of antimicrobial stewards by being a part of the new Year 3 Elective “Introduction to Antimicrobial Stewardship” at the Leslie Dan Faculty of Pharmacy (Course Coordinator: Miranda So). At least 100 students are currently enrolled. The course will give pharmacy students a 360-view of antimicrobial stewardship in different patient settings, encompassing clinical practice; change management; program development; and an introductory component to research.

+ **PROVINCIAL ROLE:**

CAHO ASP ARTIC Project:

Over the past 2 years, the MSH-UHN ASP has been leading this provincial Council of Academic Hospitals (CAHO) initiative, Adopting Research To Improve Care (ARTIC), assisting the academic hospitals throughout Ontario in implementing a stewardship program in their ICUs. December 31st, 2013 marks the end of the data collection period, whereby the 14 participating ICUs have been submitting data for the period spanning from January 2011 to December 2013. This project is in its final phase and data analysis is currently underway. A final report will be submitted in March 2014 to the Council of Academic Hospitals of Ontario (CAHO) and the participating sites.

In addition to analysing the consumption and cost data of antimicrobials, we are currently analysing the patterns of antimicrobial resistance among the 14 participating ICUs. The MSH-UHN ASP will be **presenting** highlights of this project at a meeting on March 3rd, 2014 **to the Ministry of Health and Long-Term Care and Health Quality Ontario**, as well as CAHO board members and the stakeholders of the 14 participating ICUs.

Critical Care Services Ontario (CCSO):

It has been previously mentioned that the MSH-UHN ASP has been working with CCSO in developing reports for the three new antimicrobial indicators in the Critical Care Information System (CCIS). **These reports will be “going-live” in March, 2014** and will allow **each adult ICU in Ontario** to evaluate their Antimicrobial use (days of antibacterial therapy, days of antifungal therapy), and ICU-onset C. difficile. ICUs across the province have been entering data in CCIS for these indicators since January 21st, 2013. This is the first such provincial network of antimicrobial utilization implemented anywhere in Canada, and starting in March, 2014 ICUs will readily have this data available to them via the new reports in CCIS.

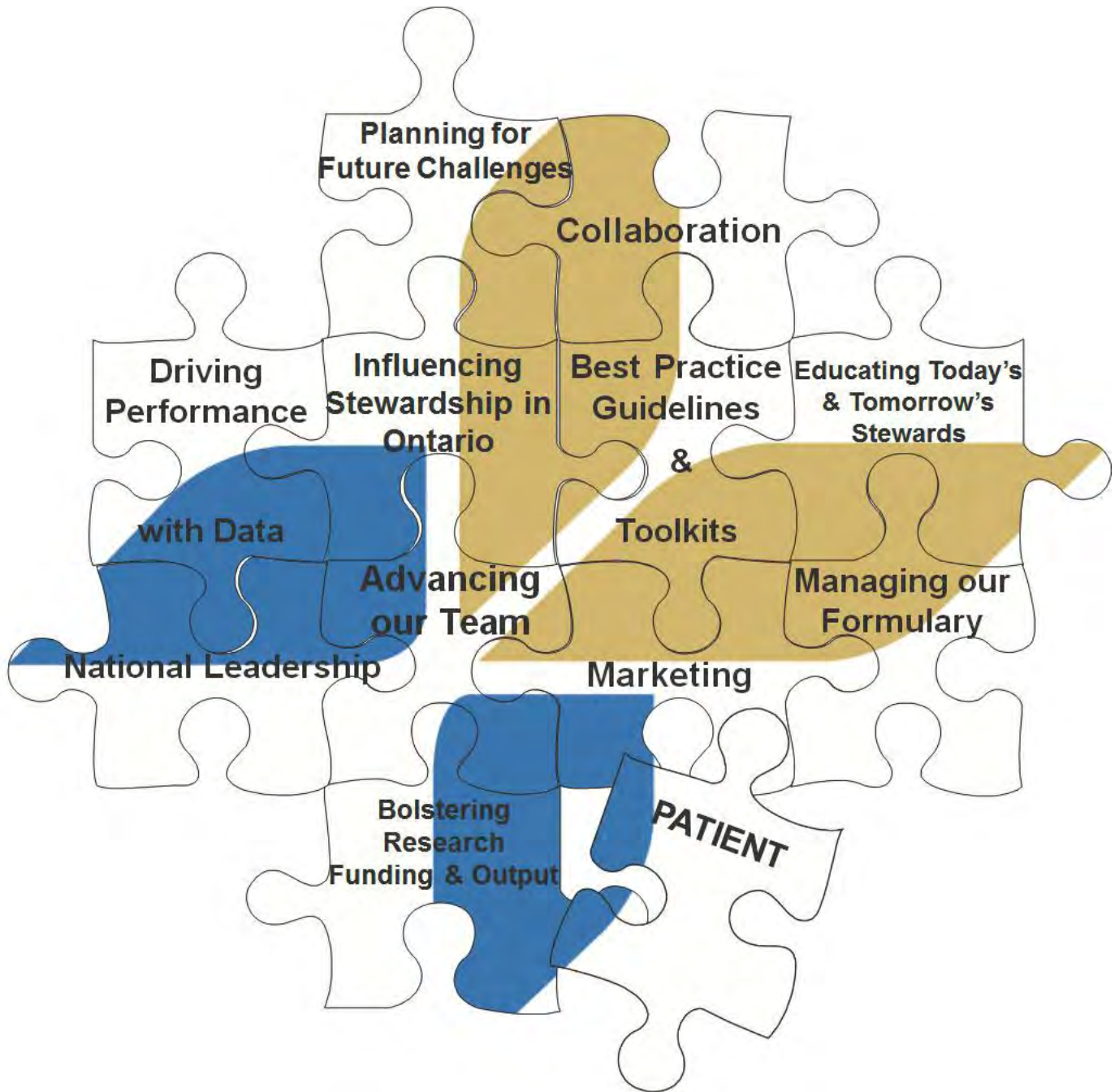
+ **NATIONAL ROLE:**

Accreditation Canada:

The MSH-UHN ASP is partnering with Accreditation Canada in a new **national initiative to assist hospitals across Canada** in setting up their antimicrobial stewardship programs. The partnership involves the development and delivery of a series of on-line workshops, and interactive group webinars. The team has identified gaps in knowledge and process relating to antimicrobial stewardship in both academic and community hospitals, and our collaborative efforts will help these sites meet Accreditation Canada’s Required Organizational Practices for Antimicrobial Stewardship. The MSH-UHN ASP team will be providing content expertise and will facilitate the webinar discussions.

MSH-UHN ANTIMICROBIAL STEWARDSHIP PROGRAM STRATEGIC PRIORITIES

The MSH-UHN ASP Strategic Plan 2013-2016 is available on the ASP website. Please contact (Tanaz Jivraj tjivraj@mtsina.on.ca) if you would like a copy.



APPENDIX

MOUNT SINAI HOSPITAL: ICU

| Indicators | FY 08/09 (Pre-ASP) | FY 09/10 | FY 10/11 | FY 11/12 | FY 12/13 | FY13/14 Performance | | | | | YTD of Previous Year |
|---|-----------------------|-----------|-----------|-----------|-----------|---------------------|-----------|-----------|----|-----------|----------------------|
| | | | | | | Q1 | Q2 | Q3 | Q4 | YTD | |
| Antimicrobial Usage & Costs | | | | | | | | | | | |
| Total Antimicrobial DDDs/100 Patient Days | 177 | 171 | 144 | 167 | 170 | 143 | 176 | 162 | | 161 | 170 |
| Systemic Antibacterial DDDs/100 Patient Days | 142 | 128 | 111 | 128 | 127 | 110 | 132 | 118 | | 120 | 127 |
| Systemic Antifungal DDDs/100 Patient Days | 31 | 24 | 20 | 33 | 35 | 27 | 37 | 38 | | 34 | 35 |
| Total Antimicrobial Costs | \$332,724 | \$285,975 | \$193,129 | \$279,859 | \$291,470 | \$64,634 | \$127,482 | \$119,279 | | \$311,395 | \$235,568 |
| Total Antimicrobial Costs/Patient Day | \$69.01 | \$59.23 | \$40.95 | \$59.22 | \$62.37 | \$55.48 | \$103.31 | \$97.05 | | \$85.83 | \$67.04 |
| Systemic Antibacterial Costs | \$174,339 | \$142,134 | \$95,773 | \$125,339 | \$134,811 | \$21,387 | \$34,127 | \$24,866 | | \$80,380 | \$111,074 |
| Systemic Antibacterial Costs/Patient Days | \$36.16 | \$29.44 | \$20.31 | \$26.94 | \$28.85 | \$18.36 | \$27.66 | \$20.23 | | \$22.16 | \$31.61 |
| Systemic Antifungal Costs | \$143,100 | \$132,519 | \$88,998 | \$141,877 | \$144,811 | \$40,572 | \$89,203 | \$86,153 | | \$215,928 | \$114,950 |
| Systemic Antifungal Costs/Patient Days | \$29.68 | \$27.45 | \$18.87 | \$30.50 | \$30.99 | \$34.83 | \$72.29 | \$70.10 | | \$59.52 | \$32.71 |
| Patient Care Outcomes | | | | | | | | | | | |
| Hospital acquired C. difficile cases (rate per 1,000 pt days) | NA | NA | NA | 5 (1.07) | 8 (1.71) | 0 (0.0) | 1 (0.81) | 1 (0.81) | | 2 (0.55) | 8 (2.28) |
| ICU Average Length of Stay (days) | 5.84 | 5.57 | 5.67 | 5.51 | 5.24 | 6.06 | 5.39 | 6.88 | | 6.10 | 5.06 |
| ICU Mortality Rate (as a %) | 20.1 | 17.6 | 16.3 | 16.5 | 17.04 | 16.3 | 13.9 | 11.7 | | 13.9 | 17.1 |
| ICU Readmission Rate within 48 hrs (as a %) | 3.2 | 2.9 | 2.7 | 2.7 | 1.86 | 4.0 | 3.9 | 2.2 | | 3.3 | 1.4 |
| ICU Ventilator Days | NA | 3286 | 2934 | 2677 | 2749 | 747 | 748 | 780 | | 2275 | 2006 |
| ICU Multiple Organ Dysfunction Score (MODS) | 4.00 | 4.04 | 4.12 | 4.25 | 4.62 | 4.73 | 4.69 | 4.70 | | 4.70 | 4.56 |

Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whooc.no/atc_ddd_index/)

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)

PRINCESS MARGARET CANCER CENTRE: LEUKEMIA SERVICE (14A, 15A, 15B)

| Indicators | FY 09/10 | FY 10/11 | FY 11/12 | FY 12/13 | FY13/14 Performance | | | | | YTD of Previous Year |
|--|-------------|-------------|-------------|-------------|---------------------|-----------|-----------|----|-------------|----------------------|
| | | | | | Q1 | Q2 | Q3 | Q4 | YTD | |
| Antimicrobial Usage & Costs | | | | | | | | | | |
| Total Antimicrobial DDDs/100 Patient Days | 295 | 274 | 282 | 253 | 264 | 265 | 263 | | 264 | 253 |
| Systemic Antibacterial DDDs/100 Patient Days | 191 | 167 | 164 | 149 | 146 | 145 | 145 | | 145 | 152 |
| Systemic Antifungal DDDs/100 Patient Days | 104 | 107 | 105 | 104 | 117 | 120 | 118 | | 118 | 101 |
| Total Antimicrobial Costs | \$1,768,317 | \$1,641,331 | \$1,310,857 | \$1,695,539 | \$392,066 | \$362,634 | \$427,800 | | \$1,182,499 | \$1,231,152 |
| Total Antimicrobial Costs/Patient Day | \$167.12 | \$154.32 | \$115.13 | \$128.91 | \$120.93 | \$111.24 | \$129.95 | | \$120.74 | \$124.69 |
| Systemic Antibacterial Costs | \$659,034 | \$609,747 | \$663,175 | \$422,438 | \$124,075 | \$123,513 | \$128,209 | | \$375,798 | \$425,064 |
| Systemic Antibacterial Costs/Patient Days | \$62.28 | \$57.33 | \$58.24 | \$45.85 | \$38.27 | \$37.89 | \$38.95 | | \$38.37 | \$43.05 |
| Systemic Antifungal Costs | \$1,109,283 | \$1,031,584 | \$647,637 | \$1,092,448 | \$267,990 | \$239,121 | \$299,590 | | \$806,702 | \$806,088 |
| Systemic Antifungal Costs/Patient Days | \$104.84 | \$96.99 | \$56.88 | \$83.06 | \$82.66 | \$73.35 | \$91.01 | | \$82.37 | \$81.64 |
| Patient Care Outcomes | | | | | | | | | | |
| Hospital acquired C. Difficile cases (rate per 1,000 patient days) | 6 (0.56) | 7 (0.65) | 14 (1.17) | 5 (.51) | 2 (.62) | 2(0.61) | 2(0.61) | | 6 (.61) | 3 (.41) |

Notes: Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whooc.no/atc_ddd_index/)

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

Data Sources: Antimicrobial DDD and Costs (Centricity)

TORONTO GENERAL HOSPITAL: CVICU

| Indicators | FY 10/11 (Pre-ASP) | FY 11/12 | FY 12/13 | FY13/14 Performance | | | | | YTD of Previous Year |
|---|-----------------------|-----------|----------|---------------------|----------|----------|----|----------|----------------------------|
| | | | | Q1 | Q2 | Q3 | Q4 | YTD | |
| Antimicrobial Usage & Costs | | | | | | | | | |
| Total Antimicrobial DDDs/100 Patient Days | 115 | 98 | 102 | 76 | 107 | 103 | | 95 | 106 |
| Systemic Antibacterial DDDs/100 Patient Days | 104 | 86 | 89 | 67 | 92 | 93 | | 84 | 94 |
| Systemic Antifungal DDDs/100 Patient Days | 11 | 12 | 13 | 10 | 15 | 10 | | 11 | 12 |
| Total Antimicrobial Costs | \$117,356 | \$107,795 | \$85,596 | \$23,405 | \$23,142 | \$27,380 | | \$73,927 | \$64,009 |
| Total Antimicrobial Costs/Patient Day | \$19.75 | \$18.94 | \$14.93 | \$15.18 | \$16.78 | \$17.90 | | \$16.61 | \$15.24 |
| Systemic Antibacterial Costs | \$109,110 | \$98,591 | \$73,627 | \$16,738 | \$20,336 | \$21,898 | | \$58,971 | \$55,384 |
| Systemic Antibacterial Costs/Patient Days | \$18.36 | \$17.32 | \$12.84 | \$10.85 | \$14.75 | \$14.31 | | \$13.25 | \$13.18 |
| Systemic Antifungal Costs | \$8,246 | \$9,204 | \$11,969 | \$6,667 | \$2,807 | \$5,482 | | \$14,955 | \$8,625 |
| Systemic Antifungal Costs/Patient Days | \$1.39 | \$1.62 | \$2.09 | \$4.32 | \$2.04 | \$3.58 | | \$3.36 | \$2.05 |
| Patient Care Outcomes | | | | | | | | | |
| Hospital acquired C. difficile cases (rate per 1,000 pt days) | 2 (0.34) | 5 (0.88) | 6 (1.05) | 1 (0.65) | 5(3.63) | 1 (0.65) | | 7 (1.57) | 4 (0.95) |
| ICU Average Length of Stay (days) | 3.12 | 2.95 | 2.97 | 3.26 | 2.91 | 3.52 | | 3.2 | 2.87 |
| ICU Mortality Rate (as a %) | 3.5 | 3.0 | 3.0 | 3.0 | 4.2 | 7.2 | | 4.8 | 2.9 |
| ICU Readmission Rate within 48 hrs (as a %) | 1.6 | 2.2 | 1.8 | 2.4 | 2.4 | 2.8 | | 2.5 | 2.2 |
| Central Line Infection Rate (per 1000 pt days) | 0.73 | 0.17 | 0.34 | 0.0 | 0.0 | 0.63 | | 0.22 | 0.23 |
| Ventilator Associated Pneumonia Rate (per 1000 pt days) | 2.99 | 2.80 | 1.91 | 2.95 | 1.04 | 0.94 | | 1.64 | 1.50 |
| ICU Multiple Organ Dysfunction Score (MODS) | 6.22 | 6.07 | 5.51 | 5.72 | 5.80 | 5.74 | | 5.80 | 5.51 |
| ICU Ventilator Days | 3015 | 3571 | 3676 | 1018 | 963 | 1063 | | 3044 | 2672 |

Notes: * Due to an error in the Centricity Pharmacy data we are unable to provide accurate DDD data and utilization cost for the CVICU for the 4th quarter of fiscal 11/12 and 1st quarter of fiscal 12/13. Use of Centricity data resumes effective 2nd quarter of fiscal 12/13.

** FY 11/12 Q4 and FY 12/13 Q1 Total Antimicrobial, Total Antibacterial and Total Antifungal Costs and DDD are taken from the estimated Centricity cost/DDD, which is 95% of the General Ledger (GL) cost/DDD.

Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whocc.no/atc_ddd_index/)

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

Data Sources: Antimicrobial DDD and Costs (Centricity)

TORONTO GENERAL HOSPITAL: MSICU

| Indicators | FY 09/10 (Pre-ASP) | FY 10/11 | FY 11/12 | FY 12/13 | FY13/14 Performance | | | | | YTD of Previous Year |
|---|-----------------------|-----------|-----------|-----------|---------------------|-----------|-----------|----|-----------|----------------------|
| | | | | | Q1 | Q2 | Q3 | Q4 | YTD | |
| Antimicrobial Usage & Costs | | | | | | | | | | |
| Total Antimicrobial DDDs/100 Patient Days | 266 | 208 | 200 | 214 | 192 | 295 | 237 | | 242 | 224 |
| Systemic Antibacterial DDDs/100 Patient Days | 184 | 153 | 141 | 160 | 144 | 224 | 167 | | 179 | 166 |
| Systemic Antifungal DDDs/100 Patient Days | 82 | 55 | 55 | 54 | 49 | 71 | 70 | | 63 | 58 |
| Total Antimicrobial Costs | \$701,451 | \$627,540 | \$572,443 | \$472,334 | \$127,286 | \$168,046 | \$155,962 | | \$451,294 | \$387,153 |
| Total Antimicrobial Costs/Patient Day | \$102.52 | \$83.81 | \$77.60 | \$63.58 | \$67.99 | \$86.31 | \$83.99 | | \$79.51 | \$67.51 |
| Systemic Antibacterial Costs | \$390,209 | \$373,504 | \$288,775 | \$229,892 | \$46,929 | \$74,461 | \$61,185 | | \$182,575 | \$179,158 |
| Systemic Antibacterial Costs/Patient Days | \$57.03 | \$49.88 | \$39.15 | \$30.95 | \$25.07 | \$38.24 | \$32.95 | | \$32.17 | \$31.24 |
| Systemic Antifungal Costs | \$311,242 | \$254,036 | \$275,176 | \$242,443 | \$80,357 | \$93,585 | \$94,777 | | \$268,719 | \$207,994 |
| Systemic Antifungal Costs/Patient Days | \$45.49 | \$33.93 | \$37.30 | \$32.63 | \$42.93 | \$48.07 | \$51.04 | | \$47.34 | \$36.27 |
| Patient Care Outcomes | | | | | | | | | | |
| Hospital acquired C. difficile cases (rate per 1,000 pt days) | 10 (1.46) | 10 (1.33) | 11 (1.49) | 11 (1.48) | 2 (1.07) | 2 (1.03) | 5 (2.69) | | 9 (1.59) | 8 (1.46) |
| ICU Average Length of Stay (days) | 8.24 | 8.61 | 8.85 | 7.79 | 8.10 | 7.30 | 8.99 | | 8.10 | 7.87 |
| ICU Mortality Rate (as a %) | 16.2 | 15.7 | 16.3 | 16.0 | 19.2 | 14.7 | 19.3 | | 17.7 | 16.6 |
| ICU Readmission Rate within 48 hrs (as a %) | 3.8 | 4.4 | 4.4 | 2.8 | 5.8 | 3.5 | 2.7 | | 4.0 | 2.9 |
| ICU Ventilator Days | 5399 | 6256 | 6507 | 6458 | 1704 | 1791 | 1609 | | 5104 | 4722 |
| Apache II score | n/a | n/a | 16.1 | 15.775 | 15.0 | 14.6 | 14.6 | | 14.7 | 15.9 |

Notes:

* Due to an error in the Centricity Pharmacy data we are unable to provide accurate DDD data and utilization cost for the TGH ICU for the 1st quarter of fiscal 12/13. Use of Centricity data resumes effective 2nd quarter of fiscal 12/13. FY 12/13 Q1 Costs and DDD are taken from the estimated Centricity cost, which is 95% of the GL cost.

Defined Daily Dose (DDD) is an internationally accepted method to measure and compare antimicrobial usage (World Health Organization, http://www.whooc.no/atc_ddd_index/)

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

Data Sources: Antimicrobial DDD and Costs (Centricity)

MOUNT SINAI HOSPITAL: NICU

| Indicators | FY 11/12 | FY 12/13 | FY13/14 Performance | | | | | YTD of Previous Year |
|--|----------|----------|---------------------|---------|---------|----|----------|----------------------|
| | | | Q1 | Q2 | Q3 | Q4 | YTD | |
| Antimicrobial Usage & Costs | | | | | | | | |
| Total Antimicrobial DOTs/100 Patient Days | 67.3 | 55.4 | 49.2 | 48.8 | 50.0 | | 49.3 | 56.3 |
| Systemic Antibacterial DOTs/100 Patient Days | 65.1 | 53.5 | 48.7 | 48.2 | 48.5 | | 48.5 | 54.8 |
| Systemic Antifungal DOTs/100 Patient Days | 2.2 | 1.8 | 0.6 | 0.7 | 1.4 | | 0.9 | 1.5 |
| Total Antimicrobial Costs | \$16,415 | \$17,682 | \$6,195 | \$5,243 | \$7,159 | | \$18,598 | \$11,771 |
| Total Antimicrobial Costs/Patient Day | \$1.31 | \$1.51 | \$2.15 | \$1.90 | \$2.57 | | \$2.21 | \$1.30 |
| Systemic Antibacterial Costs | \$14,783 | \$16,505 | \$6,131 | \$5,196 | \$6,498 | | \$17,825 | \$11,059 |
| Systemic Antibacterial Costs/Patient Days | \$1.18 | \$1.41 | \$2.13 | \$1.88 | \$2.33 | | \$2.11 | \$1.23 |
| Systemic Antifungal Costs | \$1,632 | \$1,177 | \$64 | \$47 | \$661 | | \$772 | \$712 |
| Systemic Antifungal Costs/Patient Days | \$0.13 | \$0.10 | \$0.02 | \$0.02 | \$0.24 | | \$0.09 | \$0.08 |

Notes:

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

TORONTO WESTERN HOSPITAL: ICU

| Indicators | FY 08/09 (Pre-ASP) | FY 09/10 | FY 10/11 | FY 11/12 | FY 12/13 | FY13/14 Performance | | | | | YTD of Previous Year |
|---|-----------------------|-----------|-----------|-----------|-----------|---------------------|----------|----------|----|----------|----------------------|
| | | | | | | Q1 | Q2 | Q3 | Q4 | YTD | |
| Antimicrobial Usage & Costs | | | | | | | | | | | |
| Total Antimicrobial DDDs/100 Patient Days | 101 | 88 | 79 | 83 | 83 | 90 | 95 | 98 | | 95 | 82 |
| Systemic Antibacterial DDDs/100 Patient Days | 94 | 78 | 73 | 77 | 78 | 85 | 85 | 94 | | 88 | 78 |
| Systemic Antifungal DDDs/100 Patient Days | 6 | 10 | 6 | 6 | 5 | 5 | 11 | 3 | | 6 | 4 |
| Total Antimicrobial Costs | \$138,502 | \$100,408 | \$101,191 | \$105,899 | \$102,978 | \$37,529 | \$28,499 | \$25,556 | | \$91,584 | \$61,503 |
| Total Antimicrobial Costs/Patient Day | \$18.39 | \$13.24 | \$13.17 | \$13.60 | \$13.37 | \$18.09 | \$14.80 | \$12.37 | | \$15.10 | \$10.82 |
| Systemic Antibacterial Costs | \$123,278 | \$87,445 | \$79,280 | \$89,784 | \$70,099 | \$20,426 | \$23,389 | \$17,171 | | \$60,986 | \$53,863 |
| Systemic Antibacterial Costs/Patient Days | \$16.37 | \$11.53 | \$10.32 | \$11.53 | \$9.10 | \$9.85 | \$12.15 | \$8.31 | | \$10.06 | \$9.48 |
| Systemic Antifungal Costs | \$13,444 | \$12,963 | \$21,911 | \$16,115 | \$32,879 | \$17,103 | \$5,109 | \$8,386 | | \$30,598 | \$7,640 |
| Systemic Antifungal Costs/Patient Days | \$1.79 | \$1.71 | \$2.85 | \$2.07 | \$4.27 | \$8.25 | \$2.65 | \$4.06 | | \$5.04 | \$1.34 |
| Patient Care Outcomes | | | | | | | | | | | |
| Hospital acquired C. difficile cases (rate per 1,000 pt days) | 6 (0.79) | 9 (1.18) | 4 (0.52) | 13 (1.66) | 5 (0.65) | 3 (1.45) | 3(1.55) | 3(1.45) | | 9 (1.48) | 4 (0.70) |
| ICU Average Length of Stay (days) | 8.39 | 7.44 | 10.68 | 9.71 | 7.98 | 6.17 | 9.69 | 7.42 | | 7.69 | 8.00 |
| ICU Mortality Rate (as a %) | 19.6 | 19.9 | 18.1 | 17.0 | 16.4 | 14.3 | 21.4 | 15.0 | | 16.7 | 16.9 |
| ICU Readmission Rate within 48 hrs (as a %) | 3.9 | 4.7 | 4.9 | 3.21 | 3.00 | 5.56 | 4.29 | 3.72 | | 4.55 | 2.55 |
| ICU Ventilator Days | 4617 | 6305 | 5960 | 5578 | 4947 | 1339 | 1297 | 1303 | | 3939 | 3573 |
| ICU Apache II Score | 15.0 | 14.7 | 13.7 | 13.8 | 12.9 | 12.7 | 13.3 | 11.5 | | 12.5 | 13.2 |

Notes:

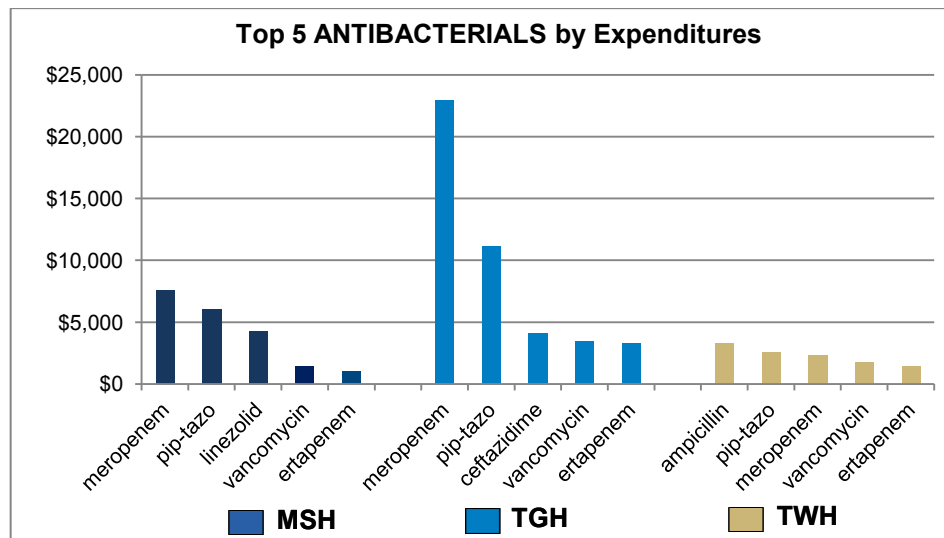
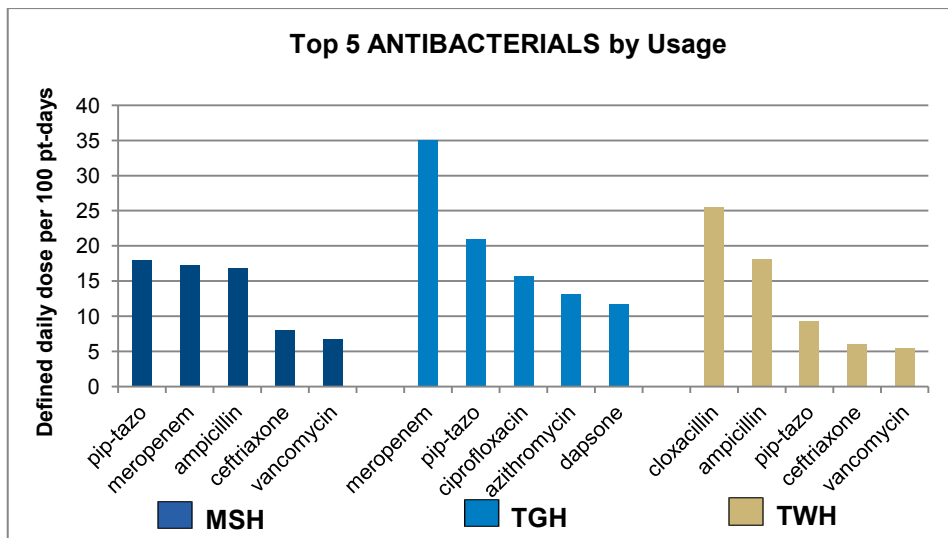
* Due to an error in the Centricity Pharmacy data we are unable to provide accurate DDD data and utilization cost for the TGH ICU for the 1st quarter of fiscal 12/13. Use of Centricity data resumes effective 2nd quarter of fiscal 12/13. FY 12/13 Q1 Costs and DDD are taken from the estimated Centricity cost, which is 95% of the GL cost.

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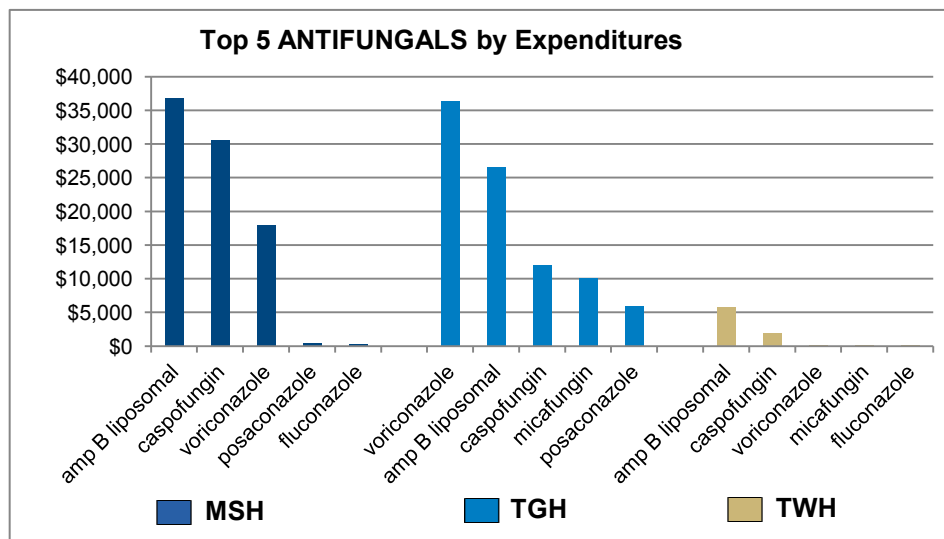
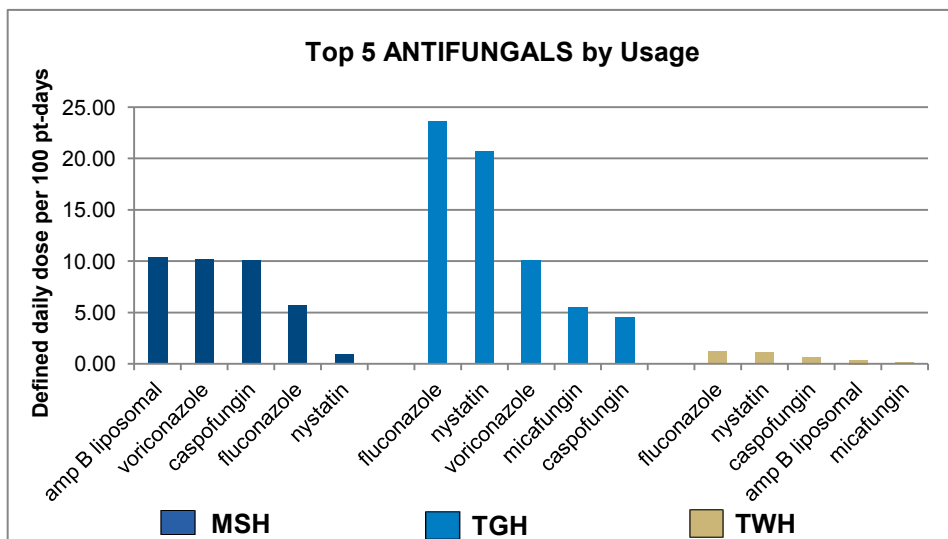
Total Antimicrobial DDDs is the sum of systemic antibacterial DDDs + systemic antifungal DDDs; non-systemic antimicrobials and antivirals are excluded

Data Sources: Antimicrobial DDD and Costs (Centricity)

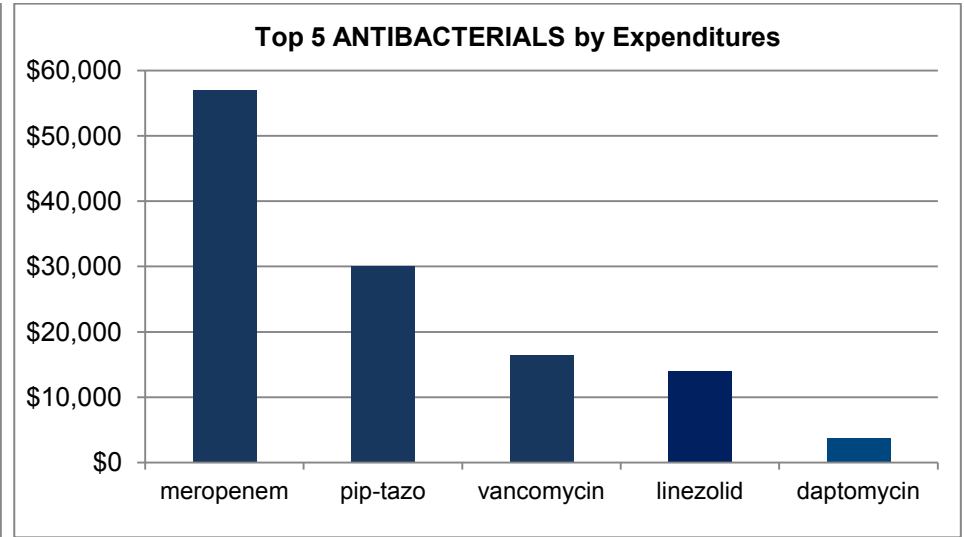
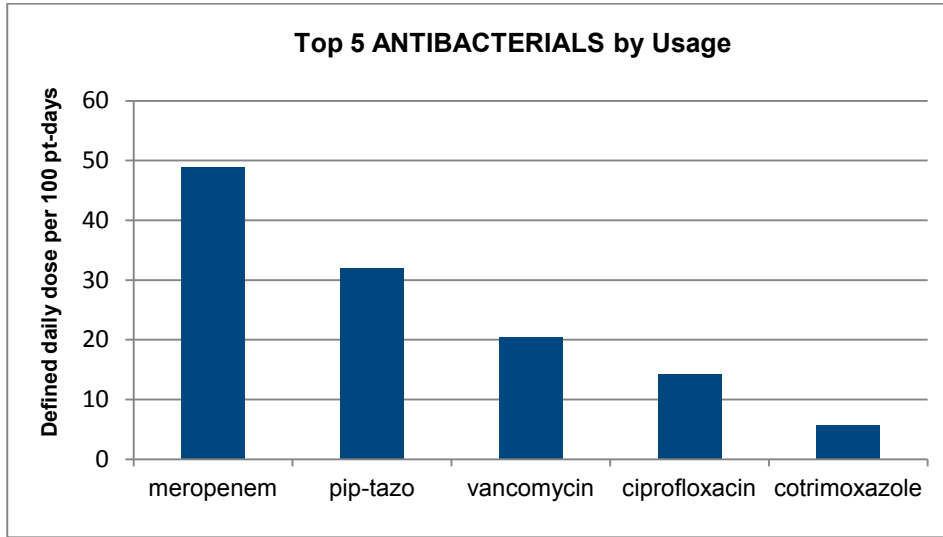
ICU FY 13/14 Q3 Top 5 ANTIBACTERIALS by Usage (DDD per 100 patient-days) and Expenditures



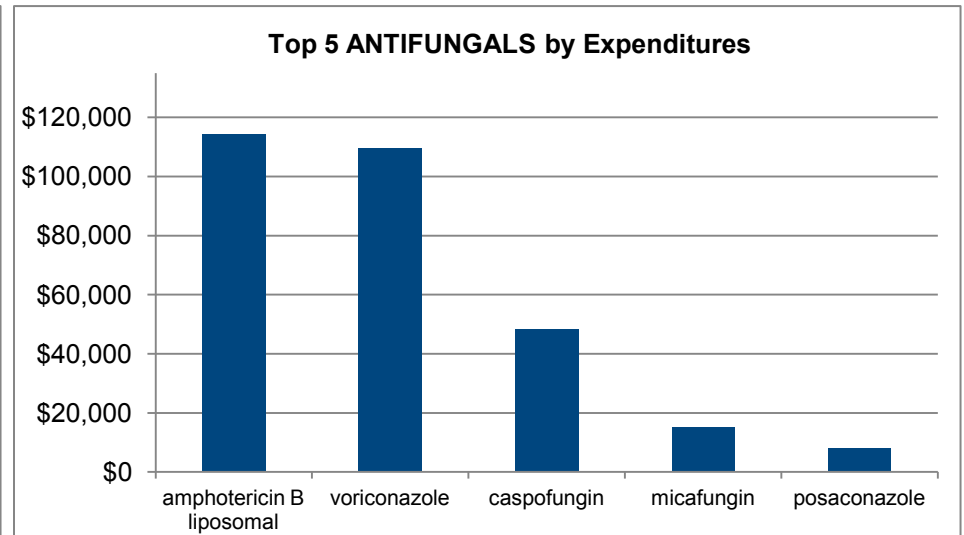
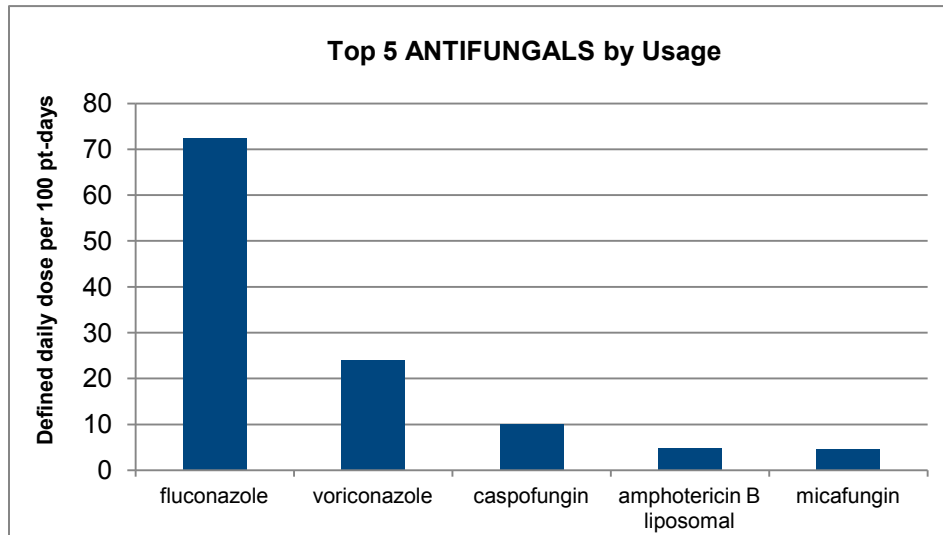
ICU FY 13/14 Q3 Top 5 ANTIFUNGALS by Usage (DDD per 100 patient-days) and Expenditures



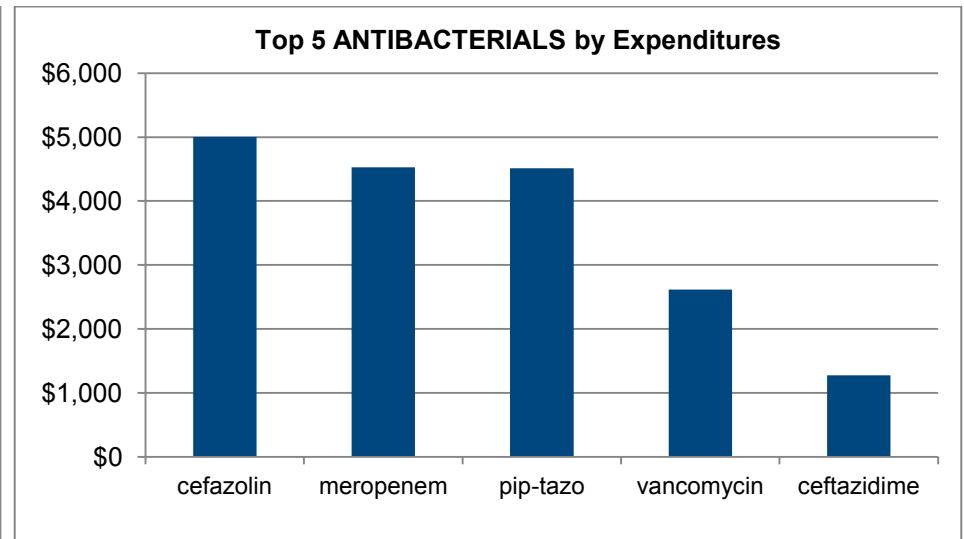
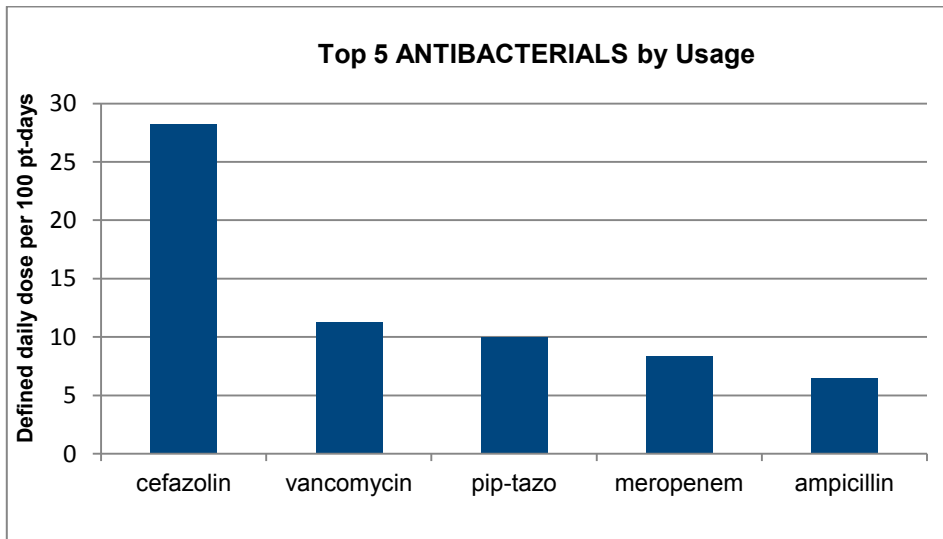
PM Leukemia FY 13/14 Q3 Top 5 ANTIBACTERIALS by Usage (DDDs per 100 patient-days) and Expenditures



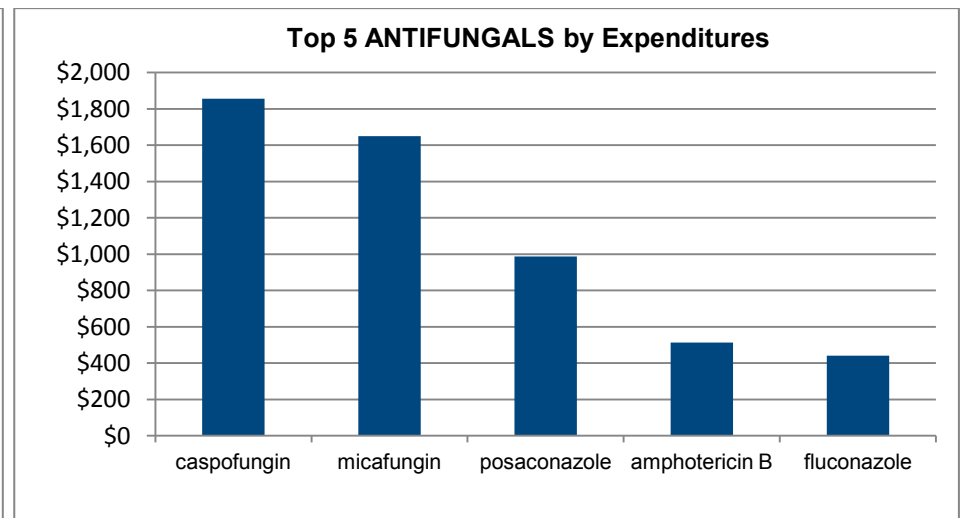
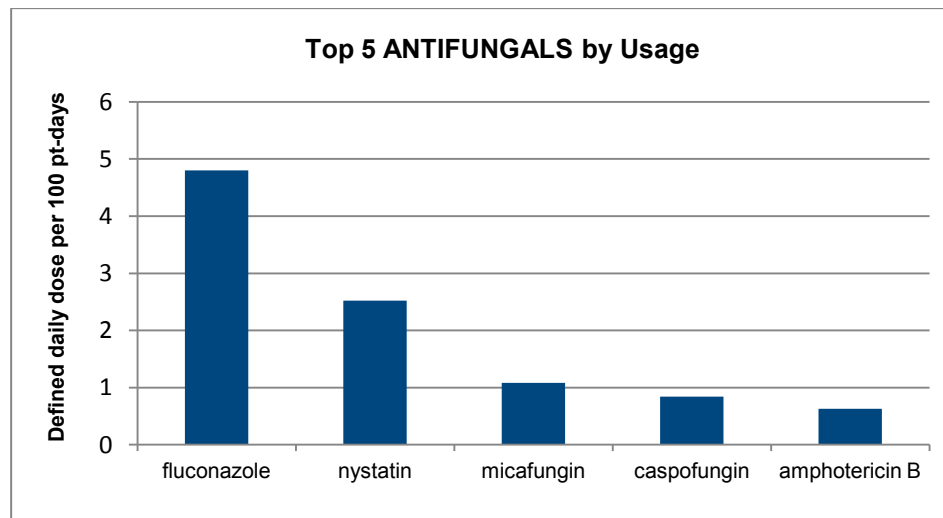
PM Leukemia FY 13/14 Q3 Top 5 ANTIFUNGALS by Usage (DDDs per 100 patient-days) and Expenditures



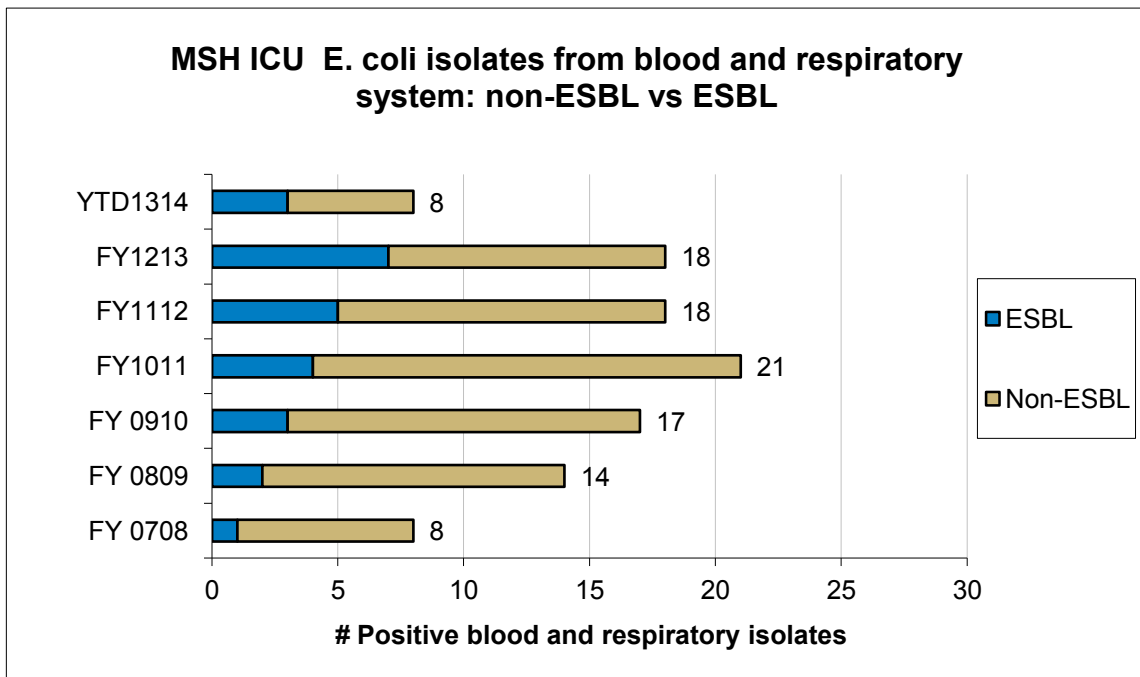
TGH CVICU FY 13/14 Q3 Top 5 ANTIBACTERIALS by Usage (DDDs per 100 patient-days) and Expenditures



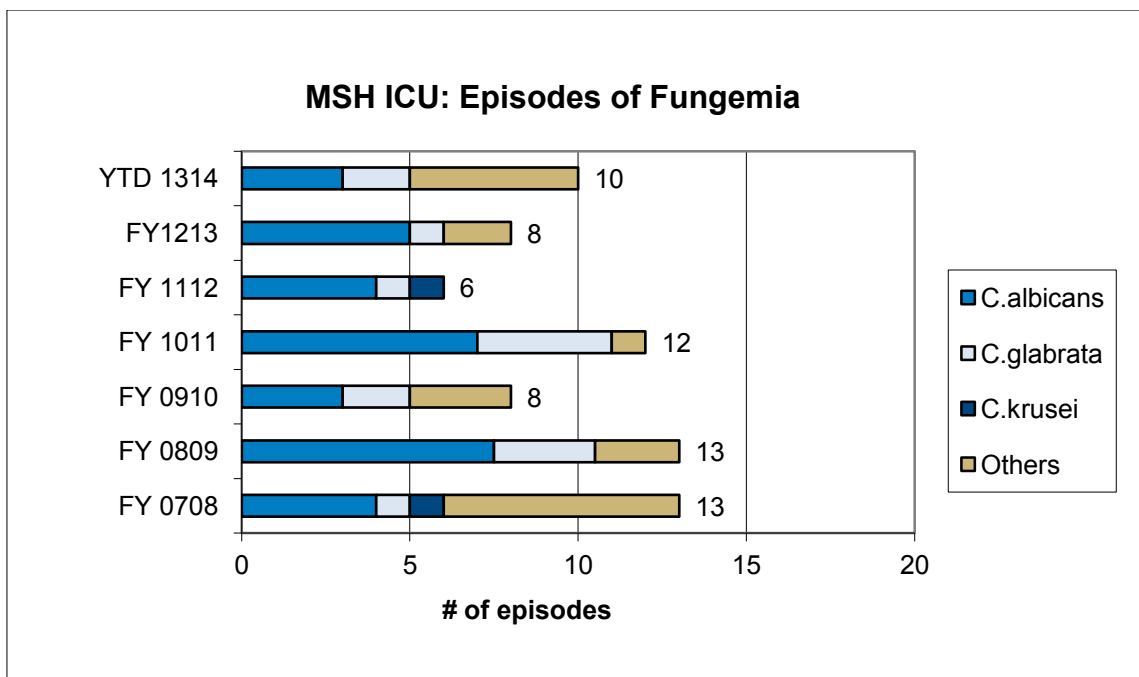
TGH CVICU FY 13/14 Q3 Top 5 ANTIFUNGALS by Usage (DDDs per 100 patient-days) and Expenditures



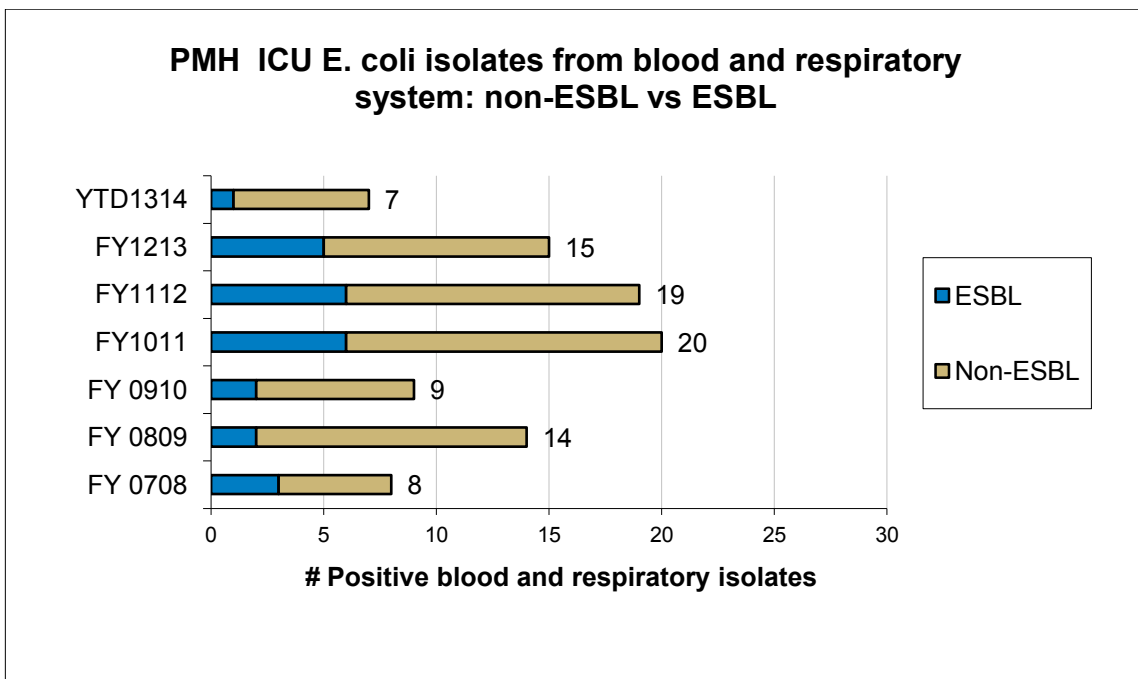
Antimicrobial Susceptibility and Pathogen Surveillance
***E.Coli* isolates: Blood and Respiratory**



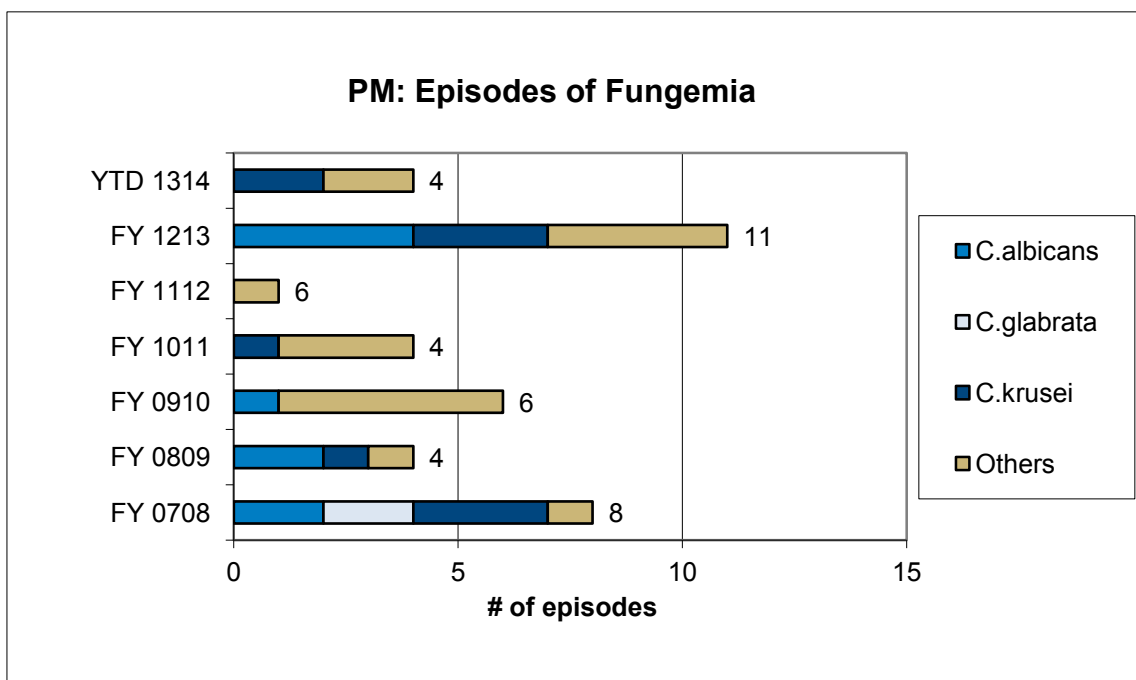
Yeast Species Isolated in Blood – MSH ICU



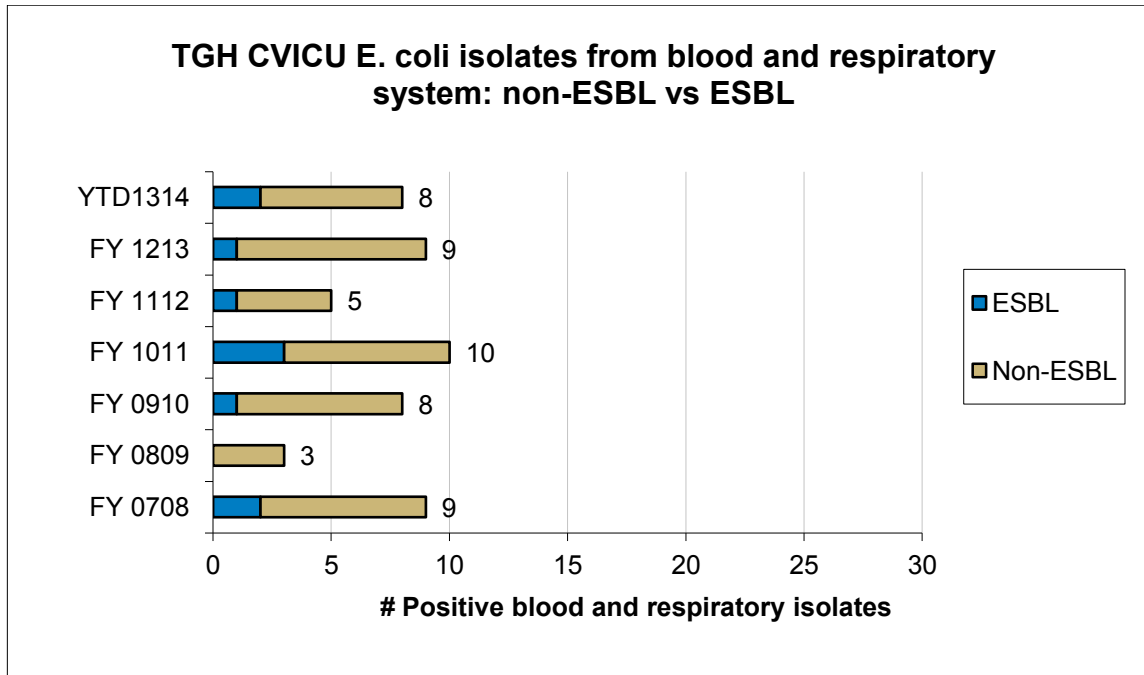
Antimicrobial Susceptibility and Pathogen Surveillance
E. Coli isolates: Blood and Respiratory



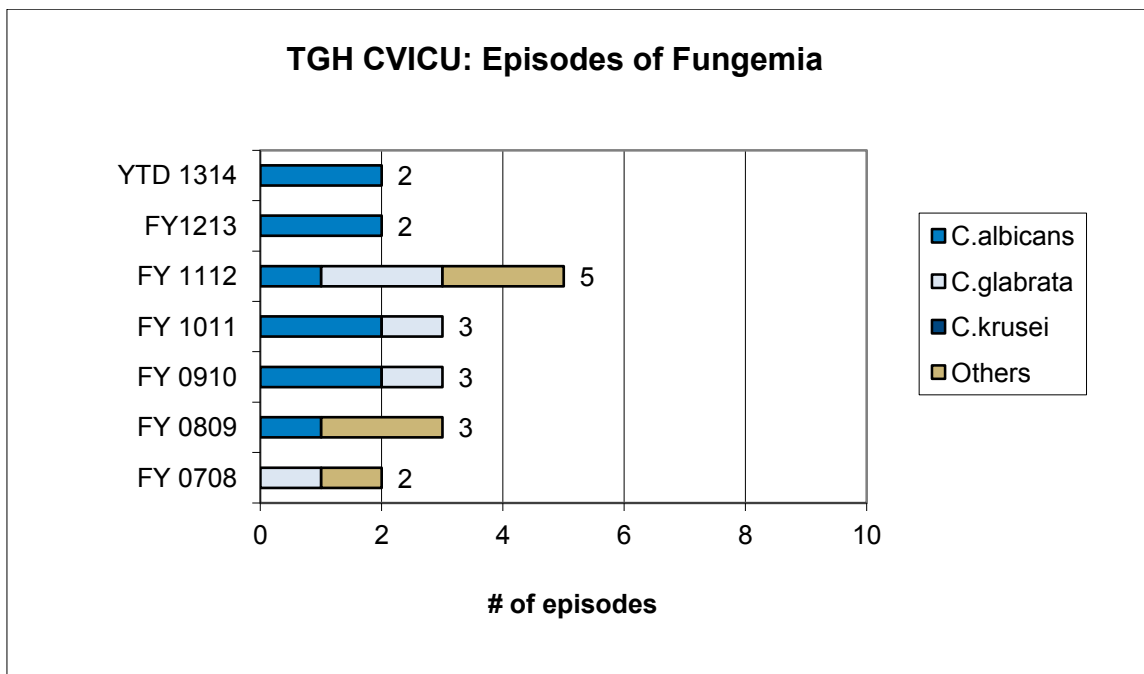
Yeast Species Isolated in Blood – Princess Margaret



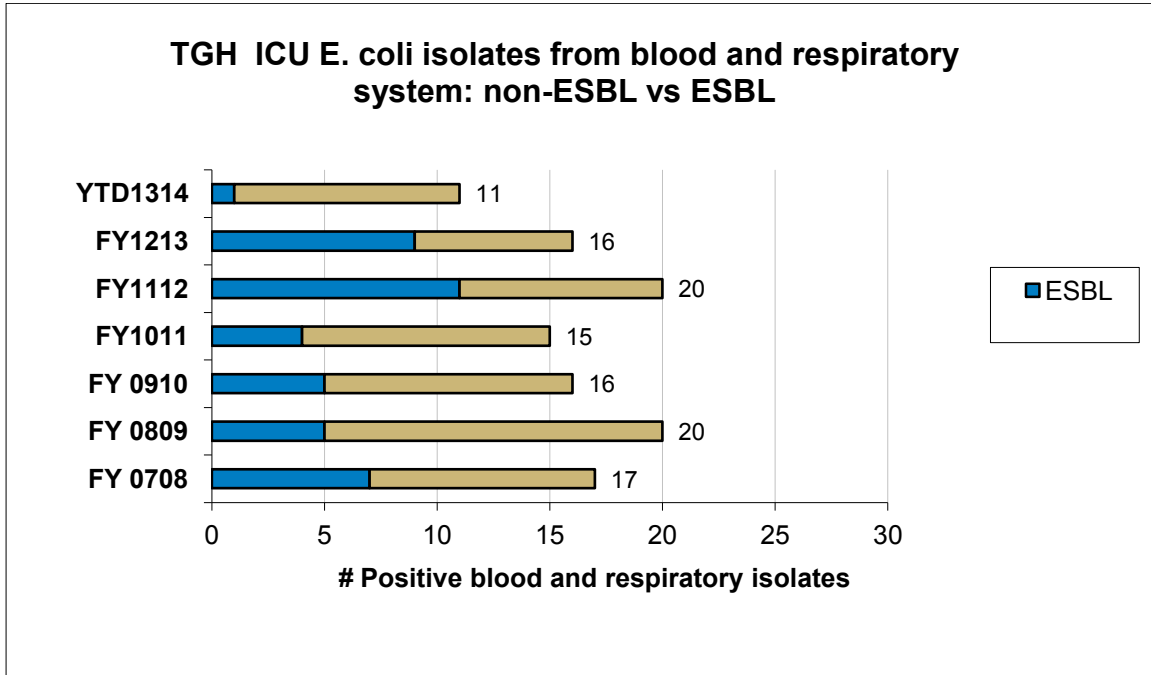
Antimicrobial Susceptibility and Pathogen Surveillance
E. Coli isolates: Blood and Respiratory



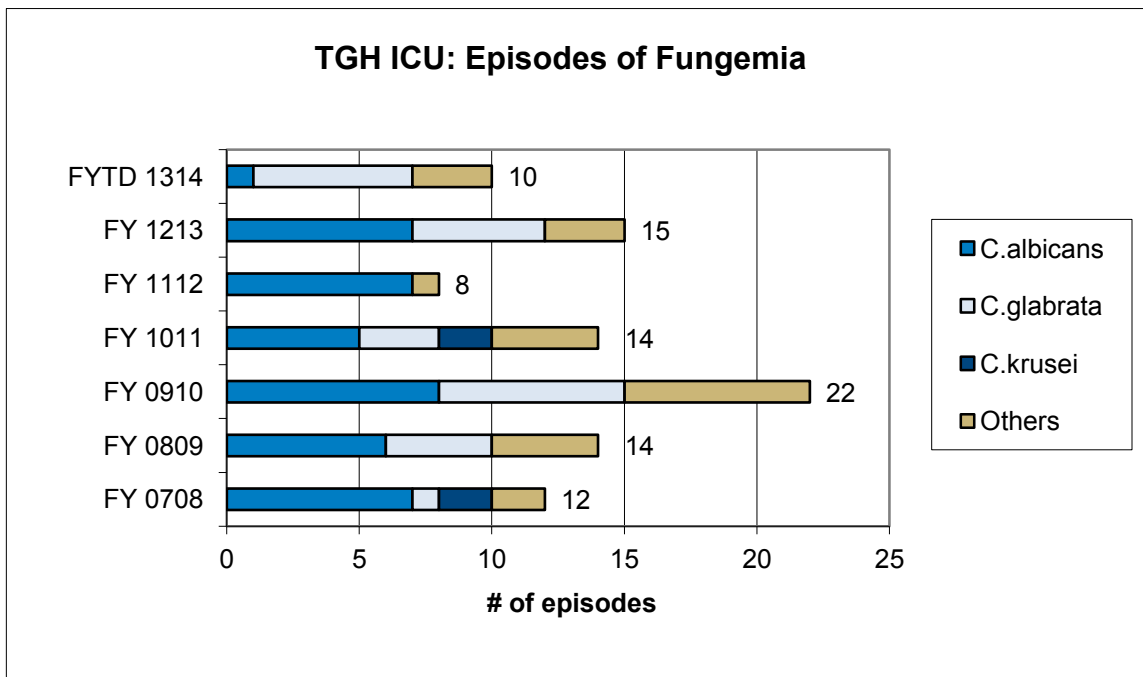
Yeast Species Isolated in Blood – CVICU



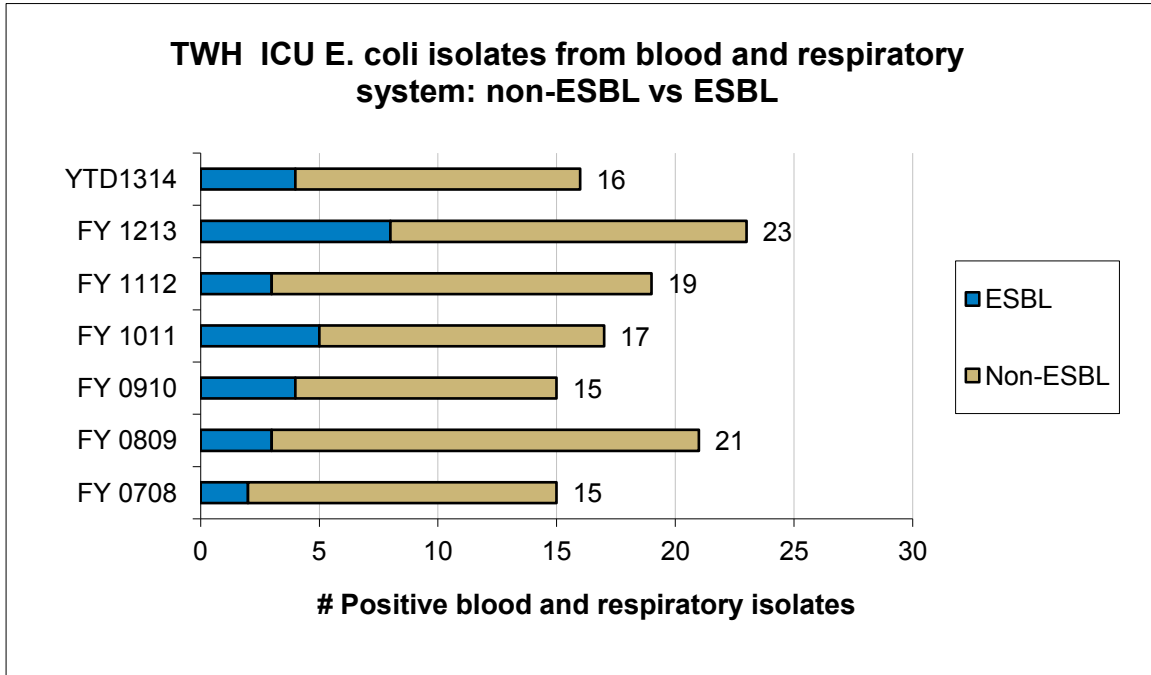
Antimicrobial Susceptibility and Pathogen Surveillance
E. Coli isolates: Blood and Respiratory



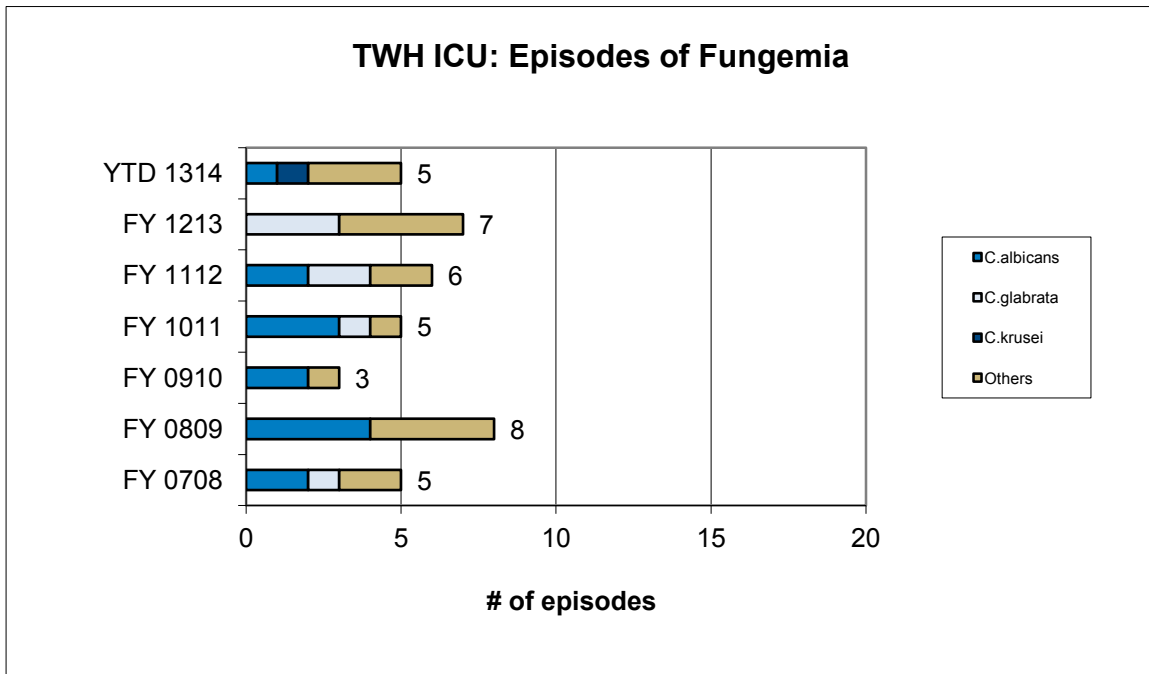
Yeast Species Isolated in Blood – TGH ICU



Antimicrobial Susceptibility and Pathogen Surveillance
E. Coli isolates: Blood and Respiratory



Yeast Species Isolated in Blood – TWH ICU

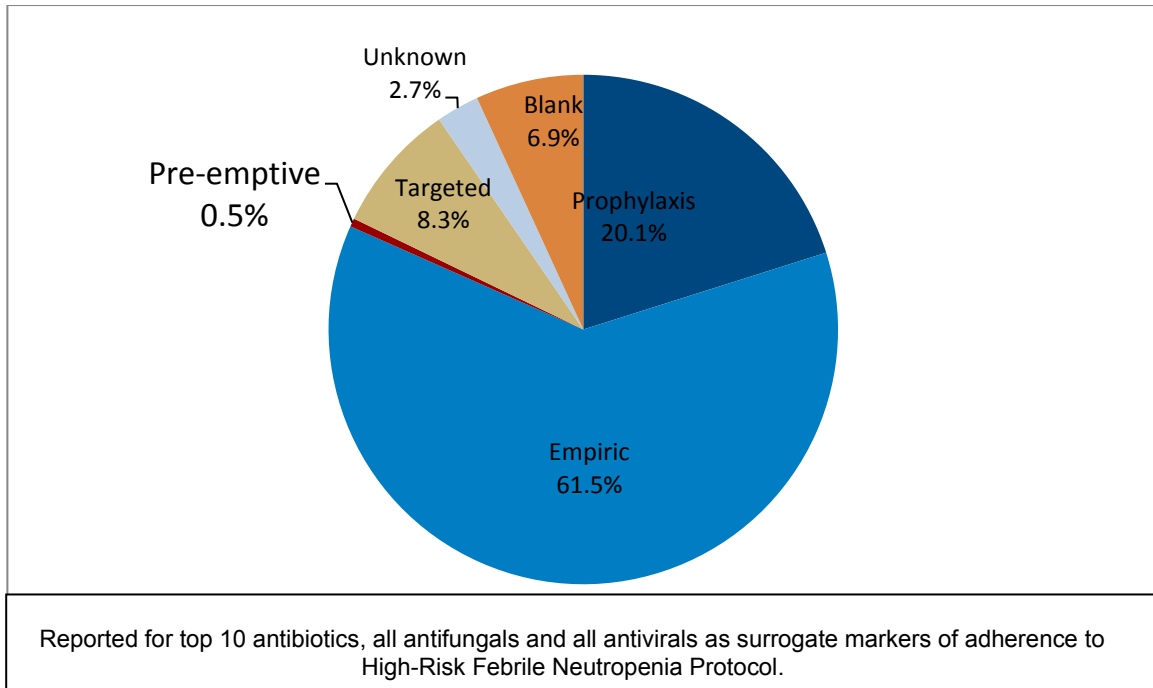


MSH ICU Total Antimicrobial Costs

| MSH ICU Total Antimicrobial Costs (Antimicrobial Costs per patient day) | | | | | | | | |
|---|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|-------------------------|
| | FY 10/11 | FY 11/12 | FY 12/13 | FY 13/14 Q1 | FY 13/14 Q2 | FY 13/14 Q3 | FY 13/14 YTD | Previous YTD |
| PMH Patients | \$114,392 (\$179.02) | \$191,928 (\$181.58) | \$182,188 (\$249.91) | \$46,659 (\$192.01) | \$91,914 (\$399.63) | \$74,117 (\$255.58) | \$212,690 (\$278.75) | \$148,586 (\$266.28) |
| Total (PMH and Non-PMH patients) | \$193,129 (\$40.95) | \$279,859 (\$59.22) | \$291,470 (\$62.37) | \$64,634 (\$55.48) | \$127,482 (\$103.31) | \$119,279 (\$97.05) | \$311,395 (\$85.83) | \$235,568 (\$67.04) |

Note: 13/14 is open year data; totals and cost per day may change based on coding changes. Antimicrobial costs from PharmNet; ICU visits and patient days from CIHI DAD Database.

Princess Margaret Leukemia Antimicrobial Use by Indication in Q3



Princess Margaret Leukemia Febrile Neutropenia Drugs by Indication Q1-3 FY 13/14

