Welcome to the Department of Pharmacy Services Annual Report for Fiscal Year 2012. This was a year in which we continued our efforts to improve the quality of our services through implementation of major projects and transformation of our pharmacy services. Among these were moving into a new replacement Children’s and Women’s Hospital in December 2011, the expansion of pharmacy-managed inpatient and outpatient anticoagulation services, continued expansion of our decentralized pharmacy practice model, expansion of our specialty pharmacy services, and expansion of our residency program to name a few.

We continued to develop our pharmacy practice model, deploying more generalist pharmacists to inpatient care areas. We are very excited about advancing our pharmacy practice model even further in the coming year utilizing our technician workforce, taking advantage of computerization, automation, and clinical decision support, and creating teams of generalist and specialist pharmacists to manage the drug therapy needs of our patients. We are also excited about expanding the role of pharmacy students and residents in the model.

One of the most important and remarkable accomplishments during the past year has been the integration and expansion of our ambulatory care clinical pharmacists into the Ambulatory Care Services model. Under the direction of Hae Mi Choe, PharmD, ambulatory care pharmacists have been integrated fully into the UM Patient-Centered Medical Home Model. In addition to reimbursement for their services within the medical home, these pharmacists are now billing and being reimbursed by third parties for their clinical services. The results of the impact of these pharmacists are now being measured and the demand for their services and involvement continues to increase. Our efforts in this area were recognized with an ASHP Best Practices Award. We are now expanding into specialty areas such as cardiology, oncology, and psychiatry, and integrating pharmacists into our Accountable Care Organization (ACO) initiatives. UM pharmacists helped lead the ASHP Task Force on the role of Pharmacists in Accountable Care Organizations.

The Department has worked very closely with the College of Pharmacy to help in expanding opportunities for Introductory Pharmacy Practice Experiences (IPPEs) for our Doctor of Pharmacy students. These students have been integrated into direct patient care and this has been a positive experience for the students and the staff and has resulted in improved patient care. We have also created a new “generalist pharmacist” Advanced Pharmacy Practice Experience (APPE) in which P4 students will gain experience in the role of a decentralized generalist pharmacist in an integrated patient care role. This has been extremely effective and now all students in the UM College of Pharmacy have this as a required experience. We also have expanded our residency programs to the largest class ever at UM. This year we have 16 residents, eight PGY1 and eight
PGY2. New programs were started this year in Solid Organ Transplant, Ambulatory Care, and Managed Care (in collaboration with Blue Cross Blue Shield of Michigan).

As with most hospitals in the US, the past year has been characterized by an unprecedented number of drug shortages and recalls. Our staff has done an excellent job managing these disruptions in the medication supply chain and has minimized the clinical, operational, and economic impact on our patients, providers and the overall health system. We also played a leadership role in working with ASHP to help quantify the impact of drug shortages on health-system personnel. This information was published and has been used in national summit meetings on drug shortages as well as in FDA hearings. We hope that this work will help better explain the issue and will lead to ultimate solutions.

In the IT area we have embarked on the implementation of the Epic system, starting with our ambulatory care clinics and Emergency Department. Pharmacy staff have worked as integral members of these teams and the ambulatory and ED areas were successfully implemented in the summer of 2012. Plans are now underway to convert our inpatient pharmacy system and CPOE system to Epic (branded at UM as MiChart) by June 2014.

The ambulatory care pharmacy services has seen the expansion of the Transplant Prescription Drug Program and the Specialty Pharmacy Program (in collaboration with the UM Prescription Drug Program), which have significantly added to the margin of the health system. The Transplant program currently supports over 1000 patients and projections are that the program could have as many as 2000 patients by FY2015. Our Transplant Specialty Pharmacy Program was recognized in 2011 as the UMHHC Clinical Program of the Year. We are currently planning for a larger new location for our Ambulatory Care Pharmacy in the Taubman Center in 2013 and the opening of a new infusion pharmacy at the Northville Health Center.

Other notable achievements during the past year included acquisition of the 3rd floor of the Victor Vaughan Building and moving many of our clinical specialists and all of our pharmacy residents to this location. This space was critical to help accommodate our growing residency and teaching programs as well as the increase in the number of clinical pharmacists in our system. A major supply chain redesign and pharmaceutical distributor contracting initiative was started during the year to attempt to reduce costs and to create efficiencies in the overall supply chain process for pharmaceuticals. This effort is expected to result in substantial savings for the health system.

The advances I have described are just some of the many accomplishments that you will see in this report. They are due to the outstanding men and women in our department who provide excellent service to our patients and their families every day. The following report highlights many of the activities and accomplishments in the various component areas of our department during FY2012.
The department works to support the mission, vision, values and goals of the University of Michigan Health System and the UM College of Pharmacy. Our mission and goals are listed below:

**Mission**
The University of Michigan, Department of Pharmacy Services strives to attain the highest level of services in patient care, education, and research. It is our intention to utilize available resources in an efficient manner to achieve the following goals:

- **Patient Care:** To provide rational, progressive pharmacotherapy in a safe, efficient, and compassionate manner to enhance the quality of life for all patients we serve.
- **Research:** To provide a leadership role in the evolution of knowledge through the development and support of investigations to benefit the advancement of health care.
- **Education:** To provide current and innovative pharmaceutical information and instruction to health professionals, healthcare students and the general public.

**Department of Pharmacy Services Specific Goals**

1. To meet the University of Michigan Health System’s mission, vision, values, and goals.
2. To assure that pharmaceutical care is of the highest quality, meeting or exceeding community and national standards.
3. To identify pharmaceutical care issues, trends, and opportunities for improvement related to the systems that support that care.
4. To assure that pharmaceutical care, practice and professional performance are regularly, validly, and reliably evaluated.
5. To assure that procedures, methods, and systems are cost effective and demonstrate significant impact.
6. To conduct research and create new knowledge related to medications and pharmacy services in patients.
7. To participate in the education of pharmacy students, post-graduate pharmacists (residents and fellows), as well as other health professionals. Collectively, by embodying these values and goals we help make the Michigan Difference [http://www.med.umich.edu/michigandifference/mdiff/index.htm](http://www.med.umich.edu/michigandifference/mdiff/index.htm).

In order to achieve these goals we rely on excellence among our staff. In order to learn more about the department and joining our staff, please go to [http://www.med.umich.edu/careers/careers/pharmacy/index.html](http://www.med.umich.edu/careers/careers/pharmacy/index.html) for more information.

To see our current openings, please go to [http://websvcs.itcs.umich.edu/jobnet/search.php?searchBox=pharmacy&searchwhat=current](http://websvcs.itcs.umich.edu/jobnet/search.php?searchBox=pharmacy&searchwhat=current).

An organizational chart of the department is displayed below:
INPATIENT SERVICES

Inpatient Services Management Team
• John Clark, Director of Pharmacy
• Phil Brummond, Assistant Director of Pharmacy, Medicine, ED and Oncology
• Brian Callahan, Assistant Director of Pharmacy, Surgery, Transplant and Cardiology
• Denise Glenn, Assistant Director of Pharmacy, Pediatrics
• Mike Kraft, Assistant Director of Pharmacy, Education and Research
• Chadi Abbas, Technician Recruiter and Trainer
• Andrew Bradley, Technical Coordinator
• Annette Davis, Technical Coordinator
• Kelli Dorsch, Lead Pharmacist, Kellogg Pharmacy
• Lisa Ginsberg-Evans, Manager, IV Systems
• Adam Goodwin, Technician Coordinator
• Kathy Kinsey, Educational Coordinator
• Pam Walker, Coordinator, ED Pharmacy Services
• Nancy Robare, Lead OR Pharmacist

There are currently 11 satellite pharmacy service areas:

University Hospital (5) – Medicine/Surgery, Oncology, Emergency Medicine, Operating Room, Central IV Admixture

Mott Children’s Hospital (4) - Medicine/Surgery, Oncology, Pediatric Operating Room, Pediatric Emergency Medicine

Cardiovascular Center (1) – ICU/Acute care (includes support of Cardiovascular Operating Room)

Kellogg Eye Surgery Center (1) – Ambulatory care pharmacy (includes support of Kellogg OR)
The Inpatient Pharmacy Services, consistent with the values of the University of Michigan Hospitals and Health Centers, places a priority on patients and family, teamwork and never-ending improvement. Pharmaceutical care is provided to both inpatients and outpatients. Pharmacists function as integral members of health care teams at University Hospital, the Cardiovascular Center and C.S. Mott Children’s Hospital, working with physicians to achieve desired therapeutic outcomes, prevent or minimize drug-related problems, and improve medication use. Pharmacists also practice in several of our ambulatory care clinics. The team includes 74 Clinical Pharmacist Generalists, 32 Clinical Pharmacist Specialists and 91 Pharmacy Technicians, who work together to assure patients receive the highest quality pharmaceutical care possible.

The Inpatient Pharmacy performs a wide range of duties 24 hours per day, 7 days per week. These include but are not limited to: prescription order verification, IV dosage and filling, chemotherapy admixtures, sterile lab and bulk drug compounding and packaging, filling of unit based medication cabinets, provide drug information to Physicians and Nurses and participation on the Cardiac Arrest Team.

Clinical services include active participation in multidisciplinary rounds, aminoglycoside and vancomycin pharmacokinetic dosing, anticoagulation management, renal dose adjustments, therapeutic interchanges, IV to PO conversions, antimicrobial management, nutrition support and patient and family education.

There is also a commitment to many educational initiatives including the training of pharmacy residents, pharmacy students, pharmacy technician students and participation in international pharmacy exchange programs.

One of the significant initiatives this year was the continued implementation of a Comprehensive Adult Inpatient Anticoagulation Service at University Hospital, Women’s Hospital and Cardiovascular Center. Through this service, our pharmacists provide anticoagulation assistance for adult inpatients receiving therapeutic anticoagulation to assure standardization and appropriateness of anticoagulation care. This includes monitoring anticoagulation therapy, ordering lab tests, adjusting doses of anticoagulants, providing patient education, and facilitating the patient’s post-discharge follow-up anticoagulation care. The service has been effectively rolled out to approximately 50% of our inpatients who need anticoagulation management; our goal is to provide this care to all adult patients receiving therapeutic anticoagulation and the roll-out will continue over the next year.

Our health system continued its participation in national initiatives directed at improving care transitions and reducing unplanned readmissions (e.g., the Society of Hospital Medicine’s Project Boost, the Institute for Healthcare Improvement’s STAAR Initiative). Pharmacists served on the Operations Committee for these initiatives and many of our pharmacists provide discharge medication teaching for patients identified to be at high risk for readmission.

Over the last year, pharmacists lead several important initiatives to significantly reduce drug cost and help the department achieve budgetary targets. Notably, our staff was intimately involved in helping to manage crucial drug shortages involving antimicrobial agents, chemotherapy agents, and many other drug classes.

Our pharmacists actively participate in the development, implementation and enforcement of drug use guidelines, policies and procedures, help to ensure appropriate use of high-risk medications, and serve on quality improvement committees throughout the institution. Initiatives and quality improvement projects undertaken by the team this year are listed below:
Medication Use Guidelines, Protocols and Treatment Algorithms

- Dose optimization for surgical antimicrobial prophylaxis
- Treatment of meningitis
- Renal dosing recommendations for IV daptomycin
- Treatment of Clostridium difficile colitis in adults
- Surgical prophylaxis in colorectal procedures
- Surgical prophylaxis in hysterectomy procedures
- Guidelines for treatment of gynecologic infections
- Renal dosing recommendations for piperacillin/tazobactam and meropenem
- Surgical antimicrobial prophylaxis guidelines for patients with severe B-lactam allergies.
- Adult skin and soft tissue infection treatment guidelines
- Surgical prophylaxis recommendations for discography procedures
- Adult and pediatric BMT fever and neutropenia guidelines
- BMT infection prophylaxis guidelines
- Infective endocarditis treatment guidelines for adults
- Trauma-Burn VTE prophylaxis
- Tranexamic acid restriction criteria for use in traumatic bleeding
- Mupirocin and Chlorhexidine Staphylococcus decolonization protocol
- Guidelines for the management of infective endocarditis in adults
- Updated HCAP guidelines
- Updated criteria for linezolid use
- Revised guidelines for the treatment of fever and neutropenia in adult hem/onc patients
- Fidaxomicin criteria for use and transitions of care process
- Ceftaroline criteria for use
- Anthracycline Cardiotoxicity
- Chemotherapy Induced Nausea/Vomiting Guidelines (updated)
- Fever in Pediatric Oncology Patients (updated)
- Infection Prophylaxis in Pediatric Oncology Patients (updated)
- Methotrexate Toxicity Guidelines (updated)
- Ifosfamide Toxicity Guidelines (updated)
- Prevention of Acute Kidney Injury in Pediatric Oncology Patients Receiving Vancomycin (updated)
- Prevention of Acute Kidney Injury in Pediatric Oncology Patients Receiving Radiocontrast (updated)
- Management of Acute Chest Syndrome (updated)
- Management of Tumor Lysis Syndrome in Pediatric Oncology Patients (updated)
- Management of Immune Thrombocytopenia (updated)
- Management of Patients Receiving Ch14.18

Policy and Procedures

- UMHS Desensitization Policy and Guidelines

Inpatient Pharmacy Statistics

- **3.1 million** prescription orders processed per year
- **21,000** doses of oral medications dispensed per day
- **5,200** doses of intravenous medications dispensed per day
- **1.4 million** doses of medications packaged per year
- **25,600** chemotherapy products prepared annually
**UM-Carelink Order Set Development /Maintenance**

- Antibiotic lock order set
- CVICU Sepsis order set
- Tranexamic acid order set for traumatic bleeding
- Inpatient pediatric hematology/oncology COG order sets
- Chemotherapy induced nausea/vomiting supportive care order set

**Medication Use Projects Initiated and/or Completed In the Last Year**

Our pharmacists initiated, conducted and/or completed the following medication use evaluations/reviews:

- Oral Vancomycin MUE
- IV Vancomycin MUE
- Piperacillin/tazobactam MUE
- Antibiotic duration of therapy MUE
- Evaluation of IVIG vs. WinRho as First-Line Therapy for Acute ITP in Pediatric Patients (initiated)
- Review of Methadone Use in a Pediatric Tertiary Care Center (initiated)

**Departmental/Health-System Publications**

Our staff contributed to our health-system publications:

- Anesthesiology Pediatric Clinical Care Website
- CVICU Handbook

**Committee Participation**

Pharmacists served on the following hospital committees, work groups and task forces:

- Accreditation and Regulatory Readiness Council
- Anesthesiology QA Committee
- Anesthesiology Technical Support Committee
- Antibiotic Stewardship Committee
- Antibiotic Subcommittee
- Anticoagulation Subcommittee
- Antimicrobial Subcommittee Bioterrorism and Pandemic Influenza Response Planning Committee
- BMT Quality Management Committee
- Burn Quality Care Committee
- C&W Arrest Committee
- Cancer Center Orders Team
- Cancer Center P&T Committee
- Cardiac Workgroup
- Cardiothoracic Pharmacist Team
- CES Division Group
- Children’s and Women’s Pharmacy/PICU Operational Planning
- Cleft palate Pain Committee
- COG Cancer Control Trials Committee
- College of Pharmacy Admissions Committee
- College of Pharmacy CSAS Communications Working Group
- College of Pharmacy CSAS PCARE Working Group
- College of Pharmacy CSAS Self-Care/Therapeutic Problem Solving Group
- College of Pharmacy Curriculum Committee
- College of Pharmacy Evidence Based Medicine Subcommittee
- College of Pharmacy Experiential Training Committee
- College of Pharmacy Faculty Development and Assessment Committee
- College of Pharmacy Faculty Recruitment Committee
- College of Pharmacy International Studies Committee
- College of Pharmacy Pharm-D Investigations Committee
- College of Pharmacy Practitioner Relations/CE Committee
- College of Pharmacy Professionalism/Leadership/Career Development Curricular working group
- College of Pharmacy Student Services Committee
- Committee on Pediatric Sedation
- CPR Committee
- Critical Care Committee
- Critical Care Steering Committee
- CVC ICU QA Committee
- CVICU Workgroup
- Device Management Committee
- ED Asthma Management Group
- ED Management Team
- ED Pharmacy Group
- EPIC Medication Build
- EPIC SME
- Falls Committee
- Glycemic Management Subcommittee of the P&T
- Hazardous Drug Handling Committee
- Holden Joint Practice Committee
- ICU Steering Committee
- Infection Control Committee
- Inpatient Cardiology QI Group
- Intravenous Acetaminophen Workgroup
- Joint Commission Medication Management Readiness Committee
- Ketogenic Diet Team
- Kidney Transplant Quarterly CQI Committee
- Kidney/Pancreas Transplant Operations Committee
- Lipid Guidelines Committee
- Liver and Lung Transplant Evaluation Committee
- Liver and Lung Continuous Quality Improvement Committee
- Liver Transplant Policy Committee
- Liver Transplant Quarterly CQI Committee
- Lung Transplant Patient Education Committee
- MCHC Pain and Sedation Committee
- Medication Profile Review Workgroup
- Michigan Congenital Heart Center (MCHC) Joint Practice Committee
- Microbiology Working Group Committee
- Mott Discharge Prescription Committee
- Mott Executive QA Committee
- Mott Rounding Group for Family Centered Care
- Mott Technical Support Committee
- Mott Women's Leadership Committee
- Needlestick Committee
- NICU Joint Practice Committee
Our pharmacists provided service and leadership to our profession by serving on a variety of external committees and work groups. These included:

**American College of Clinical Pharmacists**
- Council on Therapeutics
- Innovation in Pharmacy Practice Selection Panel
- Medication Management Accountability Measures Work Group
- Committee Chair for Young Investigator Research Presentations
- Volunteer Recognition

**American Society for Parenteral and Enteral Nutrition**
- Membership Committee
- Self-Assessment Committee

**Centers for Disease Control- National Healthcare Safety Network**
- Antibiotic and Resistance Surveillance Group

**Michigan Society of Health-System Pharmacists**
- Board of Directors
- Membership Committee
- Michigan Pharmacy Practice Model Initiative
- Co-Chair, Educational Affairs
- Public Affairs Committee
Michigan Society for Parenteral and Enteral Nutrition
- Treasurer
- President-Elect

National Quality Forum (NQF)
- Steering Committee, Endorsement Maintenance: Surgery Project
- Safety – Healthcare-Associated Infections, National Priorities Partnership

Society of Infectious Diseases Pharmacists
- Public Policy Committee
- Political Advisory Committee
- Antimicrobial Stewardship Task Force

University Healthsystem Consortium
- Practice Advancement Committee

American Society of Health-System Pharmacists
- Chair, Section Advisory Group on Business Management
- Council on Therapeutics
- Council on Education and Workforce Development
- Medication Management Accountability Measures Work Group

**Other Accomplishments**
- Standardized processes for medication preparation and double checking
- Expanded pharmacist roles in precepting pharmacy students on both IPPE and APPE rotations
- Developed and implemented pharmacist run ambulatory clinic within the Department of Psychiatry
- Developed and implemented new 24/7 ED service in pediatrics
- Participated in the planning for new CPOE system with initial roll-out planned for the ED
- Developed strategies for managing national shortages of IV products by compounding bulk solutions or batch activities
- Generated cost savings through reductions in IV medication waste by preparing bulk solutions in IV Clean Room
- Remodeled Kellogg Eye Center pharmacy and expanded retail business
- Developed a pilot program utilizing Pharmacy Technicians to assist with improving transitions of care with a focus on issues related to access to medications
- Implemented nutrition support services
• Implemented online scheduling program for team (Shiftplanning®)
AMBULATORY PHARMACY SERVICES

Ambulatory Pharmacy Services encompass three separate outpatient pharmacies as well as three infusion pharmacies, specialty pharmacy, outpatient symptom management, and transitions of care. The infusion pharmacies are located in the Cancer Center, Canton Health Center and East Ann Arbor Health Center. In addition to dispensing functions, the pharmacy staff supports many pharmaceutical care activities for the University of Michigan Hospitals and Health Centers (UMHHC) ambulatory areas. All pharmacies provide the following services:

- Clinical review of prescription
- Physician consultation and drug information provision
- Patient consultation
- Reimbursement assistance

Patient-Centered Medical Home and Accountable Care Organization Activities
The Patient Centered Medical Home (PCMH) pharmacists are embedded in 14 of our primary care sites as an integral member of the care team. PCMH pharmacist’s primary role is to evaluate and optimize therapeutic regimens to achieve treatment goals for diabetes, hypertension, hyperlipidemia and poly-pharmacy. Examples of specific services provided include medication reconciliation, medication initiation and dosage adjustment via a collaborative practice agreement, medication adherence assessment, self-management and goal setting, patient education on chronic medical conditions and medications, some physical assessment, orders for diagnostic tests or medical equipment, and referrals to other health care providers. Prescriptive authority through collaborative practice agreement has been endorsed by the Credentialing Committee at our health system.

PCMH pharmacists have provided care to over 1,700 patients leading to 6,174 clinic visits and phone consultations (5/1/11 – 4/30/12). During patient encounters, PCMH pharmacists use motivational interviewing strategies to empower patient to take an active role in managing their chronic conditions. In addition, pharmacists have made over 2,600 therapeutic changes to improve medication use and outcomes. PCMH pharmacists provide services one to six half-days a week depending on the patient panel size at the clinics.

In the upcoming years, PCMH pharmacists will focus on polypharmacy patients to help reduce overall drug costs and promote cost-effective prescribing strategies. In addition, we will target high cost/risk patients to prevent hospitalizations due to medication related issues. As our institution engages in national demonstration projects to improve care and decrease health care costs for our Medicare patients, pharmacists have the opportunity to extend services to specialty clinics. Also, in our effort to disseminate our services to a broader community, we will be developing innovative partnerships with community pharmacists.

Transitions of Care
Over the past year, several partnerships and projects have worked to support the University of Michigan Hospital and Health System’s goals towards improving transitions of care. These projects have ranged in scope and team members. A pilot involving well-trained certified technicians in medication admission histories and increasing access to medications took place through targeting medications with prior authorizations and high copays. The result of this pilot is a consistent technician transition of care position. The medication admission histories were passed on to our student teams and the technician now works both on the floor and in the community pharmacy setting to improve access to medications when patients are leaving the
inpatient setting. Additional partnerships are in progress to improve medication education focusing on pediatrics and oncology as well identification of patients with high-risk medication use for increased pharmacist involvement.

**Symptom Management Services**

The pharmacist-run Anemia Management Clinic has continued from previous years. Outcomes data has been assessed and presented showing improved clinical outcomes and cost savings. This program functions under a collaborative practice agreement and utilizes TheraDoc for patient tracking to ensure compliance with FDA REMS program for ESAs. In addition, pharmacist team members provide Medication Management Services where the pharmacist will review medications, including herbal and dietary supplements, and assess for drug- or disease-interactions. Recommendations are communicated with the primary oncologist.

New this year, the Oral Medications for Cancer Therapy Program was initiated May 7, 2012. The program currently is following all patients receiving oral anticancer meds with focus on streamlining and providing support for medication access, providing medication reconciliation, patient medication education, patient compliance/adherence information, drug-drug interaction review and medical record documentation. This team also works on creating and providing the health system with oral medicine education instructing patients on adverse effects and when to contact their clinic providers. Program outcomes are currently being assessed and we anticipate caring for >1000 patients/year.

**340B Contract Pharmacy Services**

The last year saw the expansion of UMHS 340B services to include many local large chain and independent pharmacy partners. The provision of pharmacy services to as many patients as possible continues with our current partnerships including 9 entities with 24 individual store locations.

**Ambulatory Pharmacies**

The Taubman Center Ambulatory Care Pharmacy (ACP) and the Cancer Center Pharmacy are located on the main campus, adjacent to the University Hospital. A third pharmacy services our East Ann Arbor Health Center.

The population served by these pharmacies includes those patients receiving care from UMHHC, patients discharged from the hospital and/or our emergency department and employees. A customer satisfaction survey of employees, dependents and retirees was conducted by the University Staff Benefits Office for those individuals who utilized the Employee Prescription Plan. This survey reflected our dedication to patient services with the University of Michigan pharmacies ranked among the highest in terms of customer satisfaction.

Ambulatory staff provides consultative services to approximately 115 ambulatory sites related to compliance with medication management standards. Sites frequently contact pharmacy staff for assistance with new drug availability, reimbursement support and individual patient drug related support. Additional services include the training of site staff to complete self-review for accrediting agencies, annual on-site consultation visits, and tracking of compliance with monthly self-inspections. The process of self-evaluation, with appropriate validation, is currently at 98%.

**Specialty Pharmacy Services**

The services of our Specialty pharmacy continue to grow. Over the past several years, what began as a program focused on solid organ transplant patients has grown to encompass rheumatology and patients living with Hepatitis C and B. Services for these patients include proactive involvement in the patient’s care, dedicated involvement in establishing access pathways, and refill reminders.
Ambulatory pharmacy representatives participate on several committees including:

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<tr>
<th>Committee</th>
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<tbody>
<tr>
<td>Ambulatory Infusion Formulary Committee</td>
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<tr>
<td>Cancer Center Pharmacy Committee</td>
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<td>Cancer Center Clinical Operations Committee</td>
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<td>Cancer Center Operations Committee</td>
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<tr>
<td>University of Michigan Pharmacy Benefits Advisory Committee</td>
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<td>University of Michigan Pharmacy Benefits Oversight Committee</td>
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<tr>
<td>Ambulatory Care Regulatory Readiness Advisory Committee (ACRRAC)</td>
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<td>Patient and Family Centered Care (PFCC) Committee</td>
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In addition to these activities, ambulatory pharmacy staff is involved in initiatives to improve the cost and quality of pharmacy services provided to university employees, dependents, and retirees with a prescription drug benefit carve-out.

**Pharmacy Demographics and Services**

<table>
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<th>Pharmacy Service</th>
<th>Details</th>
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| **Ambulatory Care Pharmacy**              | • Prescription volume = 300 / day  
• Utilizes ScriptPro automation  
• Discharge prescriptions account for 40% to 50% of total volume  
• Compounding services provided—generally about 10 compounds per day  
• Generic dispense rate equals 75%, which exceeds standards  
• Utilize coaster patient paging system to inform patients of prescription status. |
| **Cancer Center Pharmacy**                | • Prescription volume = 135/ day  
• Supports a high volume of investigational drug protocols  
• Generic dispense rate equals 70% which exceeds standards |
| **East Ann Arbor Pharmacy**               | • Prescription volume = 300/ day  
• Generic dispense rate equals 75% which exceeds standards |
| **Specialty (Transplant) Pharmacy Services** | • Currently support over 1000 patients  
• Projected volume to grow to more than 2000 patients in 2014  
• Pharmacy staff facilitate obtaining Prior Authorization if needed  
• Proactively contact patients for refills |
| **UMHS Employee/Retiree Specialty (Campus) Pharmacy Services** | • Current support over 200 patients  
• Approximately 120 drugs designated as specialty product  
• Proactively contact patients for refills |
| Cancer Center Infusion Pharmacy | • Supports 73 patient chairs/beds, representing 150-200 patients per day  
• Approximately 46,000 infusion procedures annually  
• Significant support provided for investigational drug protocols  
• Utilizes Phaseal technology to safeguard employees from chemotherapy exposure  
• Emphasis on patient safety by tracking compliance with independent pharmacist double checks of new orders entered. Results indicate 98-100% compliance  
• Pharmacists monitor patient laboratory results and recommend dose adjustments when appropriate  
• Provide nursing education for new medication  |
|---|---|
| Canton Health Center Infusion Pharmacy | • Primary support is for oncology patients; however other infusion needs are also supported  
• Capacity is 9 chairs. Average number of patients per day is 25.  
• On-site infusion pharmacy services  |
| East Ann Arbor Infusion Service | • Supports infusion therapy for non-oncology patients  
• Capacity is 10 chairs. Average number of patients per day is 25  
• On-site infusion pharmacy services  |

Additional Projects involving Ambulatory Team Members
- Chemotherapy Order Set Project  
- Drug Shortage Responses  
- Maintain Pharmacist Corner in Thrive Magazine, a UMCCC quarterly publication created for Cancer Center patients/survivors/family.

Current Initiatives
- Ongoing support of growth in Specialty Pharmacy Services including Transplant as well as Rheumatology and Hepatology.  
- Identifying opportunities for clinical involvement of staff pharmacists to access and improve adherence to medication regimen for Specialty Pharmacy patients  
- Implementation of ambulatory infusion services in the Taubman Health Center Backfill Project. Infusion and Ambulatory Pharmacy services are projected for Spring/Summer of 2013.  
- Evaluate the potential for implementation of Medication Therapy Management Services in the outpatient pharmacies.  
- Cancer Center Medication Reconciliation Project

Finally, we’d like to congratulate Arthur Poremba, MS, RPh on his retirement as Assistant Director for Ambulatory Pharmacy Services. During his time at the University of Michigan, Art made an immense impact on the profession and all who had the pleasure to work with him. He continually endeavored to provide consistent and innovative pharmacist services for all patients.
He was a strong patient advocate and engaged in all levels of patient care; personally responding to patient concerns and initiating a 24 hour on-call pager to respond to patient questions. Most of all Art sought to develop peers and staff and worked as a leader of the team. Best of luck to Art and thanks to him for his service to the health system and the profession.
MEDICATION SAFETY

“It has been said that more mistakes in medicine are made by those who do not care than by those who do not know.”


The Medication Safety Committee at the University of Michigan is committed to improving the safe use of medications throughout our healthcare environment. The committee is represented by hospital administration, home care services, nursing, physicians, a physician assistant, pharmacy, quality improvement and risk management. Meetings are held monthly along with our sister committee, Peds Med Safety, and report directly to the Pharmacy & Therapeutics Committee.

Accomplishments:

• Removal of Laxative of choice (LOC) and Antacid of choice (AOC) orders from UM-CareLink orderables.

• Furosemide infusion concentration change: concentration changed from 1 mg/mL to 10 mg/mL to decrease the amount of fluid administered to a patient and to match furosemide concentration in the syringe pump.

• Missing medications project - several initiatives were implemented to address missing medications and avoid re-work. Initiatives included order perfection with WORx vendor, changes in cart delivery and IV delivery, stocking of compounded fentanyl and midazolam infusions in automated dispensing cabinets, addition of 6 common medications to the automated dispensing cabinets, and STAT delivery of specific infusions.

• Reporting of Adverse Drug Reactions Policy revised to include workflow changes with utilizing the Patient Safety Reporting System (PSRP) to report an adverse drug reaction (ADR) and notifying the prescriber. ADRs are reviewed by a risk management consultant and the medication safety coordinator and determined if the event was preventable or non-preventable. The medication safety coordinator will determine which ADRs shall be reported to the FDA. All ADRs will be reviewed by the Medication Safety Committee and recommendations for action made to the P & T Committee.

• New Policy – Utilization of 23.4% NaCl. Policy created to establish standards to store, prepare, dispense and safely administer 23.4% NaCl, a High-Alert medication. The intended patient population is for patients with either acute or refractory elevated intracranial pressure (ICP) or signs of acute herniation syndrome. A clinical guideline was also developed and included in the policy; failure mode effects analysis completed.

• New Policy – Use of Epoprostenol and Treprostinil. Policy created for newly designated High-Alert medications at UMHS that define the standards for prescribing, dispensing, and administering epoprostenol, thermostable epoprostenol and treprostinil. In addition, a clinical guideline was developed for patients requiring a parenteral epoprostenol infusion for the treatment of ischemic digital ulcers due to scleroderma.

• Improvements to the Patient Safety Reporting System (PSRP) – based on reporter feedback the online reporting tool was changed to facilitate more reporting and require less time. Changes include: eliminating the selection of contributing factors for the reporter, consolidation of the medication ordered and administered into one field, decreased amount of patient demographics required and elimination of 11 fields and 1 table.
• Error Awareness: a daily email is sent by Risk Management to hospital leadership and members of the Medication Safety Committee and Pediatric Medication Safety Committee to increase error awareness and facilitate process improvement. Colleagues within the Pharmacy department received a weekly email describing adverse events in which pharmacy was involved or had an opportunity to identify or prevent the error.

• Completion of the 2011 ISMP Self-Assessment with assessment scores and gaps presented to the Medication Safety Committees, Patient Safety, and Pharmacy Management. Ongoing review and addressing of gaps by working groups is occurring.

• Specific reviews of adverse events for anticoagulants, 2011 reported events and rituximab events occurred.

• Review of the Velcade (bortezumab) safety alert on inadvertent IT administration and impact on UMHS practices.

**Reported Medication Safety Reported Events:**

![Graph showing Adult Inpatient Medication Events Reported per 10,000 Net Doses Dispensed]

![Bar chart showing Med Events - The 5 Right's, Count of Incident Id for specific incident types]
RESEARCH AND EDUCATION

A. Research

The Department of Clinical, Social and Administrative Sciences research covers a wide range of inpatient and outpatient drug and disease state management, pharmacokinetic, and pharmacogenomic topics. Joint appointments with the Medical School, Department of Anesthesiology, and the Department of Pediatrics underpin an emphasis on collaboration efforts. The collaboration effort includes the Department of Pharmacy Services and the Renal Replacement Therapy Kinetics Study Group (RRTKSG), which is a multidisciplinary research group established through the Department. The Focus on Medicine Project is a large collaboration between our department as well as the Center for Medication Use, Policy and Economics. Research areas of the individual clinical faculty members may be found at our Department website:  http://sitemaker.umich.edu/csas/home

B. Clinical Faculty Grants

The Department of Clinical, Social and Administrative Sciences' faculty had intramural and extramural grants totaling $1,374,255 in fiscal year 2011-2012.

<table>
<thead>
<tr>
<th># of these faculty on funded grants</th>
<th>Tenure Track Faculty</th>
<th>Non-Tenure Track Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td># of competing and non-competing grants and contracts</td>
<td>28</td>
<td>5</td>
</tr>
</tbody>
</table>

(The number of grants does not include those submitted pending award notification.)

Departmental Direct and Indirect Cost Trends:

<table>
<thead>
<tr>
<th>Exp</th>
<th>FY03</th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
<th>FY07</th>
<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>10 Year Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Cost Totals</td>
<td>0</td>
<td>170,962</td>
<td>641,879</td>
<td>248,605</td>
<td>1,200,862</td>
<td>1,201,627</td>
<td>626,063</td>
<td>715,000</td>
<td>860,860</td>
<td>1,008,696</td>
<td>7,021,687</td>
</tr>
<tr>
<td>Indirect Cost Totals</td>
<td>9,130</td>
<td>0</td>
<td>88,188</td>
<td>197,349</td>
<td>100,541</td>
<td>332,262</td>
<td>282,981</td>
<td>335,555</td>
<td>390,076</td>
<td>365,559</td>
<td>2,101,641</td>
</tr>
<tr>
<td>TOTALS</td>
<td>9,130</td>
<td>170,962</td>
<td>730,067</td>
<td>445,954</td>
<td>1,301,403</td>
<td>1,533,889</td>
<td>909,044</td>
<td>1,050,555</td>
<td>1,250,936</td>
<td>1,374,255</td>
<td>9,123,328</td>
</tr>
</tbody>
</table>
C. Clinical Faculty Publications

<table>
<thead>
<tr>
<th></th>
<th>Tenure Track (N= 15 faculty)</th>
<th>Non-Tenure Track (N= 26 faculty)</th>
</tr>
</thead>
<tbody>
<tr>
<td># of published peer reviewed articles</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td># of published books, book chapters and books edited</td>
<td>9</td>
<td>13</td>
</tr>
</tbody>
</table>

# of publications does not include those in press or submitted. Numbers may not add up due to fact that faculty often collaborate on papers.

D. Impact Factor

A stated goal of the Department is to publish our manuscripts in influential journals. This level of influence can be measured using “impact factor.” The impact factor for 2011-12 from Clinical Faculty peer-reviewed research manuscripts is depicted in the chart below.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Impact Factor</td>
<td>2.62</td>
</tr>
<tr>
<td>Min</td>
<td>0.557</td>
</tr>
<tr>
<td>Max</td>
<td>10.558</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.039</td>
</tr>
<tr>
<td>Average</td>
<td>3.313</td>
</tr>
</tbody>
</table>

E. Mentoring

The Department's research covers a wide range of inpatient and outpatient drug and disease state management, pharmacokinetics, and pharmacogenomics. In addition to conducting research itself, we mentor future researchers through our work with residents, pharmacy students and fellows and are mentoring 10 graduate students and 2 fellows. Additionally, there were approximately 98 Pharm.D. student investigations and resident projects last year within the College of Pharmacy precepted by members of our Department.
<table>
<thead>
<tr>
<th>UM Pharmacy Residency Class 2011-2012</th>
<th>Specialty (PGY-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy &amp; General Practice (PGY-1)</td>
<td></td>
</tr>
<tr>
<td>Allen Antworth</td>
<td>Cuong Hoang – Critical Care</td>
</tr>
<tr>
<td>Walter Claire</td>
<td>Shannon Hough – Oncology</td>
</tr>
<tr>
<td>Elizabeth Koselke</td>
<td>Jennifer Lose – Cardiology</td>
</tr>
<tr>
<td>Paul Stranges</td>
<td>Jennifer Lunger – Pediatrics</td>
</tr>
<tr>
<td></td>
<td>David Mulherin – Informatics</td>
</tr>
<tr>
<td></td>
<td>Jerrica Shuster – Hematology/Oncology</td>
</tr>
<tr>
<td></td>
<td>Marie Yu – Infectious Disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UM Pharmacy Residency Class 2012-2013</th>
<th>Specialty (PGY-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy &amp; General Practice (PGY-1)</td>
<td></td>
</tr>
<tr>
<td>Kylee Funk</td>
<td>Justina Damiani – Pediatrics</td>
</tr>
<tr>
<td>Megan Hartranft</td>
<td>Aimee Gowler – Critical Care</td>
</tr>
<tr>
<td>Emily Israel</td>
<td>Angie Huang – Infectious Disease</td>
</tr>
<tr>
<td>Bernard Marini</td>
<td>Beth Koselke – Oncology</td>
</tr>
<tr>
<td>Meghan McComb</td>
<td>TrisAnn Rendulic – Transplant</td>
</tr>
<tr>
<td>Allison Palumbo</td>
<td>Paul Stranges – Ambulatory Care</td>
</tr>
<tr>
<td>Ngoc Vu</td>
<td>Claire Walter – Cardiology</td>
</tr>
<tr>
<td>Brad Williams</td>
<td></td>
</tr>
<tr>
<td>Elizabeth Kelly – Managed Care</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fellows 2012-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridget Scoville, Pharm.D. (Critical Care Nephrology; preceptor: Mueller)</td>
</tr>
<tr>
<td>Kyle Burghardt, Pharm.D. (preceptor: Ellingrod)</td>
</tr>
</tbody>
</table>
Graduate Students 2012-2013

JongWha Chang
Sumit Chhabra
Justin Gatwood
Yun Han
Ala Iaconi
Chi-Mei Liu
David Frank Malewski
Isha Patel
Xi Tan
Erin Thatcher

Statistics for 2011-2012 Experiential scheduling for:
P1 students = 78
P2 students = 82
P3 students = 91
P4 students = 84

F. Clinical Faculty Awards and Acknowledgements

In the past year, several of our COP faculty received prestigious and distinguished awards, and we acknowledge them for their significant contributions to the profession of pharmacy.

1. Dr. Rajesh Balkrishnan became a member of the Healthcare Safety and Quality Improvement Research (HSQR) study section and the Agency for Healthcare Research and Quality for 2011-2012. Dr. Balkrishnan also gave the keynote address at the 44th annual conference of the Indian Pharmacological Society in Manipal, India.

2. Dr. Allison Blackmer was awarded the ASPEN Rhodes research grant, and was also nominated for the Preceptor of the Year Award. Dr. Blackmer also received three “Making a Difference” awards at the hospital during the past academic year.

3. Dr. Peggy Carver served as the Phi Delta Chi Fraternity Advisor this year. The organization won several awards this year, including the Michigan Leadership Award for Outstanding Student Organization, a competitive award among the over 1,000 student organizations at the University of Michigan. UM's Alpha chapter was ranked nationally (of 88 chapters) as: 7th for the Emory W. Thurston Grand President's Award (the highest award in the fraternity and the highest ranking since chapter reactivation in 2004), 4th nationally for the John D. Grabenstein Leadership award, 3rd nationally for the Ralph Saroyannm Brotherhood Award and Desmet Scholarship, 2nd nationally for the Scrapbook award, and received the Dale W. Doerr Achievement Award. The organization was also nominated for the University of Michigan Philanthropy Award.

4. Dr. Hae Mi Choe was given the ASHP Best Practice Award.
5. **Dr. John Clark** was awarded the 2011 Outstanding Young Alumnus Award from the University of Toledo College of Pharmacy.

6. **Dr. Heidi Diez** was given the ASHP Best Practice Award.

7. **Dr. Vicki Ellingrod** was a 2012 MICHR Distinguished Mentor Awardee. Two of her Pharm D. students were also given awards: Kristen Gardner won the CPNP Trainee Research Award as the CPNP Annual Meeting in Tampa, FL, and Stephen Lott was awarded the McGlone research award within the COP. **Dr. Ellingrod** was also a Grant Reviewer for the Italian Ministry of Health, Department of Innovation, General Direction for Scientific and Technologic Research and a Scientific mentor for ACCP Focused Investigator Training Program. Additionally, **Dr. Ellingrod** was a Program Grant Reviewer for NIGMS in January 2012 for the 2012 NIH Director’s Pioneer Program and for EMNR in December 2012 for Specialized Centers of Research on Sex Differences.

8. **Dr. Steven Erickson** was nominated for the Teaching Excellence Award, COP, and was awarded the Student Appreciation Award from the P3 class for the year 2011-2012.


10. **Dr. Varsha Mehta** was elected to the ACCP Practice and Research Based Network Community Advisory Panel. **Dr. Mehta** was also appointed to be a Faculty Associate for the University of Michigan Center for Global Health.

11. **Dr. Tami Remington** won the Best Practices Award in Health-System Pharmacy in the American Society of Health System Pharmacy.

12. **Dr. Stuart Rockafellow** won the Innovative Practice Award from MPA, as part of the Ambulatory Care Pharmacists Group. He also won the Best Practices Award from ASHP as a part of this group. **Dr. Rockafellow** was awarded BCAP status, and received the P4 Class Student Appreciation Award.

13. **Dr. Leslie Shimp** won the Best Practice Award in Health-System Pharmacy from the American Society of Health-System Pharmacists.

14. **Dr. Burgunda Sweet** received the MSHP Professional Practice Award as well as the USP Award for Innovative Response to Public Health Challenge. **Dr. Sweet** was also a nominee for the U of M Teaching Excellence Award.

15. **Dr. Deborah Wagner** was a finalist for the ASHP Award for Excellence in Medication Safety.

16. **Dr. Paul Walker** was a finalist for the University of Michigan Health System Quality Month Exemplar for the following project:

17. **Dr. Trisha Wells** was awarded the 2011 ASHP Pharmacy Best Practice Award.

18. **Dr. James Stevenson** was appointed by Governor Snyder to the Michigan Board of Pharmacy.
19. **The Department of Pharmacy Services** was honored with some significant national awards during this year. It was awarded the Innovative Practice Award from the Michigan Society of Health-System Pharmacists for the development of patient-centered medical home model pharmacy services. It was also awarded the 2011 ASHP Best Practice Award for this development. ASHP also gave the department the Foundations’ Award for Excellence in Medication Safety for work in improving safety related to pain management. Finally, the department won the UMHS Clinical Program of the Year Award for the UMHS Transplant Specialty Pharmacy Service.

G. Summary of the Pharmacy International Programs

**Doshisha Women’s University Students and Faculty**  
(August 14 – August 24, 2012)

**Faculty:**
Kazu Naruhashi

**Students:**
Akiko Hamahata  
Mika Katayama  
Mari Kishiba  
Yuri Kitagawa  
Machi Nakamura  
Ai Takaki

**Bath Student**  
(October 1 – December 31, 2012)

Jiwan Gurung

**Pharmabridge Program Visiting Faculty**  
(July 10 – August 15, 2012)

Sreedharan Nair  
Prasannakumar Shetty

**Student Committee for International Opportunities (SCIO):**
The “Student Committee for International Opportunities” have actively assisted the hosted students find residence, planned social activities for them, and transported some of them from and to the airport.

**Center for Global Health (CGH) Internal Advisory Committee (IAC):**
The college is represented by the Director of International Programs on the CGH IAC and provides input on the Center’s direction, projects, and review of Faculty and student associate applications and appointments, and review grant proposals.

**Council on Global Engagement:**
This is a policy and a process setting body that facilitates students and faculty travel abroad. The College is also represented by the Director of International Programs.

**International Contractual Agreements (or memorandum of Agreement) signed in previous Years:**
None beyond the exchange agreements signed with: 1) University of Bath (England), 2) Kwame Nkrumah University of Science and Technology (KNUST, Ghana), 3) University of
Barcelona (Spain), 4) The Lebanese American University (LAU, Lebanon), 5) Doshisha Women’s College of Liberal Arts (Japan). A memorandum of agreement has also been signed with the University of Kalamoon in Syria.

**International Contractual Agreements in the signature Queue at the University Counsel’s office:**
University of Puerto Rico. All other exchange discussions are currently frozen

**Policies and Procedures:**
Application forms have been revised. Policies and procedures of selected international programs processes have been documented. A C-Tool for the entire International Programs is being established.
Appendix A

Department of Clinical, Social and Administrative Sciences
Publications Highlights, 2011 - 2012

Books and Book Chapters Edited


9. Acid related disorders of the Upper GI tract. Fugit R, Rockafellow S, Berardi RR. In Understanding Pharmacology for Pharmacy Technicians. ASHP


12. Sweet, Burgunda wrote 25 monographs for off-label uses of medications for Off-Label Facts


**Non-Peer Reviewed Papers Published 2011-2012**

1. **Blackmer AB**. Improving Safety for Pediatric Patients: Acetaminophen Concentration Standardization. Pharmacy Times, January 2012; 10-11


3. **Mason, Nancy** is an Iron Deficiency Anemia Consultant for Dialysis of Drugs Pocket Guide, in which she writes about eight articles per year

4. **Redic, KA**. Next-Generation Proteasome Inhibition in Multiple Myeloma. Oncology Pharmacist, February Suppl:8-9, 201

5. **Remington TL**. Pharmacy Practice Spotlight – Power of Many. MSHP Monitor September 2011

6. **Stumpf, Janice** wrote twelve issues of the newsletter Pharmacy for UM

**Peer-Reviewed Articles Published 2011-2012**


42. Harder JL, Heung M, Vilay AM, Mueller BA, Segal JH. Carbamazepine and the active epoxide metabolite are effectively cleared by hemodialysis followed by continuous


47. **Kucukarslan SN**, **Shimp LA**, Lewis NJW, Gaither CA, Kirking DM. Patient desire to be involved in treatment decisions – the missing link in MTM participation? J AM Pharm Assoc 2012.


63. Merajver SD, Balkrishnan R. Making the case for integrated assessments of the biological, social, and system determinants of treatment for breast cancer to understand and improve outcomes in patients everywhere Current Medical Research and Opinion – 28(3):415-417, 2012. PMID 21995647


65. Chow SL, Singh H, DiDomenico RJ, Dunn SP, Johnson SG, Marrs JC, Vardeny O, Bleske BE. Key Articles Related to Complementary and Alternative Medicine in Cardiovascular Disease: Part II. Pharmacotherapy 2011;31(10)1041. DOI: 10.1592/phco.31.10.1041


77. Serkova NJ, Standiford TJ, Stringer KA. The emerging field of quantitative blood metabolomics for biomarker discovery in critical illnesses. Am J Respir Crit Care Med. 2011 Sep 15; 184(6):647-55. PMID 21680948

2011-2012 Scientific Presentations

Posters:

Alaniz, Cesar
Five year experience with hydrocortisone use for septic shock. Society of Critical Care Medicine Meeting. Poster.

Bleske, Barry
Implementing Team-Based Learning at the College of Pharmacy. CRLT 50th Anniversary Learning Conference. Poster.

Bostwick, Jolene

Metabolic monitoring in outpatient psychiatry. Quality Month Exhibition, University of Michigan Health System, Ann Arbor, MI. Poster.

Carver, Peggy

Choe, Hae Mi

Ellingrod, Vicki


Erickson, Steven

Kraft, Michael


Kraft MD, Wooley JA. Evaluation of Peripheral Parenteral Nutrition (PPN) at an Academic Medical Center: Is there a role and are we optimizing use? American Society for Parenteral and Enteral Nutrition Clinical Nutrition Week, Orlando, FL, January 2012. Poster.


Mason, Nancy


Mehta, Varsha

Mueller, Bruce

Redic, Kimberly
Presence of potential risk factors for medication errors in commercially packaged versus non-commercially packaged investigational drugs. ASHP Summer Meeting 2012. Poster.

Stringer, Kathleen

Sweet, Burgunda
Prescriber compliance with IVIG guidelines. ASHP Midyear Clinical Meeting. Poster.

Walker, Paul
Walter C, Barnes M, Dorsch D, Walker PC. Assessment of the transition of anticoagulation care from an inpatient to outpatient setting after implementation of an inpatient pharmacist-assisted anticoagulation service. Presented at the ASHP Midyear Clinical Meeting December, 2011. Poster.


Wells, Trisha

Invited Presentations:

Blackmer, Allison
Bostwick, Jolene

Carver, Peggy


Ellingrod, Vicki

Folate Pharmacogenetic Predictors of Antipsychotic associated Metabolic Syndrome and endothelial functioning University Nebraska Medical Center College of Pharmacy Grand Rounds, February 2012, Omaha, Nebraska. Invited, Podium.


Dietary Predictors of Endothelial functioning in schizophrenia. University of Tennessee College of Pharmacy. Invited, Podium.

Implementing Team Based Learning at the College of Pharmacy. CRLT 50th Anniversary Meeting May 2012. Invited, Poster.

Farris, Karen


Klein, Kristin
Implementing Team-Based Learning at the College of Pharmacy. Poster presentation at CRLT 50th Anniversary Celebration. Invited, Poster.

Kraft, Michael


Mueller, Bruce
Rethinking How We Determine Drug Removal in Patients Requiring CRRT. National Kidney Foundation. Invited

Remington, Tami

Stevenson, James
Leadership Lessons for Professional Success. Invited Commencement Speaker, Rush University Medical Center Pharmacy Residency Program, Chicago, IL, June 25, 2012.
Informal and Innovative Leadership, Invited Keynote Lecture, Initiation Ceremony of the Gamma Chi chapter of the Phi Lambda Sigma National Pharmacy Leadership Society, Wayne State University College of Pharmacy, Detroit, MI, April 6, 2012.
Academic Considerations with the Pharmacy Practice Model, Invited presentation at the Pharmacy Practice Model Initiative: Defining the Future of Pharmacy Practice, Cleveland Clinic, Cleveland, OH, July 22, 2011.

Stringer, Kathleen
Pulmonary Delivered Tissue Plasminogen Activator for the Treatment of Plastic Bronchitis. School of Pharmacy, Virginia Commonwealth University. Invited.
Pulmonary Delivered Tissue Plasminogen Activator for the Treatment of Plastic Bronchitis. Faculty of Pharmaceutical Sciences, University of British Columbia. Invited.

Sweet, Burgunda
Impact of drug shortages on health systems in US. FDA drug shortage public hearing. Invited.

Wagner, Deborah
Effects of Venous Thromboembolism Risk Assessment in Hospitalized Adult Medicine Patients. ASHP MCM. Invited, Poster.

Extended Stability of IV Acetaminophen in Syringes and Glass Bottles. ASHP MCM. Invited, Poster.

Multimodal Analgesia Reduces Serious Opioid Adverse Events and Need for Rescue in Children. SPA. Invited, Poster.


Pediatric VTE Risk Scoring Assessment. VTE Steering Committee and Mott QA Committee. Invited, Podium.

Behind Closed Doors or everything you think you know about IR, MRI, CT and procedural areas. MHA. Invited, Podium.


Alvimopam for Post Op Ileus. MSQP. Invited, Podium.

InVitro Clearance of Dexmedetomidine in ECMO. 28th Annual CNMC symposium. Invited, Poster.

Evaluation of a Pediatric Venous Thromboembolic Scoring Tool in Surgical Patients. SPA. Invited, Poster.

A retrospective Description of Anesthetic Medication Dosing for Underweight, Normal Weight, and Overweight/Obese Children. SPA. Invited, Poster.

Prefilled, Prelabeled Syringes in the Operating Room. Provider Acceptance. ASA annual mtg. Invited, Poster.


Podium Presentations:

Carver, Peggy

Choe, Hae Mi
Current Concepts in the Management of Type 2 Diabetes. Annual Pharmacy Lectures, University of Michigan College of Pharmacy. Invited, Podium.

Making Your Case: Improving Transitions of Care at Discharge with Pharmacist Involvement. 46th ASHP Midyear Clinical Meeting. Invited, Podium.

Mehta, Varsha

Remington, Tami

Stringer, Kathleen
The Drug Information Service (DIS) provides pharmaceutical, pharmacological, and therapeutic information to the University of Michigan Hospitals and Health Centers and to health practitioners in the local area. In FY12, the Service handled over 2,000 questions for health care providers. In addition to providing drug information for patient care, the Service manages all drug shortages that require conversion to an alternative therapy or allocation of existing stock. Other responsibilities of the Drug Information Service include handling of product defects and drug recalls, managing the inpatient, cancer center and ambulatory clinic formularies, and participating in the development of clinical guidelines as requested. The DIS serves as a practice/teaching site for the UM College of Pharmacy and UMHS postgraduate pharmacy resident training. DIS staff is involved with the UM-CareLink physician order entry system, coordinating database integration, and ensuring that formulary agents are appropriately entered into the system to accurately reflect restrictions on prescribing or use.

The staff of the Drug Information Service supports the functions of the UMHC Pharmacy and Therapeutics (P&T) Committee and several of its subcommittees. Responsibilities include: conducting thorough reviews of all published information related to safety and efficacy of new drugs, recommending the addition or deletion of products from the formulary, implementing therapeutic conversion programs, and approving policies related to drug use across the continuum of care. The P&T Committee is supported through several subcommittees including the Ambulatory Infusion Formulary Committee, Anticoagulant/VTE Subcommittees, Antimicrobial Subcommittee, Cancer Pharmacy Committee, Drug Use Evaluation Committee, Glycemic Management Subcommittee, Medication Safety Committee, Nutrition Advisory Committee, Pediatric Medication Use Committee, and the Product and Vendor Selection Committee. Some of the key accomplishments of the Committee in FY12, either directly or through the subcommittees, include:

- Reviewed 20 new pharmaceutical agents and conducted several class reviews
- Implemented numerous medication line item reviews resulting in significant cost savings
- Implemented and/or modified restriction criteria for formulary agents due to safety concerns
- Managed on-going critical drug shortages, many of which required identification of alternate therapies
- Developed four new policies optimizing safe and effective medication use: (1) self-administration of medications in the ambulatory area; (2) use of epoprostenol and treprostinil; (3) use of 23.4% saline; and (4) inpatient desensitization for drug hypersensitivity.
- Revised six existing policies related to electrolyte replacement, drug samples, surgical prophylaxis, venous thromboembolism risk assessment and high alert medications.
- Multiple medication use guidelines were developed and/or revised. New guidelines include: daptomycin renal dosing; management of gynecological intra-abdominal infections; pediatric use of enoxaparin; use of rivaroxaban; use of enteral glutamine; dosing argatroban based on anti-IIa levels; use of intravenous acetaminophen; surgical prophylaxis in discography and octreotide use in fistula management.
- Several safety measures were implemented involving safeguards in CPOE, processes within pharmacy practice and/or formulary management.

The DIS published a monthly, web-based newsletter, Pharmacy ForUM Newsletter, informing health care staff of Pharmacy and Therapeutics Committee decisions and new information regarding medications. Each monthly issue also includes current news briefs and several articles of interest related to drug therapy or safe use of medications. The table of contents is sent to all UMHHC health-care providers by email, with a PDF version attached and a link to the full online newsletter.
## Committees

<table>
<thead>
<tr>
<th>Committee</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy and Therapeutics Committee</td>
<td>Charged with ensuring safe and effective drug use within the institution. Its activities are supported by several subcommittees</td>
</tr>
<tr>
<td>Ambulatory Infusion Formulary Committee</td>
<td>Charged with reviewing medications for use in the ambulatory infusion setting that are not used for oncology indications, and to standardize care between the outpatient infusion centers and the inpatient setting, when possible</td>
</tr>
<tr>
<td>Antimicrobial Subcommittee</td>
<td>Advise P&amp;T Committee on issues related to antimicrobials</td>
</tr>
<tr>
<td>Anticoagulation Subcommittee</td>
<td>Advise P&amp;T Committee on issues related to therapeutic uses of anticoagulant therapy</td>
</tr>
<tr>
<td>Cancer Pharmacy Committee</td>
<td>Advise P&amp;T on issues related to cancer therapy</td>
</tr>
<tr>
<td>Drug Use Evaluation Committee</td>
<td>Review drug use within the institution in order to ensure compliance with criteria, and improve medication safety and fiscal accountability</td>
</tr>
<tr>
<td>Glycemic Management Subcommittee</td>
<td>Review medications and treatment protocols designed to improve and standardize glycemic control processes</td>
</tr>
<tr>
<td>Medication Safety Committee</td>
<td>Review the medication use process to improve medication safety</td>
</tr>
<tr>
<td>Nutrition Advisory Committee</td>
<td>Review practices and develop policies specific to safe and effective use of nutritional therapy.</td>
</tr>
<tr>
<td>Pediatric Medication Safety Committee</td>
<td>Review issues specific to medication use in pediatric patients.</td>
</tr>
<tr>
<td>Product and Vendor Selection Committee</td>
<td>Review market changes in formulary products (new formulations, generics or pricing) to continually enhance formulary effectiveness</td>
</tr>
<tr>
<td>VTE Subcommittee</td>
<td>Advise P&amp;T Committee on issues related to VTE assessment and prevention</td>
</tr>
</tbody>
</table>
The goal of the Investigational Drug Service (IDS) at the University of Michigan Health System (UMHS) is to ensure that investigational drug studies and other drug-related research at the Hospitals and Clinics are conducted in a safe and efficient manner. In doing so, the IDS assists investigators in complying with the requirements of the FDA, study sponsors, Michigan State Board of Pharmacy Regulations, The Joint Commission, and hospital and pharmacy policies. The IDS is a part of the Department of Pharmacy Services (DOPS), with oversight by the UM Medical School and the UMHS Pharmacy and Therapeutics Committee, and only manages studies approved by the Medical School Institutional Review board.

The IDS is responsible for developing and implementing procedures for the proper control and handling of investigational drugs, including procurement, storage, medication labeling and dispensing, drug inventory management, and other distribution and control functions. This includes development of the Dispensing Guidelines (which outline the Pharmacy’s responsibilities for preparing, packaging, labeling, and dispensing the drug, as well as maintaining dispensing records) and a study-specific prescription ordering template. IDS pharmacists are responsible for direct oversight of all drug dispensing from the central IDS location. In addition, IDS pharmacists are responsible for providing adequate training and support for dispensing of investigational drugs by other DOPS staff in satellite pharmacy locations.

The IDS is located in the central pharmacy, and is staffed Monday-Friday, 8:00 am to 4:30 pm. It is staffed by 5 FTE of clinical pharmacists, 5 FTE of certified pharmacy technicians, and 0.2 FTE pharmacy interns. On-call support is provided for investigators, study teams, DOPS staff, and other UMHS staff 24 hours a day, 7 days a week.

### IDS Metrics Summary:

<table>
<thead>
<tr>
<th>TOTAL-ALL IDS</th>
<th>TOTAL FY08</th>
<th>TOTAL FY09</th>
<th>TOTAL FY10</th>
<th>TOTAL FY11</th>
<th>TOTAL FY12</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total billed activity</td>
<td>$348,043</td>
<td>$431,263</td>
<td>$482,646</td>
<td>$615,009</td>
<td>$534,390</td>
<td>-13%</td>
</tr>
<tr>
<td>Total unbilled activity</td>
<td>$145,951</td>
<td>$186,267</td>
<td>$194,777</td>
<td>$211,168</td>
<td>$230,589</td>
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<tr>
<td>Total charges</td>
<td>$493,994</td>
<td>$617,530</td>
<td>$677,423</td>
<td>$826,176</td>
<td>$764,979</td>
<td>-7%</td>
</tr>
</tbody>
</table>

**Dispensing by location**

<table>
<thead>
<tr>
<th>Location</th>
<th>TOTAL FY08</th>
<th>TOTAL FY09</th>
<th>TOTAL FY10</th>
<th>TOTAL FY11</th>
<th>TOTAL FY12</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2 IDS</td>
<td>4778</td>
<td>4738</td>
<td>6226</td>
<td>8266</td>
<td>6819</td>
<td>-18%</td>
</tr>
<tr>
<td>UH-Satellite</td>
<td>758</td>
<td>465</td>
<td>249</td>
<td>277</td>
<td>149</td>
<td>-46%</td>
</tr>
<tr>
<td>C&amp;W</td>
<td>432</td>
<td>195</td>
<td>437</td>
<td>390</td>
<td>382</td>
<td>-2%</td>
</tr>
<tr>
<td>OR or CVC</td>
<td>1</td>
<td>159</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>50%</td>
</tr>
<tr>
<td>CC OP</td>
<td>1605</td>
<td>1920</td>
<td>1821</td>
<td>1685</td>
<td>1782</td>
<td>6%</td>
</tr>
<tr>
<td>CC Inf</td>
<td>2441</td>
<td>3769</td>
<td>4125</td>
<td>4273</td>
<td>3588</td>
<td>-16%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>10015</td>
<td>11137</td>
<td>12860</td>
<td>14896</td>
<td>12726</td>
<td>-15%</td>
</tr>
</tbody>
</table>

| Monthly Avg # Open studies | 290 | 311 | 318 | 375 | 377 | 1% |
| New studies opened (Initiation) | 192 | 118 | 101 | 127 | 131 | 3% |
| Closed studies | 98  | 104 | 98  | 135 | 146 | 8% |

| eResearch activities | Initial reviews | 190 | 175 | 208 | 216 | 208 | -4% |
| Amendments | 589 | 752 | 587 | 512 | 550 | 7% |
| Total | 779 | 927 | 795 | 728 | 758 | 4% |

| Monitor visits | 390 | 592 | 613 | 691 | 652 | -6% |
| Inventory "Adjustments" | 1470 | 2119 | 2479 | 3495 | 3032 | -13% |
| Inventory "Receives" | 2510 | 4247 | 6434 | 7937 | 7111 | -10% |
| Inventory "Transfers" | 1713 | 3188 | 6590 | 1966 | 2174 | 11% |
| WebIDS/OPC transaction total | 5668 | 9554 | 15503 | 13398 | 12317 | -8% |
Service Highlights:

- Implemented revised IDS Fee Structure
- Hired and trained an additional IDS pharmacist (incremental increase in FTE); hired and trained P1 intern (to fill vacant position)
- Redistributed lead pharmacist assignments to balance workload to FTE
- Reorganized return shelf and other storage areas
- Continued implementation of study protocols in UM-CareLink for inpatient studies; participated in MiChart planning for implementation in August 2012
- Revised existing SPGs/SOPs (Temperature Monitoring, Use of Satellites)
- Revised IDS Operations documents for training and quality assurance purposes
- Improved and automated monthly billing reconciliation and processes
- Participated in Office of Research Compliance evaluation of IRBMED Ancillary Committee role
- Implemented improved pharmacy services to MCRU (medication delivery, participation in all study initations, new patient medication histories, monthly staff CE seminar)
- Participated in DOPS Pediatrics Hematology/Oncology Clinical Trials Workgroup
- Participated in Ravitz Phase I multidisciplinary team
- Participated in COG Phase I multidisciplinary team
- Demonstrated regulatory compliance via internal and external audits performed by the following agencies and cooperative groups: FDA; Clinical Trials Network; UM Clinical Trials Office (QARC)
- Provided representation on the following research oversight committees:
  - IRBMED Boards A2 and B1 (Skyles)
  - Protocol Review Committee (Siden)
  - Cancer Center Pharmacy and Therapeutics Subcommittee (Redic)
  - MICH CTO (Tamer)
  - eResearch Committee (Tamer)
  - ECRIT (Redic)
  - Ambulatory Infusion Subcommittee (Redic)

Medication safety and practice model projects (on-going):

- Member of ASHP SICP SAG on Medication Safety (Redic)
- Protocol Deviation Rates in Investigational Drug Clinical Trials: A Comparison of Drug Ordering Processes and Forms; Redic, Tamer, Skyles with Chen (UM COP student)
- Hazardous Drug Handling Survey; Redic with Vandagriff (UM COP student)
- Hazardous Drug Packaging Wipe Study; Redic, Christen, Chaffee with Fang (UM COP student)
- Hazardous Drug Dispensing in Ambulatory Practice Wipe Study; Christen, Redic, Chaffee with Lander (UM COP student)
- Impact of Pharmacy Student-Conducted Medication Histories in a Clinical Research Unit; Redic and Skyles with Zacardelli (UM COP student)

Staff Education:

- Continued new DOPS staff training module
- Continued DOPS annual staff IDS review and attestation
- Completed IDS Pharmacists training in Good Clinical Practice (CITI course)
- Provided regular 9 MCRU staff CE seminars (P4 APPE students mentored by Skyles and Redic)
- Continued Clinical Trials Office new staff training
- Continued Clinical Trials Office training on conducting IDS audit
- Continued MICHR Sponsor-investigator training on IDS audits

Teaching (College of Pharmacy):

- Offered IDS Elective APPE (Christich, Siden and Tamer)
- Precepted MCRU/IDS Institutional APPE (9) (Redic and Skyles)
- Precepted IDS Institutional IPPE for Fall and Winter semesters (Siden)
- Precepted IDS one-week module for Institutional APPE with Kinsey/Kraft (12) (Siden and Tamer)
- Precepted PGY-2 Hematology/Oncology Residents (2) (Siden)
- Participated in Medication Reconciliation IPPE (1) (Redic)
- Developed and taught Operations Lab Modules for P422 (DeJohn, Propes, Redic and Christich)
- Offered PGY-1 Elective Rotation and writing project (Redic)
- Mentored Pharmacy Phamily (Redic)
• Mentored P680 seminar students (Redic)

**Presentations, Posters, and Meetings:**

- Tamer HR. IDS Networking Session Facilitator, ASHP Midyear Clinical Meeting and Exhibition, Anaheim, California, December 2011.
- Redic KA. “New Kids on the Block: Medication Safety and Investigational Drugs” CE presentation for UMHS CCRU Study Coordinators, February 2012.
- Redic KA, Skyles AJ, Tamer HR. “Presence of potential risk factors for medication errors in commercially packaged versus non-commercially packaged investigational drugs” Poster presentation at ASHP Summer Meeting, June 2012.

**Publications:**

- Skyles AJ, Tamer HR, Redic KA, Siden RS, Loo AL, Mason N. Investigational Drug Service Advanced Pharmacy Practice Experience (APPE) (accepted for publication in Currents in Pharmacy Teaching and Learning)
- Siden R and Wolf M. “Disintegration of chemotherapy tablets for oral administration in patients with swallowing difficulties” submission to JOPP (accepted for publication in J Oncol Pharm Practice)

**IDS Team:**

- Kim Redic, PharmD, BCPS, Coordinator and Clinical Assistant Professor
- Anna Christich, PharmD, Clinical Pharmacist and Adjunct Clinical Assistant Professor
- Dana DeJohn, CPhT, IDS Pharmacy Technician II
- Chris Dolan, IDS Intern and PharmD Candidate, Class of 2015
- Courtney Hammer, CPhT, IDS Pharmacy Technician I
- Denise Propes, CPhT, IDS Pharmacy Technician III
- Rivka Siden, PharmD, MS, Clinical Pharmacist and Adjunct Clinical Assistant Professor
- Amy Skyles, PharmD, Clinical Pharmacist and Adjunct Clinical Assistant Professor
- Bonnie Snyder, CPhT, IDS Pharmacy Technician III
- Helen Tamer, PharmD, Clinical Pharmacist and Adjunct Clinical Assistant Professor
- Roxana Taralunga, CPhT, IDS Pharmacy Technician III
- Karrie Trapp, CPhT, IDS Pharmacy Technician III
- Susan Weadock, PharmD, Clinical Pharmacist and Adjunct Clinical Assistant Professor
- Julie Zhu, IDS Intern and PharmD Candidate, Class of 2014
COMPUTERIZATION AND AUTOMATION

The Department of Pharmacy utilizes and supports computer and automated systems in a number of areas. The Medical Center Information Technology (MCIT) Pharmacy team is responsible for supporting a number of these systems. The department has also utilized its own technical expertise in developing and supporting systems such as LabelSafe, the Reckoning and the Pharmacy external and internal web pages.

MCIT Pharmacy team

The MCIT Pharmacy team is a group within MCIT assigned solely to the support of technology in Pharmacy. This includes support of major pharmacy applications, Pharmacy automated dispensing systems, and other technical responsibilities such as ad hoc report production and desktop support. The team is located in the B2 Pharmacy administrative office area. The group provides Pharmacy systems support 24 hours per day, 7 days per week, 365 days per year. The team responds to an average of 90 MCIT help desk calls per month.

In addition to implementation and support activities, the MCIT Pharmacy team is actively involved in the education of pharmacy informatics professionals through the PGY2 Pharmacy Informatics program and precepting students on rotation from the College of Pharmacy.

Major Pharmacy systems

- WORx – Inpatient Pharmacy system used to support Pharmacy dispensing, clinical and billing activities.
- QS/1 – Outpatient Pharmacy System used to support pharmacy dispensing, clinical and billing activities in the East Ann Arbor, Ambulatory Care and CC outpatient pharmacies.
- QS/1 – Outpatient Pharmacy Point of Sale system used in all outpatient pharmacies
- Ateb IVR - phone refill system used in the Ambulatory Care Pharmacy
- Omnicell – Approximately 100 automated dispensing cabinets utilized throughout the Medical Center inpatient and outpatient locations.
- Omnicell Workflow Rx – Inventory control carousel system
- SecureVault – Narcotic Vault management system
- ECHO – Amerisource/Bergen purchasing system
- TheraDoc – Clinical pharmacy management system
- WebIDS – Investigational Drug Service management system
• MobileView – RFID based drug box tracking system
• MedNet - PCA pump system
• ROBOT – automated inpatient dispensing system
• ScriptPro – automated outpatient dispensing system
• PACMED - high speed packager
• The Reckoning – 340b tracking system
• Bosswalk – financial crosswalk system
• LabelSafe – safe packaging/labeling system

Pharmacy automated dispensing systems

• **Omnicell** – dispensing system used to secure and manage medication inventory

• **McKesson RxOBOT**
  - UH inpatients only
  - Fills on average 450 drawers/day
  - 4000 - 4500 pics/day
  - 798 line items

• **ScriptPro**
  - Used in Ambulatory Care Pharmacy (ACP)
  - Fills approximately 40-45% of ACP prescriptions
  - Contains 178 Line items

Fiscal Year 2012 Activities

There were a number of significant computerization and automation projects in the department over the past year. This work included the following projects:

- **Opening of the new Children's and Women's hospital**
  - Installation of 47 additional Omnicell cabinets
  - Relocating approximately 25 cabinets from existing Mott to new hospital
  - Configuring WORx for the new hospital
• **MiChart (Epic) project activation**
  - Supported implementation of QS/1 MiChart Charge and ADT interfaces
  - Implemented Epic Surescripts ePrescribing functionality
  - Supported implementation of Omnicell MiChart ADT interface
  - Supported implementation of WORx MiChart Charge and ADT interfaces
  - Supported implementation of WORx MiChart allergy interface

• **QS/1 Outpatient system**
  - Performed two QS/1 version upgrades

  - **Omnicell**
    - Upgraded OmniCenter (XPC) server to Omnicell software version 15.5
    - Upgraded the Omnicell XPC server
    - Upgraded all Omnicell cabinets in C&W to version 15.5 before C&W go live and provided Nursing training documents on new software features.
    - Upgraded remaining omnicell cabinets to version 15.5 in Jan/Feb.
    - Worked with Omnicell on a Beta project for their 16.5 software release.
    - Worked with Omnicell on a Beta project to evaluate their OIS 6.2 release.
    - Deployed a MS WSUS solution with Omnicell to automate the Windows Critical Update patches for all Omnicell cabinets.
    - Installed cabinets in ANGIO3 (IR#3), ANGIO5 (IR#5), ED North (redploy), ED East Wing, and MPU Expansion
    - Relocated cabinets for numerous construction projects in the ED, MPU, Trauma Burn, and other Nursing Units.

  - **WORx**
    - Performed an upgrade to version 4.3

• **Echo**
  - Supported implementation of the AmerisourceBergen Passport system

• **MobileView drug box tracking system**
  - Expanded use of the MobileView RFID system to cardiology

**Key automation projects planned for FY 2013**

Computerization and automation efforts in the Department of Pharmacy continue this year with the following active major projects:

  - **MiChart** – continue support of this project as stage 3 begins.
  - Support the selection and implementation of a smart infusion pump system
  - Implementation of an HL7 doctor (provider) interface in QS/1 pharmacy system
  - Implementation of the SystemOne replacement application FastTrack
  - Perform the following planed system upgrades
    - Upgrade Omnicell WorkflowRx servers
    - Upgrade Omnicell Workflow application
    - Upgrade Omnicell SecureVault system
    - Upgrade the MobileView RFID tracking system
  - Support implementation of the RxScan bar code checking pilot
  - Support implementation of the DoseEdge IV safety and workflow management system
The ECS Medication Use Systems Team (ECS-MUST) is nationally recognized for its collective expertise in pharmacy informatics, particularly as it applies to computerized provider order entry and clinical decision support. In accordance with the mission and values of the University of Michigan Hospitals and Health Centers, the Department of Pharmacy and the Department of Medical Center Information Technology, the ECS-MUST strives to achieve patient-centric management and optimization of Medication Use Systems as an enterprise component of our Electronic Patient Care Environment (EPCE).

**ECS Medication Use Systems Team Members:**
- Jennifer Maksym, Interim Manager, UM-CareLink
- Kelly Ciarkowski, co-Team Lead, Medication Configuration
- Jennilyn Suhajda, co-Team Lead, Medication Configuration
- Mohammad Ateya, Clinical Pharmacist Analyst, Medication Configuration
- Mary Jo Bucrek, Clinical Pharmacist Analyst, Chemotherapy Configuration
- Lori Burnham, Clinical Pharmacist Analyst, Chemotherapy and general Medication Configuration
- Wendy Bussard, Clinical Pharmacist Analyst, Med Use System Projects
- Susan Crowe, Clinical Pharmacist Analyst, Medication Configuration
- Jason Matuszkiewicz, Med Systems Analyst, Medication Configuration
- Lisa Poon-Konrad, Clinical Pharmacist Analyst, e-Prescribing, Medication Configuration
- Nancy Whitney, Clinical Analyst, Formulary Alignment and Medication Configuration

**Scope of our work | Team’s Responsibilities**

We manage more than 4500 medication order items which may exist independently or within 1800 online order sets and which are ordered and managed online by more than 12,000 CPOE users overall.

We use Allscripts’ Sunrise Clinical Manager (SCM) suite of applications, known locally at the University of Michigan as UM-CareLink. We have an electronic interface for medication orders to the pharmacy information management system, Mediware WORx. We provide Computerized Provider Order Entry (CPOE), Clinical Decision Support (CDS), and an electronic Medication Administration Record (eMAR). These three functions are core components of a fully-electronic medication-use data management process.

ECS-MUST is responsible for supporting, maintaining, optimizing and extending computerized provider order entry, clinical decision support, electronic documentation of medication administration and bedside barcode scanning for all inpatients at University Hospital, the Cardiovascular Center (CVC), CS Mott Children’s Hospital and Von Voitlander Women’s Hospital.

**Support**
- We provide 24x7x365 3rd and 4th level pager-based, on-call support for medication CPOE issues
- We respond rapidly to troubleshoot newly reported break-fix issues
- We communicate about system issues and planned downtime events
- We monitor a medication-specific issues e-mail box, pharm-cpoet@med.umich.edu
- We review responses to phone calls and other documented issues from the UM-CareLink Support Center (6-8000) for quality assurance purposes

**Maintenance**
We manage formulary updates in UM-CareLink, editing an average of 20 medication order pathways in CPOE each month.

We respond to drug shortages by making CPOE changes to indicate the shortage and suggest alternatives on-line to help ordering clinicians.

We update order sets routinely with new and revised drug therapies.

We revise the code of CDS rules and functions called Medical Logic Modules (MLMs) routinely with new and revised drug therapies.

We revise system configuration based on new findings, code updates and upgrades.

**Optimization**

- We complete 5 enhancement requests weekly for revisions to onscreen text and functions within the online drug ordering pathways of UM-CareLink.
- We add new order sets to help improve and standardize patient care using UM-CareLink.
- We conceive, code, test and implement new CDS rules and functions.
- We implement new features and functions for the UM-CareLink software.

**Committee Participation**

As a team we participate in the following committees:

- Enterprise Clinical Information Systems (ECiS) Steering Committee
- Enterprise Clinical Systems Leadership Team
- CIO Management Team Committee
- Pharmacy and Therapeutics Committee
- Clinical Decision Support and Outcomes Committee
- Medical Center IT Pharmacy Operations Committee (MCIT Rx OPS)
- Medication Safety, Adult
- Medication Safety, Pediatrics
- Cancer Pharmacy Committee
- Pharmacy UM-CareLink Integration Team (PCIT)
- Product & Vendor Selection Committee (PVSC)
- Venous Thromboembolism (VTE) Prophylaxis Committee
- Anticoagulation Committee

**Key Accomplishments FY2012**

- Successfully hired and trained 2 new Pharmacist Analysts (May/June 2012)
- 2 pharmacists from the team are certified in the Epic Willow system (June/July 2012)
- Implemented an online Nurse Vaccine Assessment and CPOE order pathway for pediatric inpatients (Aug 2012)
- Initiated changes to peritoneal dialysis antibiotic workflow to enhance safety (April 2012)
- Implemented Nutrition Services interface and workflows, including medication order related clinical decision support (July 2012)
- Continue to support the roll-out of the Anticoagulation Service in pharmacy (Spring 2012)
- Implemented Hazardous Drug notifications for staff on the eMAR (July 2011)
- Successfully passed Leapfrog Group’s CPOE Evaluation Tool (Jun 2012)
- Implemented TPN electronic order file transfer to Central Admixture Pharmacy Services (Sept 2011)
- Kept CPOE up-to-date with multitudes of drug shortages (Winter/Spring 2012)

**CONTINUOUS QUALITY IMPROVEMENT**

*Quality Improvement and Regulatory Compliance Committee*
The Department of Pharmacy Services Continuous Quality Improvement Program revolves around the departmental mission: excellence in patient care, education, and research. The committee’s specific charge is to ensure the continuous competency of all staff as they perform their care for patients, and a complete compliance of practices and processes with all the safety and regulatory rules and regulations set by regulatory agencies and professional organizations. It is composed of a chair, a medication safety coordinator, manager of ambulatory care, and leads in regulatory compliance and clinical services, staff competency, inpatient decentralized services, and system and technology improvement, and a pharmacist and pharmacy technician staff member. The group is led by an Assistant Director of Pharmacy Services.

Primary Activities of the Quality Improvement and Regulatory Compliance Committee

Staff Competency
- Conducted an annual educational competency program in March. Compliance with this competency testing this past year has been at 100%.
- Utilized M-Learning, the computerized administration, correction, collation, and reporting of this data to respective staff members, and provided aggregate data to both the department and the institution.
- Media fill testing for all designated staff as required by USP 797 on Pharmaceutical Compounding – Sterile Preparations: this was deferred in 2012 for all but new hires. Severe drug shortages required the use of the sterile vials normally used for media fill testing (which were also in short supply) to be used for drug preparation.

Regulatory Activities
- Continued planning to maintain constant readiness for upcoming TJC visit expected during the Fall of 2012.
- The recommendations from very successful April 2010 Joint Commission Survey have been implemented.
- Completed a successful ASHP accreditation visit in 2011.

Additional Tasks
- Departmental QI plan updated (annually)
- Continue to monitor narcotic use in the organization and surveillance
- Implementation of the patient reconciliation process compliant with the patient safety goals
- Participation in hospital-wide surveys and audits of medication storage areas
- E-mail communications to staff and management on compliance issues
- Preparation and dissemination of reports as requested
- Insulin storage compliance audits were tracked
- Medication labeling audits on nursing units were established and completed
- Policy and procedures review and coordination
- IV Clean Room is maintained USP 797 compliant and ensured all regulatory requirements are completed and documented.
- Monitoring for USP 797 compliance in pharmacy satellite areas.
• Drug storage audit occur and are monitored monthly for all inpatient and outpatient areas that have medication storage; focused audits occur on specific questions on the Drug Storage Audit.
• Maintain all quality metric in central location on shared drive.
• Attempt to have bimonthly meeting be paperless, present information through projector.
• Omnicell System:
  o Rate and reasons for overrides
  o Controlled substances discrepancies within pharmacy

Proposed Goals for FY13
• Inspection rate of medication storage areas in Omnicells and outpatient clinics will continue to be measured
• Inventory management improvement
• Develop inpatient operational dashboard
• Areas outside of Omnicell use for narcotics will have additional measures developed to prevent diversion
• Work in the development of barcode medication administration system to ensure compliance with regulatory and safety requirements.
PURCHASING AND CONTRACTING

The Department of Pharmacy Services provides direction for, and oversight of, pharmaceutical purchasing and contracting activities for the University of Michigan Hospitals and Health Centers. On an ongoing basis, these activities include:

- coordination of pharmaceutical and prime vendor bid processes
- monitoring purchases for contract compliance, enhanced savings opportunities and correct billing
- identifying potential purchasing cost reduction opportunities
- ensuring compliance and identification of potential cost savings in the Public Health Service (PHS) 340B Drug Pricing Program
- troubleshooting identified product shortages, recalls and market withdrawals

Purchasing team members include:
Susan Garrett, Inpatient Pharmacy Buyer
Jeremy Dornbos, Inpatient Pharmacy Buyer
Elaine Waldrup, Outpatient Purchaser
Timothy Hedglen, Outpatient Purchaser
Sherry DeLoach, Coordinator, Contracting and Purchasing

In fiscal year 2012, the Department of Pharmacy Services (DOPS) experienced an 18% increase in total pharmaceutical expenses over fiscal year 2011. Pharmaceutical purchases (inpatient, outpatient, infusion and ambulatory clinics) for FY12 totaled approximately $165,178,000 as compared to FY11, when purchases totaled, $139,463,000. Outpatient areas (traditional retail, infusion and transplant) accounted for 78% ($129,178,000) of total purchases for FY12, while purchases made for all hospitals and health centers totaled 22% ($36,000,000).

The reasons for such a significant drug spend increase are multifactorial. Explanations include: increased utilization, significant drug price increases, introduction to the market of new high-cost drugs, and purchases made off contract and direct from manufacturers to compensate for (on-contract) drug shortages. The DOPS is continuously working on methods and data sources to identify, track, and forecast fluctuations and increased drug expenditures while hoping to better predict the impact on pharmaceutical purchasing in the Health System.

The biennial pharmaceutical bid process was completed during FY12. Over 100 vendors were solicited for bids. As a result, over 7,200 individual drug line item bids were received and reviewed for contract awards. This process, completed June 30th, resulted in nearly 50 signed vendor contracts. Additionally in FY12, the DOPS initiated a Request For Proposal (RFP) for a (new) prime vendor. This RFP also included an invitation to vendors to bid on a partnership with UofM for improvements and enhancements in the UMHS supply chain process. As of press time, this RFP is still ongoing.

Significant cost saving initiatives implemented in FY12:
- Continued conversion in the inpatient and outpatient settings to generic products from brand-name, due to patent expirations. Significant savings this year were seen with transitions to the following generic injectable products: gemcitabine, meropenem, imipenem-cilastatin and levofloxacin. As well as oral formulations of clopidogrel, quetiapine and olanzapine.
- Contracts negotiated and signed with previously non-contracted vendors
- Continued success in the negotiation and access of “inpatient PHS” and “PHS-like” pricing from various pharmaceutical manufacturers for products used in inpatient areas or inpatient-like venues
- Inpatient therapeutic interchange initiatives
- Evaluated drug categories with significant changes in the market place to ensure continued cost savings
340B Drug Pricing Program

- Continued to utilize and maintain software to identify optimal purchases and follow regulatory guidelines
- Monitored and identified drugs for savings potential; especially drugs new to the 340B program, drugs offered on Apexus (340B Prime Vendor) contract as well as a new joint-venture contract with wholesaler (AmerisourceBergen Drug Corporation), and drugs that have taken significant price changes (e.g. Gemzar)

Drug recalls and shortages

- Managed over two hundred critical drug shortages during FY12. Most significant included: oncolytics, pain and emergency medications, electrolytes, antibiotics and many of the more “common” medications including sodium bicarbonate, bacteriostatic water and sodium chloride.
- Provided first and second line evaluation of available alternative purchases to ensure continued inventory during stock-out(s)
- Investigated outsourced compounded medications or foreign drug procurement
- Managed critical drug shortages through consolidation of product, therapeutic substitutions and/or alternative therapies
- Evaluated the impact of potential operational changes with available alternatives
- Provided communication to staff regarding drug shortages and recalls
- Tracked spend for substitute products to recoup cost difference (through “Failure to Supply” contract clauses) where applicable
BUSINESS OPERATIONS

Size and Scope

- During FY12, Pharmacy Services had total revenue of $424 million and total expenses of $168 million.
- In addition, we purchased and distributed an additional $20 million of pharmaceuticals for administration in our clinic areas.

**UMH Pharmacy Services FY12 Revenue and Expenses**

<table>
<thead>
<tr>
<th></th>
<th>Hospital</th>
<th>Retail</th>
<th>Infusion</th>
<th>Total</th>
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<tbody>
<tr>
<td>FY12, July 2011 - June 2012 (in 000s)</td>
<td></td>
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<tr>
<td>Revenue</td>
<td>254,452</td>
<td>51,038</td>
<td>118,704</td>
<td>424,195</td>
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<tr>
<td>Salary/Benefits</td>
<td>21,184</td>
<td>3,672</td>
<td>2,751</td>
<td>27,607</td>
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<tr>
<td>Supplies/other</td>
<td>51,150</td>
<td>21,341</td>
<td>67,989</td>
<td>140,480</td>
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<td>Total exp</td>
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<td>25,013</td>
<td>70,740</td>
<td>168,087</td>
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<tr>
<td>Gross margin %</td>
<td>72%</td>
<td>51%</td>
<td>40%</td>
<td>60%</td>
</tr>
</tbody>
</table>

**Percent Change from Previous Year**

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<thead>
<tr>
<th></th>
<th>Hospital</th>
<th>Retail</th>
<th>Infusion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>3%</td>
<td>21%</td>
<td>27%</td>
<td>11%</td>
</tr>
<tr>
<td>Salary/Benefits</td>
<td>8%</td>
<td>19%</td>
<td>0%</td>
<td>8%</td>
</tr>
<tr>
<td>Supplies/other</td>
<td>10%</td>
<td>19%</td>
<td>29%</td>
<td>20%</td>
</tr>
<tr>
<td>Total exp</td>
<td>9%</td>
<td>19%</td>
<td>28%</td>
<td>18%</td>
</tr>
</tbody>
</table>

- Our staff included 132 pharmacists, 12 residents, 151 pharmacy technicians, 12 management staff and 10 administrative staff. We experienced 8% staff growth primarily due to the opening of our new Children’s and Women’s Hospital.

**FY12 Staffing Distribution**
Special Projects

Our retail pharmacy area supports two specialty pharmacy initiatives. For our post-transplant patients we provide ongoing financial counseling and provide mail delivery of immune-suppressives and other medications needed by these patients. In addition to improving patient care and patient and staff satisfaction, this program had a net margin of $5.8 million in FY12. For University employees, we provide mail delivery of specialty drugs, with a net margin of $6.7 million in FY12.

Our outpatient infusion services had continued growth in FY12, with the addition of infusion sites in the new Mott Children’s Hospital. Our total infusion area net revenue was $118.7 million. Overall our infusion pharmacies provided medications that had a net margin of $48.0 million.

As a disproportionate share hospital, we have been eligible to participate in the 340b discount program since 2004. This participation and the discounts it provides are essential to the financial success of our special projects.

Trends and Metrics

In today’s economic climate, all teaching hospitals face significant reimbursement and cost control challenges. UMHHC is proactive in managing our financial resources to support the highest quality patient care, teaching and research activities. We maintain a rolling six-quarter forecast so that we can plan for change. We measure our revenue and expense in terms of our patient activity so that we can grow as needed. In addition to evaluating our total dollar revenue and expense, we use unit of service (UOS) ratios to guide our analysis of our performance. For the two years ended in June 2012, our patient days were up by 4.1%, our revenue per unit of service was up 3.9% and our expenses per unit of service were up 2.2%.

<table>
<thead>
<tr>
<th>Hospital Services</th>
<th>FY12</th>
<th>FY11</th>
<th>Pct Chng</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpt Adjusted Days</td>
<td>313,714</td>
<td>301,429</td>
<td>4.1%</td>
</tr>
<tr>
<td>Net Chg/UOS</td>
<td>774.19</td>
<td>745.36</td>
<td>3.9%</td>
</tr>
<tr>
<td>Sal &amp; Ben/UOS</td>
<td>57.84</td>
<td>54.24</td>
<td>6.6%</td>
</tr>
<tr>
<td>Supp &amp; Oth/UOS</td>
<td>152.03</td>
<td>151.12</td>
<td>0.6%</td>
</tr>
<tr>
<td>Total Expense/UOS</td>
<td>209.87</td>
<td>205.36</td>
<td>2.2%</td>
</tr>
<tr>
<td>FTE/10k UOS</td>
<td>6.31</td>
<td>6.25</td>
<td>1.0%</td>
</tr>
<tr>
<td>Mgn %</td>
<td>72.9%</td>
<td>72.4%</td>
<td></td>
</tr>
</tbody>
</table>
HOMEMED FISCAL YEAR 2012 in REVIEW

The milestones experienced in fiscal year 2012 included continued stabilization of our business practice model and virtual environment. Additionally, progress was demonstrated in the transition to an electronic health record.

Activity Metrics

HomeMed supports the continuum of care as a referral recipient charged to provide patients a safe and effective transition to home. HomeMed activity is directly fueled from UMHHC activity\(^1\) which is quantified to include 44,929 annual inpatient discharges, 1,938,541 annual clinic visits, and 90,688 annual emergency services / urgent care visits. This translates into an average monthly census of \(\approx 1,700\) active HomeMed patients, one-third of whom receive infusion related services with enteral nutrition comprising the remaining two-thirds of patient services provided.

Referral Capture

Data extracted from AllScripts™ (UMHS Discharge Planning Practice Management software) reveals that FY’12 demonstrated a slight increase in the total number of referrals sent to HomeMed (Graph 9). Contrarily, patients placed with HomeMed for services declined slightly from the FY’11 total of 75% to just 73% of total referrals in FY’12.

In total 3,518 home infusion referrals were entered into the Allscripts™ database for FY’12; 2,575 of which were ultimately placed with HomeMed for a 73% placement rate. In comparison to FY’11, 3,359 home infusion referrals were entered into Allscripts™ and 2,525 referrals were placed with HomeMed for a 75% placement rate (Graph 10).

Allscripts™ data also demonstrate that 989 patients required a re-start of home infusion services in FY’12 and 718 of those patients were restarted with

\(^1\) Data extracted from Hospital Finance Data Mart>Executive Dashboard>Activity>Patient Activity
HomeMed. This data reflects only those referrals captured via Allscripts™. Data from HomeMed’s internal operating software suggests that 86.4% of referrals came through the Allscripts™ processing pathway. Referrals directly faxed to HomeMed from UM physicians, UM hospital and other non-UM physician offices made up the remainder of referrals placed with HomeMed.

Clinical Care Management
FY’12 represented the first full year that HomeMed operated in the six team care management model. Each team is comprised of a dietitian, nurse, pharmacist, pharmacy technician associate and pharmacy technician specialist. Patients are assigned to a team and each team is responsible for all care (referral to discharge) for their assigned patients.

The workload was leveled for existing patients prior to beginning the new model, and was routinely reviewed and re-leveled during the first several months of FY’12. Staff feedback indicated a desire to minimize patient movement after the initial team assignment. This request led to process improvement in the workload leveling report and in how work is assigned at the intake level. Specifically, staff members access a workload leveling report and assess team workload prior to assignment of new patients; this practice also considers existing patient caseloads when team assignments are determined. This change has improved the workload leveling across the teams.

Additionally, continuity of care and customer service is believed to be enhanced by this six team model.

Clinical care management activity summarized herein is reflective of infusion therapies and does not include care interventions made in patients receiving enteral nutrition. Also, un-scheduled care management issues are prioritized and resolved as they occur; this workload is not retrospectively recorded and thus cannot be quantified within the tracking database.

In FY’12 a total of 19,612 scheduled clinical interventions were completed on behalf of infusion therapy patients. This is an increase from the scheduled clinical interventions completed in FY’11 (18,333) and is summarized below by type (Table 2).

<table>
<thead>
<tr>
<th>Clinical Intervention</th>
<th># of Tasks Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral / Other</td>
<td>3,409</td>
</tr>
<tr>
<td>Check Hospital Status</td>
<td>880</td>
</tr>
<tr>
<td>Obtain / Clarify Prescription</td>
<td>1,899</td>
</tr>
<tr>
<td>Assessment / Care Planning</td>
<td>1,244</td>
</tr>
<tr>
<td>Care Coordination</td>
<td>995</td>
</tr>
<tr>
<td>Clinical Monitoring^2</td>
<td>6,458</td>
</tr>
<tr>
<td>Laboratory Analysis</td>
<td>4,513</td>
</tr>
<tr>
<td>Other (Variable)</td>
<td>214</td>
</tr>
<tr>
<td><strong>Total Clinical Care Interventions</strong></td>
<td><strong>19,612</strong></td>
</tr>
</tbody>
</table>

Both the number and type of clinical interventions provided to infusion patients were evaluated to facilitate a year-to-year comparison and assess for

^2 Clinical Monitoring includes: First Dose Follow Up contact, clinical calls, checking patient status, clinic visits, ending therapy, and reviewing clinical paperwork.
changes in workload. This comparison is summarized below (Table 3).

<table>
<thead>
<tr>
<th>Clinical Intervention</th>
<th>FY’11 Tasks</th>
<th>FY’12 Tasks</th>
<th>YTY Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral / Other</td>
<td>3,034</td>
<td>3,409</td>
<td>12.4% ↑</td>
</tr>
<tr>
<td>Check Hospital Status</td>
<td>1,350</td>
<td>880</td>
<td>34.8% ↓</td>
</tr>
<tr>
<td>Obtain / Clarify Prescription</td>
<td>1,272</td>
<td>1,899</td>
<td>49.3% ↑</td>
</tr>
<tr>
<td>Assessment / Care Planning</td>
<td>1,374</td>
<td>1,244</td>
<td>9.5% ↓</td>
</tr>
<tr>
<td>Care Coordination</td>
<td>954</td>
<td>995</td>
<td>4.3% ↑</td>
</tr>
<tr>
<td>Clinical Monitoring</td>
<td>3,342</td>
<td>6,458</td>
<td>93.2% ↑</td>
</tr>
<tr>
<td>Laboratory Analysis</td>
<td>3,916</td>
<td>4,513</td>
<td>15.2% ↑</td>
</tr>
<tr>
<td>Other (Variable)</td>
<td>3,091</td>
<td>214</td>
<td>93.1% ↓</td>
</tr>
<tr>
<td><strong>Total Clinical Care Interventions</strong></td>
<td><strong>18,333</strong></td>
<td><strong>19,612</strong></td>
<td><strong>6.9% ↑</strong></td>
</tr>
</tbody>
</table>

Overall, these data indicate an almost 7% increase in scheduled clinical interventions in FY’12 compared to FY’11. All types of activity show an increase except for check hospital status, assessment/care planning, and those interventions captured under the term “other”. The decrease in tasks related to check hospital status and assessment/care planning are likely related to the current model requiring less hand-off of tasks amongst staff members. This decrease in “hand-off” work complemented by ownership of and accountability for that work has facilitated a more timely completion of tasks. The decrease in “variable” tasks is attributed to standardization of task type entry into the database.

Antibiotic services account for the vast majority of clinical workload, followed by IV hydration, TPN, catheter maintenance, chemotherapy, and other anti-infectives, as illustrated in Graph 11. Of note, the clinical workload related to the Children’s Intestinal Rehabilitation Program (CHIRP) patients is not recorded in this database, and is not reflected in the workload numbers.

Another means of analyzing clinical work is to review intervention type by service, as shown in Graph 12. Again we see that the vast majority of clinical work is related to antibiotic service, demonstrated by many peaks across the various intervention types. Also demonstrated is that the other most common services related to clinical interventions (antifungal therapy, catheter care,
Chemotherapy, irrigations, IV hydrations, LMWH and TPN) require significant clinical work, but only for select types of interventions.

**Infusion Nursing**

Overall nursing visit activity decreased by 10.4% in FY’12 compared to FY’11. In FY’12 HomeMed established and supported nursing services for 590 patients through the subcontracted provision of 3,625 nursing visits with an expense of $399,514. The actual cost per visit paid by HomeMed is not calculated based on number of visits and annual expense due to the time lapse inherent to visit provision and invoice remittance. HomeMed renegotiated contracts in FY’12 with five agencies, agreeing to pay increased reimbursement rates as high as $145 per 2 hour visit. Generally, the HomeMed paid expense to agencies per visit is higher than the payer reimbursement to HomeMed for providing the contractual service.

Michigan Visiting Nurses (MVN) served as the predominant nursing agency (50%), although agencies throughout the state of Michigan were employed (Graph 13). The distribution of activity among agencies is displayed graphically.

HomeMed nursing staff contributed to the provision of nursing services for 1,006 visits for 180 patients, 288 of the visits (28.6%) were covered by Blue Cross Blue Shield Home Infusion Therapy (BCBSM HIT) plans, which decreased dramatically (60.9%) from FY’11 (Table 4). This is most likely due to the increased number of Hizentra® patients followed by our nursing staff as well as an increase in the number of chemotherapy visits. Additionally, HomeMed nurses completed an additional 718 visits for patients without insurance, late connections to infusion pumps in the hospital, patients without geographical access to a preferred provider agency, and when the established agency for the patient did not have the staffing or training necessary to provide the required service. HomeMed nursing is reserved for more complex patient cases. The calculated visit per HomeMed nurse FTE per day remained unchanged at essentially one visit per FTE per day.
### Table 4: Infusion Nursing Overall Activity

<table>
<thead>
<tr>
<th>Metric Summary</th>
<th>FY ’11</th>
<th>FY ’12</th>
<th>% ∆</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Infusion Nursing Visits</td>
<td>4,047</td>
<td>3,625</td>
<td>10.4 ↓</td>
</tr>
<tr>
<td>Annual Agency Expense&lt;sup&gt;3&lt;/sup&gt;</td>
<td>$445,518</td>
<td>$399,514</td>
<td>10.3 ↓</td>
</tr>
<tr>
<td>HomeMed In-Home Nurse Activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCBSM HIT Visits&lt;sup&gt;4&lt;/sup&gt;</td>
<td>737</td>
<td>288</td>
<td>60.9 ↓</td>
</tr>
<tr>
<td>Non-BCBSM Visits</td>
<td>367</td>
<td>718</td>
<td>95.6 ↑</td>
</tr>
<tr>
<td>HomeMed Total</td>
<td>1104</td>
<td>1006</td>
<td>7.4 ↓</td>
</tr>
<tr>
<td>Visits per FTE per Day</td>
<td>1.04</td>
<td>1.02</td>
<td>-</td>
</tr>
<tr>
<td>Training Team Nurse Activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Sessions</td>
<td>1,240</td>
<td>1,090</td>
<td>12.0 ↓</td>
</tr>
<tr>
<td>Cancer Center Connections</td>
<td>1,942</td>
<td>2,545</td>
<td>31.0 ↑</td>
</tr>
<tr>
<td>Vascular Access Encounters</td>
<td>64</td>
<td>42</td>
<td>34.4 ↓</td>
</tr>
<tr>
<td>Assessments / Care Coordination</td>
<td>1,354</td>
<td>1,320</td>
<td>2.5 ↓</td>
</tr>
<tr>
<td>Clinic Visits</td>
<td>5</td>
<td>-</td>
<td>100 ↓</td>
</tr>
</tbody>
</table>

The primary drivers of HomeMed staffed nursing services (Graph 14) consisted of 894 visits for the purpose of drug administration (82%), while 8% were for initial assessment, teaching, and infusion and the remaining 10% were for access device disconnects and removal.

**Graph 14: Etiology of HomeMed Nurse Visit**

- Drug Administration
- Initial Assessment / Teaching
- Disconnect / IV Removal
- Ongoing Monitoring / Teaching
- Blood Draw or Blood Return Check
- Troubleshooting Pump/Access
- Catheter Placement / Port Access
- First Dose of Medication
- Deliver supplies
- Chemo Spill
- Medication Bag Change

HomeMed also employs a dedicated group of skilled nurses to provide patient education and training (N=1090), prior to discharge. This staff, known as the HomeMed Training Team, also connects continuous infusion chemotherapy to patients (N=2545) in the Cancer Center, first dose administration of medication in the vascular access unit (N=42), and assessment and care coordination from hospital to home for (N=1320). Activity in the Cancer Center increased 31% year over year.

**Distribution**

For the purpose of this summary, distribution will include all processes required to pick, pack, and ship an order to a HomeMed patient. The no-mix prescription picking activity increased slightly in FY’12 compared to FY’11 (Graph 15). However, the average monthly number of non-compounded units picked decreased by 7.3% in FY’12 (Graph 16).
In FY’12, the average number of monthly patient orders processed were 2,783 - up from 2,752 in FY’11 (1% increase). See Graph 17.

The average number of monthly delivery orders decreased from 2,802 in FY’11 to 2,766 in FY’12 (1.3% decrease). For the purposes of this review, same day deliveries will be defined as orders shipped and delivered on the same. Same day orders averaged 73% of all deliveries (down from 77% in FY’11). The remaining 27% were handled by UPS. HomeMed completed approximately 88% of the same day deliveries in FY’12 (down from 91% in FY’11). See Table 5 for the delivery order metric summary and Graph 18 for monthly trends by method.

The percentage of deliveries handled by HomeMed staff decreased slightly in FY’12, which can be explained by significant Inventory and Distribution (I&D) staffing changes and turn over in the second half of FY’12. It took several months to hire and train 2 replacement home care service technicians.

The FY’12 average monthly expense for non-HomeMed deliveries was $40,206 ($49,910 Jan-June ’12 during staffing shortage) and is up}

---

5 FY’11 & FY’12 Ave values represent a monthly average
6 Other defined as Overnight Courier Service
significantly (25%) from $32,144 in FY’11 (Graph 19), with an average cost per delivery of $40.35.

The increased reliance on and expense of couriers is undesirable. The distribution area had significant overtime in FY’12 equivalent to 1661 hours (42 weeks of FTE). It is unlikely that additional reduction in courier utilization can be achieved without additional HCST resources or revocation of 2 HCST positions created in the Inventory area.

**Pharmaceutical Admixture**

Clean room pharmaceutical admixture activity has remained relatively flat in FY’12 concurrent with the overall activity previously reported. The average number of compounded prescriptions filled in FY’12 was 1,707 and is up from 1,698 in FY’11 (0.5% increase). See Table 6 for annual monthly average and Graph 20 for monthly trends.

<table>
<thead>
<tr>
<th>Clean Room Metric Summary</th>
<th>FY’11 Ave</th>
<th>FY’12 Ave</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compounded fills</td>
<td>1698</td>
<td>1707</td>
<td>0.5%↑</td>
</tr>
<tr>
<td>Compounded doses</td>
<td>12,252</td>
<td>11,721</td>
<td>8%↓</td>
</tr>
<tr>
<td>Compounded units</td>
<td>11,181</td>
<td>10,903</td>
<td>2.4%↓</td>
</tr>
</tbody>
</table>

The FY’12 compounding activity decreased by 8% and 2.4% for compounded doses and units, respectively, from FY’11. See Graph 21. Of note, compounded doses and units in FY’11 were elevated by a drug shortage of adult multivitamins (no-mix). During the shortage, HomeMed compounded vitamin syringes for all adult TPN patients from 7/2010 through 3/2011. A commercial product became available and an estimated 4,500 doses of vitamins were compounded during the FY’11 shortage.

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Graph 19: FY’11 Distribution Expense by Method (Courier)

Table 6: Clean Room Admixture Summary FY’10 vs FY’11

Graph 20: Clean Room Compounded Order Activity

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7 Annual averages are based on monthly averages.
Graph 22 provides a summary of the service types compounded in the clean room in FY’12. Antibiotics are the predominate service type compounded at HomeMed (47%) followed by TPN (14%) and Catheter Care (antibiotic and ethanol locks) (14%).

**GRAPH 22: TOP COMPONDBED SERVICE TYPES**

Product purchasing trends showed that there was growth and recession of several key product/programs in FY’12. The most notable factors increasing the overall spend are: increased immunoglobulin spend ($477K), increased anti-hemophilia factor spend ($411), growth of the enteral program ($190K) and drug shortages ($175K); totaling $1.25M increased spend in FY’12.

**Inventory Expense**

As in FY’11, Pharmacy and Medical/Surgical Supplies were combined into the overall “Supplies” category for financial planning in FY’12. There were not individual spend goals for Pharmacy or Medical/Surgical plan categories. The “Supplies” category FY’12 planned spend was $12,056,498 and the year-end actual spend was $12,530,351, which reflects an overall unfavorable variance of 4%

---

**TABLE 7: FY’11 INVENTORY METRIC SUMMARY**

<table>
<thead>
<tr>
<th>Metric</th>
<th>FY ’11</th>
<th>FY ’12</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Inventory Purchases*</td>
<td>$10,325,816</td>
<td>$12,066,061</td>
<td>$1,740,245</td>
</tr>
<tr>
<td>Medical Surgical Supplies (incl. formula)</td>
<td>$2,752,479</td>
<td>$3,214,605</td>
<td>$462,126</td>
</tr>
<tr>
<td>Pharmacy (drug) Supplies</td>
<td>$7,573,319</td>
<td>$8,896,471</td>
<td>$1,323,152</td>
</tr>
<tr>
<td>340B Purchases</td>
<td>$5,052,727</td>
<td>$5,371,503</td>
<td>$318,776</td>
</tr>
<tr>
<td>Non 340B Purchases</td>
<td>$2,520,592</td>
<td>$3,524,968</td>
<td>$1,004,376</td>
</tr>
<tr>
<td>Purchases: Gross Sales</td>
<td>18.5%</td>
<td>20.2%</td>
<td>1.7 % pts</td>
</tr>
<tr>
<td>Avg Inventory Value (Drug &amp; Supplies)</td>
<td>$897,353</td>
<td>$906,895</td>
<td>$9,542</td>
</tr>
<tr>
<td>Counted Inventory Value</td>
<td>$725,437</td>
<td>$737,115</td>
<td>$11,678</td>
</tr>
<tr>
<td>Inventory Turnover</td>
<td>11.5</td>
<td>13.3</td>
<td>1.8 % pts</td>
</tr>
<tr>
<td>Inventory Shrinkage</td>
<td>19.1%</td>
<td>6.1%</td>
<td>(13% pts)</td>
</tr>
</tbody>
</table>

8 DME pump purchases are excluded.

**Inventory Management**

HomeMed had significant increases in pharmaceutical and medical/surgical supply purchases in FY’12 (Table 7).
In comparison, the FY’11 category spend was $10,713,223. The $1,817,128 (17%) expense increase in FY’12 is explained further below.

The cumulative inventory spend exclusive to Pharmacy and Medical / Surgical supplies for FY’12 amounts to $12,066,061.

Adjusting for non-pharmaceuticals purchased under the Pharmacy Supplies account, the actual spend on pharmacy supplies are calculated to equal $8,896,471\(^\text{10}\). The adjusted pharmacy supplies spend in FY’11 was $7,573,319. The unfavorable variance (17%) between FY’11 and FY’12 is driven by: an increase in operational activity (6.9%), therapy mix changes influenced by expensive drug purchases; and lost 340B eligibility due to product purchasing changes resultant from drug shortages, manufacturer re-branding, and HomeMed brand to generic conversions.

The top ten drug purchases by dollar amount in FY’12 are significantly different from those observed in previous fiscal years and are depicted graphically (Graph 24\(^\text{11}\)).

Significant pharmaceutical trends in FY’12 are:

- Immune globulins contribute to the largest component of the pharmacy spend and increased in FY’12 by over $440K.
- The second largest product group type contributing to the HomeMed pharmacy spend is blood factors. The overall product category spend exceeded $415K in FY’12.
- Three new immune modulators were dispensed in FY’12 for an increase in pharmacy spend of approximately $88K. See table 8 for a list of

---

\(^9\) Source= Datamart (actual vs actual) and Hyperion (forecast)
\(^\text{10}\) Adjusted spend= (FY total Budget Category 4605 (DataMart™)-supply invoices)+ formula invoices from Budget Category 4505 (DataMart™)-HcN™ supply and formula purchases from Amerisource and Hospira.

\(^\text{11}\) Source= HcN™ Activity
immune modulators purchased in FY’11 and FY’12.

<table>
<thead>
<tr>
<th>Immune Modulators</th>
<th>FY’11 Spend</th>
<th>FY’12 Spend</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eculizumab (Soliris)*</td>
<td>N/A</td>
<td>$49,898.88</td>
<td>$49,898.88</td>
</tr>
<tr>
<td>Alemtuzumab (Campath)*</td>
<td>N/A</td>
<td>$34,863.83</td>
<td>$34,863.83</td>
</tr>
<tr>
<td>Palivizumab (Synagis)</td>
<td>$82,976.78</td>
<td>$31,561.72</td>
<td>-$51,415.06</td>
</tr>
<tr>
<td>Infliximab (Remicade)</td>
<td>$16,143.54</td>
<td>$5,947.62</td>
<td>-$10,195.92</td>
</tr>
<tr>
<td>Bevacizumab (Avastin)*</td>
<td>N/A</td>
<td>$2,862.80</td>
<td>$2,862.80</td>
</tr>
<tr>
<td>Adalimumab (Humira)</td>
<td>$1,603.10</td>
<td>-$1,603.10</td>
<td></td>
</tr>
</tbody>
</table>

* New in FY’12

Decreases in Pharmacy spend were seen for some specialty program products, notably:

- Milrinone: Due to a product availability interruption of the normal premixed bags of Milrinone in mid FY’12, HomeMed converted to an alternative concentrated product with favorable contract purchase pricing. This conversion resulted in a $47.7K reduction in spend compared to FY’11.

- Synagis®: FY’12 was the third year of the HomeMed Synagis® (palivizumab) program for RSV prophylaxis in premature infants. The program grew from 5 patients in FY’10, to 15 patients in FY’11 and decreased in FY’12 to 10 patients. The overall pharmacy spend decreased to $31.5K in FY’12, down from $83K in FY’11. Additional work may be required in FY’13 to reinvigorate HomeMed’s marketing campaign with providers related to the availability of our Synagis® program.

The overall number of 340B units purchased in FY’12 (2,819) decreased compared to FY’11 (3,604) by 22%. These percentage decreases in FY’12 are unfavorable trends that were negatively impacted by several factors resulting in loss of 340B eligibility including but not limited to: product conversions due to drug shortages, brand to generic conversion due to payer requirements, manufacturer NDC modifications due to re-branding or minor reformulation, and increased Medicaid payer mix (1.4% increase from FY’11 to FY’12).

The FY’11 340B purchases constitute a FY’12 estimated cost savings of $2,975,307 compared to $2,772,493 in FY’11 (7% increase in FY’12). Specialty pharmaceuticals often have manufacturer imposed allocations (restrictions) on the number of manufactured units available for 340B drug discount. HomeMed advocated for new or increased access to 340B allocations in FY’12.

- In October 2011, Baxter BioScience™ granted an increase in our monthly 340B purchase allocation from 1300 g to 1800 g per month. This allocation increase was based upon increased product utilization and HomeMed advocacy/application for additional 340B allocation in 2010. The 500 g increase in access to 340B pricing is estimated to save HomeMed $160K annually.

- In April 2012, CSL Behring™ granted 340B allocation, to HomeMed, for 350 grams per month of Hizentra® (50% of average use). This 340B allocation will save HomeMed $83K annually.

**340B Drug Discount Savings**

Overall, 340B purchases comprised $5,371,503 (66%) of the total drug spend in FY’12 compared to $5,052,727 (70%) of the total drug spend in FY’11.
Enteral Nutrition
The FY’12 spend on enteral products is calculated based upon HcN™ activity and is equal $1,039,484 and is up from $849,179 in FY’11. This $190,306 (22.4%) expense increase corresponds to a 14.2% increase in average monthly enteral patient activity between FY’11 and FY’12.

Medical & Surgical Supplies
Health system financial records indicate that the HomeMed spend on medical/surgical supplies (Budget Category 4505) in FY’12 equaled $1,127,502 and is increased from FY’11 ($1,002,038). Adjusting for the medical/surgical expenses (including enteral and equipment supply products) imbedded in pharmaceutical invoices, the actual spend on formula and supplies are calculated to equal $3,214,605\(^{10}\). The adjusted spend in FY’11 was $2,752,497\(^{10}\). The $462,111 (17%) supply expense increase in FY’12 is further explained in (Graph 25)\(^{12}\) and divided among product groupings. Based upon HcN™ dispensing activity, several changes in FY’12 resulted in the increased medical/surgical variance, namely:

- Increased enteral activity resulted increases in related supplies
  - Enteral Tubes and button spend increased by $45.6K (12%)
  - Enteral Pump Supplies (Infinity only) increased by $81.2K (41%)\(^{13}\)
  - Hizentra® Program Growth increased subcutaneous administration supplies as seen by the $26K (35%)
  - Clean room supply spend increased in FY’12 primarily related to:
    - Increased PhaSeal® supply requirements $23.2K (90%)
    - TPN compounding and bag supply spend increased by $17.4K (11%)

\(^{10}\) Adjusted spend= (FY total Budget Category 4505 (DataMart™)+ supply invoices from Budget Category 4605 (DataMart™)+ HcN™ supply and formula purchases from Amerisource and Hospira.

\(^{12}\) Source= HcN™ Activity

\(^{13}\) See Equipment section for additional discussion of Pump and related supply activity

Shortages
HomeMed was affected by numerous shortages in FY’12. The shortages impacted patient care, reduced optimal drug purchasing, and increased staff workload in all clinical and operational areas. Product shortages require complex inventory and patient order management plans. Shortages can often be managed without interruption of therapy for a patient. However, in FY’12 several shortages required product allocation or referral restriction.
Some shortage management strategies implemented in FY’12 are summarized in Table 9.

**TABLE 9: FY’12 DRUG SHORTAGE INTERVENTIONS**

<table>
<thead>
<tr>
<th>Drug Shortage Response (consequences)</th>
<th>FY’12 Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generic Equivalent Substitution</strong></td>
<td></td>
</tr>
<tr>
<td>May result in off contract purchasing</td>
<td></td>
</tr>
<tr>
<td>Often results in lost 340B eligibility</td>
<td></td>
</tr>
<tr>
<td>Ceftazidime, Doxorubicin, Fluorouracil, Gentamicin, Leucovorin, Tobramycin, Magnesium Sulfate, Mesna, Pip/Tazo, Vancomycin</td>
<td></td>
</tr>
<tr>
<td><strong>Concentration Change</strong></td>
<td></td>
</tr>
<tr>
<td>Gentamicin, Octreotide, Mag Sulfate, Zinc</td>
<td></td>
</tr>
<tr>
<td><strong>Drug in class substitution</strong></td>
<td></td>
</tr>
<tr>
<td>Requires physician order change</td>
<td></td>
</tr>
<tr>
<td>Adult/Ped Multivitamins, Ilex Cream,</td>
<td></td>
</tr>
<tr>
<td><strong>Patient Specific Allocation</strong></td>
<td></td>
</tr>
<tr>
<td>Reserve drug supply for active patients and decline new business</td>
<td>Amikacin</td>
</tr>
<tr>
<td><strong>Dose restriction</strong></td>
<td></td>
</tr>
<tr>
<td>Requires physician order change</td>
<td></td>
</tr>
<tr>
<td>May result in adverse clinical outcomes from suboptimal dosing</td>
<td>Amikacin, Sodium, Bicarb</td>
</tr>
<tr>
<td><strong>Change Unit of Dispensing</strong></td>
<td></td>
</tr>
<tr>
<td>Change of product type</td>
<td></td>
</tr>
<tr>
<td>Diphenhydramine, Mini Bag Plus, Gemstar tubing, Sterile Water for Inj., Ondansetron, Ranitidine</td>
<td></td>
</tr>
<tr>
<td><strong>High Risk Compounding</strong></td>
<td></td>
</tr>
<tr>
<td>Significant increases in purchase price</td>
<td>Sodium Phosphate, Selenium, Copper</td>
</tr>
<tr>
<td>Increased risk to patients</td>
<td></td>
</tr>
<tr>
<td><strong>International Importation</strong></td>
<td></td>
</tr>
<tr>
<td>Increased ordering complexity</td>
<td></td>
</tr>
<tr>
<td>Ca Folinate (Leucovorin), Foscarnet (Foscavir)</td>
<td></td>
</tr>
</tbody>
</table>

The most significant shortages in FY’11 were related to generic pharmaceuticals and TPN macro- and micro-nutrients. Numerous manufacturers had prolonged drug shortages in FY’12 including: Hospira™, American Regent ™, and Bedford Laboratories™. Table 10 summarizes the most significant shortages increasing the FY’12 pharmacy spend. This non-exhaustive summary shows that off contract purchases and lost 340B eligibility resulted in a minimum of a $175K increased product expense in FY’12. Shortages also create additional expense through consuming staffing resources but were not quantified here.

**Table 10: Shortages increasing expenses in FY’12**

<table>
<thead>
<tr>
<th>Increased Expense from Shortages</th>
<th>FY’11 Spend</th>
<th>FY’12 Spend</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TPN Nutritional</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium Gluconate</td>
<td>$12,638.90</td>
<td>$29,449.80</td>
<td>$16,810.90</td>
</tr>
<tr>
<td>Copper*</td>
<td>$953.28</td>
<td>$5,389.92</td>
<td>$4,436.64</td>
</tr>
<tr>
<td>Potassium Chloride</td>
<td>$7,617.71</td>
<td>$6,110.96</td>
<td>$-1,506.75</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>$8,963.32</td>
<td>$17,671.77</td>
<td>$8,708.45</td>
</tr>
<tr>
<td>Selenium</td>
<td>$6,862.79</td>
<td>$20,422.60</td>
<td>$13,559.81</td>
</tr>
<tr>
<td>Sodium Chloride 23.4%*</td>
<td>$28,876.55</td>
<td>$28,077.60</td>
<td>$-798.95</td>
</tr>
<tr>
<td>Zinc</td>
<td>$4,042.27</td>
<td>$4,362.61</td>
<td>$320.34</td>
</tr>
<tr>
<td><strong>Other Miscellaneous Shortages</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini Bag Plus</td>
<td>$23,515.80</td>
<td>$39,800.00</td>
<td>$16,284.20</td>
</tr>
<tr>
<td>Octreotide</td>
<td>$26,442.92</td>
<td>$30,905.46</td>
<td>$4,462.54</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>$34,137.62</td>
<td>$54,250.84</td>
<td>$20,113.22</td>
</tr>
<tr>
<td>Leucovorin</td>
<td>$3,138.16</td>
<td>$4,212.30</td>
<td>$1,074.14</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>$57,401.59</td>
<td>$95,658.41</td>
<td>$38,256.82</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>$12,733.76</td>
<td>$17,419.32</td>
<td>$4,685.56</td>
</tr>
<tr>
<td>Fluorouracil</td>
<td>$15,633.29</td>
<td>$25,617.07</td>
<td>$9,983.78</td>
</tr>
</tbody>
</table>

**Total Expense Increase FY’12** $172,821.26

**Inventory Turnover**

The FY’12 inventory turnover equaled 13.3 and is increased from 11.5 in FY’11 and is significantly higher than national benchmark standards of 6.815. While improved from last year, it is likely that the FY’12 turnover rate is still underestimated due to continued difficulties with inventory deduction related to shared TPN products and clean room supplies. It is anticipated that new inventory deduction processes will improve the accuracy of the virtual inventory counts, valuation, and turnover in FY’13. An additional force reducing inventory turns is drug shortages, which have led pharmacies to carry additional stock above regular par levels to accommodate intermittent product releases. HomeMed has carried several months of sock of

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14 Source= HcN™ Activity

15 Comparative data acquired from Strategic Healthcare Programs, Home Infusion Operational Efficiency Benchmarking
items on shortage to bridge the gap between infrequent manufacturer production releases. HomeMed will continue to work to optimize the quantities on hand of non-shortage items in FY’13 to control inventory valuation and further improve the turnover rate.

**Inventory Shrinkage**
The estimated FY’12 Shrinkage percent is 6.6%, which is improved from 19.1% in FY’11. This significant improvement is attributed to improved shared inventory adjustments for TPN components (since Dec ’10) and clean room supplies (since Feb ’12). Further work needs to continue to improve waste tracking in the clean room, another source of shrinkage. HomeMed also plans to evaluate warehouse security and safety in FY’13 to prevent shrinkage from theft. Unlawful diversion of inventory items is not suspected due to monthly surveillance of purchasing reports and the statement of account.

**Billing and Reimbursement**

**Payer Demographics**
Gross Sales for FY12 increased by 6.9% over last year to $59,630,612, compared with FY’11 gross sales of $55,796,476. The majority of those sales were covered by BCBS plans at $15 Million dollars or 26 percent of total gross sales. Prescription drug plan payers (Rx Plans), Health Maintenance Organizations (HMO), and the state Medicaid programs were nearly equal in the amount of gross sales attributed to them with each payer representing 17% of the total gross sales (Graph 26).

The Prescription drug plan category includes medications covered by Medicare Part D plans; some commercial prescription drug plans; and all drugs dispensed to Michigan Medicaid beneficiaries as the state’s home infusion benefit is a ‘split benefit’ involving 2 claims (one medical claim, one Rx claim) per encounter. Consequently, the total sales attributable to prescription drug plans are actually HomeMed’s second highest gross sales payer. Other third party payers (Commercial) along with Medicare and self-pay made up the remaining 23% of Gross Sales for FY12 for HomeMed.

**Billing Performance**
FY’12 Gross Revenue was $59,630,612 for an average of $4,969,217 per month. Comparing these results to the previous fiscal year, revenue was up by 6.9%. Contributing to this increase were changes in therapy mix, as well as an overall
increase in infusion days of 7.6%. One notable change in therapy mix was a significant increase in the provision of Immunotherapy service, a high revenue-generating service. Our Billing Department had a very successful year with regard to timely claim submission. On average, 82.3% of claims were submitted within sixty days of the provision of service. Looking at other metrics, the percentage of AR exceeding 120 days was down 8.6% compared to FY’11 to 53%. While an improvement, this figure remains above our goal level of 30% due to a variety of factors, including recruiting and training of new billing staff, changes in payer requirements, and challenges with our software system. This goal will carry-over to FY’13, where continued improvement is anticipated. A final billing metric where progress was seen this fiscal year is the DSO. Days Sales Outstanding was down almost 20% from FY’11 to 77 days - a significant improvement. Again, this measure is expected to decrease further in FY’13, as new billing staff gain experience and intake staff work to further refine their documentation practices to meet payer guidelines in a timely manner.

Overall cash collections were slightly decreased this fiscal year by 1.8 percentage points over FY’11, and cash collection relative to gross revenue was unfavorsbly changed at 41.5%. Cash collection as a percentage of Net Revenue lag 90 days was 104.35%, reflecting the successful collection of aged AR as well as excellent collections on more recent net revenue. HomeMed continues to be very successful in collections, with bad debt remaining at a low 1% for the year.

Charity care was provided in FY’12 amounting to $213,709.23, or 0.3% of gross revenue. This includes MSupport, financial accommodation, and hospital accommodation patients.

In summary, Fiscal Year 2012 was another exceptional year for HomeMed’s Reimbursement Department. Additional advances to fully achieve the operational efficiency of the software, coupled with an increasingly seasoned reimbursement staff, should allow us to fully-realize our new steady state, and accordingly, identify areas to improve and maximize our billing and collection success.

Patient Care Satisfaction
The HCS Departmental Performance Improvement Plan outlines annual goals with established outcome measurement criteria. HCS partners with external organizations to benchmark performance, e.g., Strategic Health Care Programs (SHP), Home Care Compare, and Fazzi. The Scorecard of Selected Performance Measures displays key performance that includes ORYX measures, OASIS measures, institutional driven measures, and HCS selected measures. Highlights of these measures are summarized below (detail reports are available for reference):
HomeMed's overall performance was 4.75 favorable to the internal benchmark and at the external benchmark “needs and expectations met” (95% or 4.73 average mean score) and was positive to the institutional benchmark (93%). This measure most closely aligns with the UMHHC measure of “care experience” (Graph 28).

A physician survey was conducted this year to evaluate their overall satisfaction with care provided to their patients and satisfaction with HCS staff interaction regarding referral and ongoing care coordination processes (reference full Physician Survey Report, June 2012). Forty-three survey responses were received representing HomeMed. A number of physicians utilized services from multiple HCS businesses. There were overall positive responses regarding timely response to referrals, contact when major decisions were required, respectful staff, and willingness to recommend the service to colleagues.

**Patient Safety**

HomeMed has an active patient safety program, with staff who are engaged with reporting errors and near misses in an effort to improve processes. In April 2011, HomeMed launched a Patient Safety Committee. The committee has representative members from each operational area. The group meets monthly to review monthly error trends and recommend process improvement initiatives and staff education.
The number of errors and near misses reported in FY’12 increased by nearly 40%. This increase does not represent a spike in new errors types (Table 11). Instead, it reflects a commitment from staff to document previously underreported events.

<table>
<thead>
<tr>
<th>TABLE 11: FY12 MEDICATION ERROR FREQUENCIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Q1</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td># Medication Errors (Total incid. near misses)</td>
</tr>
<tr>
<td># Prescriptions Filled</td>
</tr>
<tr>
<td># MEs/1000 Rxs Filled*</td>
</tr>
</tbody>
</table>

There was a reduction (60%) in the number of medication errors that reached a patient caused harm or required intervention to prevent harm (category D and higher) in FY’12. See the following table for additional trends by severity.

<table>
<thead>
<tr>
<th>Table 12: Medication Errors by Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categorization of Error by Severity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Q1 FY’12</th>
<th>Q2 FY’12</th>
<th>Q3 FY’12</th>
<th>Q4 FY’12</th>
<th>Total FY’12</th>
<th>Total FY’11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor: A</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Minor: B</td>
<td>44</td>
<td>135</td>
<td>116</td>
<td>243</td>
<td>538</td>
<td>46</td>
</tr>
<tr>
<td>Minor: C</td>
<td>26</td>
<td>31</td>
<td>42</td>
<td>68</td>
<td>167</td>
<td>112</td>
</tr>
<tr>
<td>Minor: D</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Major: E - I</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>174</td>
<td>160</td>
<td>314</td>
<td>719</td>
<td>169</td>
</tr>
</tbody>
</table>

Frequency increased from FY 2011 to FY 2012

See the following table for a summary of safety initiatives that resulted from many of the errors and near misses reported by staff in FY’12.

Overall, the number of errors reported reaching the patient increased only moderately compared to a notable increase in reported near misses (Graph 29).
### Performance Improvement

Home Care Services continues its commitment to performance and process improvement. Many improvement projects are evidenced across HCS. At HomeMed, a Safety and Standardization lean project workshop took place, with the goals of standardizing and streamlining the checking processes, refining responsibilities for each checking point to reduce the number of errors at the final checking steps, and reducing the number of errors that potentially reach the patient.

Additionally, a Clinical and Inventory/Distribution workgroup was created and active in FY’12. This workgroup designed process change to promote standardization within operations amongst multiple team, inventory, and distribution staff. Near the end of FY’12 expected processing time frames were implemented along with standard, scripted communication for management of routine, repeated patient issues. Steps were also taken to begin capturing unscheduled delivery charges. The process changes heralded by this group will continue into FY’13.

### Health Care Compliance

The 2012 HCS Compliance Work Plan provided the framework for the HCS Compliance Program. This included risk assessment, prioritization, and action plans to address compliance issues identified by the governmental regulators, OIG, new regulations, and departmental identified risks and improvement goals. Highlights of risk reduction activities, specific

<table>
<thead>
<tr>
<th>Table 13: FY’12 Safety Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q1</strong></td>
</tr>
<tr>
<td>• Managed Ketorolac recall</td>
</tr>
<tr>
<td>• HomeMed Inventory Management Lean</td>
</tr>
<tr>
<td>Retreat to outline current state</td>
</tr>
<tr>
<td>and develop standardized processes</td>
</tr>
<tr>
<td><strong>Q2</strong></td>
</tr>
<tr>
<td>• Adjusted compound labels so that</td>
</tr>
<tr>
<td>entire label can be read without</td>
</tr>
<tr>
<td>carryover to the back of the product</td>
</tr>
<tr>
<td>• Implemented guidelines of Cart Sharing</td>
</tr>
<tr>
<td>for orders that use the same medication vial in an attempt to circumvent “Wrong Patient” errors when compounding orders</td>
</tr>
<tr>
<td>• Developed new standardized practices for: Checking Pharmacists, shipping staff, and clean room staff</td>
</tr>
<tr>
<td>• HomeMed label changes to add yellow strip on label that highlights basic prescription information</td>
</tr>
<tr>
<td><strong>Q3</strong></td>
</tr>
<tr>
<td>• Launched the HomeMed Medication Management webpage</td>
</tr>
<tr>
<td>• Implemented patient education initiative to circumvent potential adverse events related to forced substitution of Gemstar pump tubing because of a shortage on the standard tubing sets</td>
</tr>
<tr>
<td>• HcN version 4.4 updates prevents team members from saving an order when the stability of the drug being filled is shorter than the days’ supply</td>
</tr>
<tr>
<td>• Modified the signature area on the delivery slips to increase staff accountability</td>
</tr>
<tr>
<td><strong>Q4</strong></td>
</tr>
<tr>
<td>• Implemented standardized compounding instructions</td>
</tr>
<tr>
<td>• Implemented mandatory cover sheets for each compounded order</td>
</tr>
<tr>
<td>• Completed internal review of Zosyn/piperacillin-tazobactam precipitation complaints which lead to multiple medication errors/adverse drug events</td>
</tr>
<tr>
<td>• Conducted Failure Mode Effect Analysis (FMEA) related to order processing and handling in response to a wrong patient error that lead to a HIPPA violation</td>
</tr>
</tbody>
</table>
regulation implementation, and enhanced staff & leadership education are included below

1. The HCS RAC audits and related action plans were reported monthly to the UMHS Revenue Integrity Committee.

2. HomeMed had only two requests for low dollar infusion services. One case was appealed and is still pending resolution.

**Employee Engagement**

UMHHC conducted the annual employee engagement survey in March 2012. This more detailed survey, now in its third year, offers improved data for analysis and targeted improvement efforts. The HCS staff willingness to recommend work area to someone looking for a good workplace (70.0) showed an increased mean score, but not a statistical difference from last year (Table 14). The HCS score was nearly at the UMHHC measure (70.8). The institutional target for FY’17 is 80. The mean score of staff attending a public meeting to discuss the previous year’s survey results (69.2) remains stable. It was exciting to see that 6/33 questions showed statistically significant improvement from last year (building cleanliness, effective problem-solving, communication with coworkers, mutual respect, work to reduce customer wait times, and high motivation teamwork).

**Table 14: Historical Employee Engagement Scores**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>259</td>
<td>301</td>
<td>356</td>
<td>356</td>
<td>317</td>
</tr>
<tr>
<td>Indicator 42: Willingness to recommend work area to someone looking for a good workplace</td>
<td>63.9</td>
<td>65.1</td>
<td>67.0</td>
<td>68.0</td>
<td>70.0</td>
</tr>
</tbody>
</table>

**Employee Education**

FY’12 program priorities focused on job specific training, professional development, MiChart training and implementation, streamlining of education tracking, and offering more on-site education programs. These priorities were driven by staff feedback, regulatory requirements, institutional initiatives, and learning needs assessments. Highlights include:

- Updated Leadership presentation in collaboration with Senior Leadership.
- Glo Germ™ hand hygiene demonstration.
- Customer service re-enactment, and Service Excellence commitment.

**Human Resource Management**

HCS structure is designed with a central Human Resources Director for the entire division. Internally within each service line, the management team oversees and provides human resource management on a daily basis. Service line managers and supervisors are responsible for all personnel functions including hiring and termination, performance evaluations and discipline, work place accommodations, etc.

HomeMed continues to have a very low turnover rate in staff. Turnover rate decreased this fiscal when compared with FY’11 (6.6% turnover). In FY ’12, the calculated turnover percentage was 4.8% or 5.4 FTEs out of a base FTE of 112. Of these individuals, two employees transferred into other UMHS departments.
Overall, HomeMed continues to demonstrate a consistently high employee retention rate.

**Marketing & Community Benefit Initiatives**
Throughout the year HomeMed conducted numerous projects intended to raise awareness of our services within the patient and referring physician community.

One important, on-going project is the HomeMed external website which provides 24x7 access to helpful patient resources. These resources include pump manuals, instructions for catheter care and frequently asked questions. This year HomeMed related content was also added to the health system’s new public infosite: uofm health.org.

**Alliances and Partnerships**
In FY12 we continued our partnership with numerous strategic organizations including: Hemophilia Foundation of Michigan, Hemophilia Alliance, Brain Injury Association of Michigan, and Case Management Society of America.

The Hemophilia Foundation of Michigan (HFM) is chartered to help patients with hemophilia as well as other bleeding disorders. Each year this organization sponsors a number of fundraisers we provide donations to. This past year we donated $4,500 to Hemophilia Foundation of Michigan activities.

The largest HFM event was SpringFest weekend, which is held each April in Frankenmuth for children with bleeding disorders and their families. Over 400 people attended this popular event at which we had a display highlighting our services.

HomeMed also provided support for the national Hemophilia Alliance organization which provides consulting and guidance to close to 100 hemophilia treatment centers.

Besides sponsoring an annual membership, HomeMed provided the funding for two UMHS Hemophilia Treatment Center members to attend the annual Hemophilia Alliance conference. This conference was attended by members of many other hemophilia treatment centers located throughout the country. During the 2-day session the attendees learned about the latest medical and reimbursement issues relating to the bleeding disorder community.

**Community Benefit Initiatives**
As in previous years HomeMed provided support for a number of community programs that benefited many patients and respective families.

The bleeding disorders community is a population HomeMed continues to strongly support. Each year medical supplies and medical support are donated to Camp Bold Eagle – the summer camp for children afflicted with hemophilia. This year our donation of supplies and medical support was over $3,000.
As in past years we also provided $1,000 to bleeding disorder patients who need assistance with transportation to and from their medical appointments. The funds were used to purchase gas cards as well as for cab and bus fare.

In FY’12 HomeMed was the major sponsor for the annual HTC family picnic. This event was held at a local park and provided an opportunity for patients and families to meet one another and share experiences and knowledge relating to bleeding disorders.

Twice in the past year HomeMed sponsored the group dinner meeting for parents with children with bleeding disorders. This very successful event series allows parents time to discuss their respective child’s medical issues with other parents going through the same experiences.

HomeMed proudly continues to provide charity care for many UMHS patients who are unable to pay for the therapies provided by HomeMed. In Fiscal Year 2012 we provided over $99,500 of charity care to our patients. An additional $114,000 of hospital and financial accommodations were provided by HomeMed on behalf of UMHS patients.

**Academic & Professional Achievements**

HomeMed continues to contribute to the education of Health Science students. There were 9 student placements at HomeMed (i.e., 8 Pharmacy, 1 Nursing) in FY ’12 and 2 staff members presented one or more lectures in the University of Michigan College of Pharmacy, School of Nursing and School of Public Health. Four pharmacy interns were employed at HomeMed. Additionally, HomeMed clinical staff supported the experiential training of students by supporting rotation components for interns educated through the School of Public Health and UMHHC Pediatric Food and Nutrition Services.

Professional staff made presentations at the local, regional, and national level; participated in scientific research as the primary or secondary investigator; and, authored both locally and nationally distributed publications. Three staff members serve as professional association board of directors (MHHA, NHIA, MSPEN, MPA) and three staff members serve on various national professional association committees. Two pharmacists are board certified in nutrition support; all in-home infusion nurses are certified registered nurses of infusion (CRNI).

In FY ’12, HomeMed hosted a group of international pharmacy professionals consisting of students, pharmacists, and professors through the College of Pharmacy International Exchange Program.
FY '12 Accomplishments

HomeMed identified 22 objectives at the start of FY'12. Of these, 10 were successfully achieved to completion and include:

- Successful conversion to the 5010 format for claim submission.
- Expansion of the home subcutaneous immunoglobulin program with an overall eleven-fold increase in activity ($512,300) compared to FY'11.
- Containing payment of recovery dollars to less than 25% of that identified in payer audit(s).
- Improved manager recognition of employee effort while engaging employees in co-worker to co-worker positive recognition.
- Incorporating “The Patient’s Story” into On Call hand off communications.
- Measuring productivity and efficiency in order processing within the new team business model.
- Implementation of a new Medication Management web page as a staff resource for information.
- Use of the BE WELL platform for patient education regarding gravity administration of antibiotics.
- Software program functional changes to secure data fields with greater integrity.
- Implementation of ergonomic changes to employee workstations and work areas to increase employee safety.

Four of the 22 goals identified in FY’12 realized substantial progress nearing greater than 75% completion and include:

- Management of Accounts Receivable such that claims were submitted in a timely manner in conjunction with problem identification and resolution creating a balance between new claim submission and addressing aged A/R.
- Changing processes to ensure team staff comply with medical documentation requisite of Jurisdiction B Provider requirements for all refill requests.
- Conversion of inventory products from brand name to generic to optimize pharmaceutical reimbursement driven by payer formularies.
- Implementation of standardized pharmacist checking processes in the clean room to ensure consistency in evaluating and authorizing the dispensing of compounded products.

Six of 22 goals were partially completed and will be carried over in some format into the next fiscal year. These include:

- Reducing the overall percentage of errors that reach a patient by 50%. This goal will be modified to accommodate encouraged increasing in overall error reporting.
- Work collaboratively within the health system to ensure patients are familiar with their insurance coverage and knowledgeable about potential out-of-pocket expenses incurred for home infusion therapy.
- Further formalization of processes related to contract reviews to facilitate cost effective purchases of necessary inventory items.
- Optimization of workflow in the HomeMed warehouse through physical redesign suited to increase efficiency and reduce waste.
Two of 22 goals not completed will remain active in FY’13:

- Increasing patient understanding of how to voice a complaint.
- Implementing an electronic platform for in-home nurse scheduling and charting.

**FY ’13 Goals and Initiatives**

HomeMed management began work to craft FY’13 goals in February and March 2012. These goals were finalized at the beginning of the fiscal year and shared with staff in August 2012.

- **Meet or exceed $63,000,000 in annual gross revenue.**
- **Improve financial metrics as compared to FY’12 values.**
- **Minimize risk for revenue loss through process change which ensures compliance with payer requirements.**
- **Implement a process for contract reviews at the distributor level to ensure access to optimal pricing when purchasing inventory items.**
- Decrease HomeMed incurred courier expenses related to outsourcing of deliveries.
- Manage salary and wage expenses to achieve an annual 2.5% productivity target.
- Decrease cost through increased efficiency gained from physical redesign of space and use of standardized workflows.
- Decrease spend within General and Office Supplies.
- Convert manual, paper documentation pathways to electronically supported activities captured within the electronic health record.
- Transition in-home nursing scheduling and charting from paper into HcN™ electronic pathways and documents.
- Improve patient satisfaction industry benchmarks for patient understanding of financial liability and how to voice a complaint.
- Create a department dashboard to convey progress toward FY’13 goals using objective measurements updated routinely.
Acknowledgements

Home Care Services (HCS) departments are acknowledged for their commitment to collaborative and coordinated care for our patients served and for the pursuit of excellence both distinctly and collectively.

HomeMed

MedEQUIP

Michigan Visiting Nurses

Michigan Visiting Care

Wheelchair Seating Services

HCS Senior Leadership is recognized for their vision and strategic planning for the future.

Ken Bandy          HCS Administrator
Karolyn Brewer     Director: Quality & Compliance
Stephanie Crane    Director: Finance
Kim Jacobson       Director: Information Systems
Chris Maksym       Director: HM, ME, WSS
Tom Mann           Director: MVN, MVC
Wendy Pratt        Director: Human Resources

The HomeMed Management Team is recognized for their many valued and effective contributions and for reaching the goals set forth by the department.

Terri Cook         HCS Facilities & Information Management
Warren Deppong     Reimbursement Manager
Debbie Kovacevich  Nurse Manager
Lisa Klein         Pharmacy Manager
Chris Maksym       Director: HM, ME, WSS
Mary Quick         Accounts Receivable Manager
Tricia Sirois      Assistant Director
Jamie Tharp        Inventory Distribution Manager

Most importantly, we recognize and applaud the employees of HomeMed who extend a daily effort to the safe and successful provision of our services.