Welcome to the Department of Pharmacy Services Annual Report for Fiscal Year 2009. 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 the opening of an Emergency Department Pharmacy, the implementation of a specialty pharmacy prescription program for UM employees, dependents and retirees in collaboration with the UM Office of Staff Benefits, and implementation of a comprehensive prescription drug program for solid organ transplant patients. We also worked collaboratively with others to implement a structured vocabulary (lexicon) for the medication list in our electronic medical record (CareWeb). This initiative will greatly enhance medication reconciliation efforts, improve patient safety, and prepare us for our planned implementation of outpatient e-prescribing. In addition to these projects, we have worked with others in the University of Michigan Hospitals and Health Centers on plans for a replacement Children’s and Women’s Hospital (scheduled for opening in 2012). Multiple pharmacies are planned for the new Children’s and Women’s Hospital. We received approval to move forward with bedside bar-code medication administration (BCMA) and have been working to develop a plan to implement intelligent infusion device technology (smart pumps) in our adult
population. “Smart” syringe pumps are already in use in our pediatric patients and in our patient controlled analgesia (PCA) therapies.

This year we also received word that we received the full six year accreditation by the American Society of Health-system Pharmacists (ASHP) for our PGY2 specialty residency program in cardiology. This is the first time that this program has been reviewed for accreditation and it joins our other accredited PGY2 programs in Critical Care, Pediatrics, Informatics and Information Technology, Infectious Diseases, and Hematology/Oncology.

We have continued to add outstanding staff and expand services to our constituents. One of our most exciting and primary goals has been to develop our pharmacy practice model initiative. We have continued to expand our new pharmacist practice model on units 5A, 5B, 6B and 6C in University Hospital and 6M and after hours coverage of the NICU in Mott Children’s Hospital. In addition we are evaluating the impact of our Med Manager decentralized pharmacy technician pilot program that was implemented in the Pediatric ICU and the Pediatric Cardiothoracic unit. We hope to learn lessons that will allow us to develop the model for future practice by our pharmacists and pharmacy technicians.

This past year our pharmacy technicians made a strong commitment to assuring competence and improving patient safety by achieving 100% certification by the Pharmacy Technician Certification Board (PTCB) While this is not yet a legal requirement in Michigan, UM pharmacy technicians are now all certified by PTCB within 6 months of hire and are setting the standard in the state.

One of the most important and remarkable accomplishments during the past year has been the integration of our ambulatory care clinical pharmacists into the Ambulatory Care Services Medical Home model. Under the direction of Hae Mi Choe, PharmD, ambulatory care pharmacists have been integrated fully into the UM 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 related to the management of drug therapy in patients with a variety of chronic disease states.

During the past year, Deb Pasko, PharmD, our Clinical Coordinator in Pediatrics, left the department to take a management role within the new Mott Children’s and Women’s Hospital Project. We were very sorry to see Deb leave the department but we are gratified that we will continue to work with her in her new role and responsibilities. Elizabeth Beckman, PharmD, was recruited to fill the Clinical Pharmacist Specialist Role in the Pediatric Intensive Care Unit. In addition, we added Ericka Howle to our clinical staff. Erika will practice in Hematology/Oncology, primarily in pediatrics.

In FY09 we also experienced another change in our management team when Mike McGregory, PharmD, left the institution to take a management position closer to home with the Clarian Health System in Indianapolis. We were fortunate to recruit Phil Brummond,
PharmD, from the University of Wisconsin’s MS/administrative residency program to assume management responsibility for the University Hospital and CVC satellite pharmacies.

The advances I have described 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 areas of our department during FY2009.
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 Systems mission, vision, values, and goals.
2. To assure that pharmaceutical care is of the highest quality, meeting or exceeding community and national standards.
1. To identify pharmaceutical care issues, trends, and opportunities for improvement related to the systems that support that care.
2. To assure that pharmaceutical care, practice and professional performance are regularly, validly, and reliably evaluated.
3. To assure that procedures, methods, and systems are cost effective and demonstrate effective impact.
4. To conduct research and create new knowledge related to medications and pharmacy services in patients.
5. 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
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 for more information.

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

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

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.

The Department is responsible for dispensing medications daily for an average inpatient population of 800 patients between the University and Mott Hospitals and the Cardiovascular Center combined. Additional services are provided to support the Emergency Department and other outpatient and clinic settings. The Department consists of pharmacists as well as technical and support personnel, who work together to assure patients receive the highest quality pharmaceutical care possible.

There are currently 8 total inpatient pharmacy satellites:

**University Hospital**- 3 inpatient pharmacies, Emergency Department pharmacy and 1 OR pharmacy

**Mott Children’s Hospital**- 1 inpatient pharmacy and 1 OR pharmacy

**Cardiovascular Center** – 1 pharmacy to service both inpatients and the OR

In addition, there is a USP 797 compliant central clean room for IV admixture in the B2 level pharmacy of University Hospital.

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 entry, 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.

The inpatient staff pharmacists also provide a variety of clinical services such as aminoglycoside and vancomycin kinetic dosing, renal dose adjustments, therapeutic interchanges, IV to PO conversions and antimicrobial management through the Patient Focused Care Program (PFC).

The Inpatient Operations Team also participates in many educational initiatives including the training of pharmacy residents, pharmacy students, pharmacy technician students, and participate in our international pharmacy exchange programs.

**Inpatient Operations Management Team**

- John Clark, Associate Director
- Brian Callahan, Assistant Director, Inpatient Operations
- Phil Brummond, Manager, UH Satellites
- Lisa Ginsberg-Evans, Manager, IV Systems
- Denise Glenn, Manager, Mott Pharmacy
- Mike Kraft, UH Clinical Coordinator
- Kathy Kinsey, Educational Coordinator
- Pam Walker, Lead ED Pharmacist
- Nancy Robare, Lead OR Pharmacist

Brian Callahan, Pharm.D.
Manager, Inpatient Operations
Key Accomplishments/ Improvement Initiatives

- Began operations of a 24/7 ED Pharmacy Satellite
- Operational planning for new Children and Women’s Hospital
- Planned and implemented as part of our practice model initiative, a program for integration of clinical and distributive work for pharmacy generalists on patient care units and planned expansion. Areas currently covered by this program include:
  - 5A, 5B, 6B and 6C in University Hospital
  - 6M and after hours coverage of NICU in Mott Hospital
- Developed workflow maximizing use of a new Class 10,000 IV Room
- Implemented an environmental monitoring plan for IV Admixture Program
- Recruited and hired a Manager for UH Pharmacies
- Developed a system for measuring metrics for work load
- Developed an attendance management system
- Expanded services to several new units including
  - 20 bed intermediate care unit
  - 16 bed general care unit
  - 17 bed clinical research unit
  - 6 Bed expansion of the PICU
- Developed and implemented a continuous education lecture series for staff
- Developed plans for remodeling the Mott Pharmacy, including workflow redesign
- Established partnership with Food and Nutrition Services to ensure safe process for adding electrolytes to pediatric oral feeds
- Improved management of satellite inventories
- Streamlined the pre-op medication order processing and distribution system
- Partnered with Perfusion to implement a new standard cardioplegia solution
- Developed and implemented changes in the technician staffing model to reduce payment of overtime hours
- Provided educational support to technicians preparing for the PTCB certification exam
- Presentation at the Michigan Society of Health Systems Pharmacists Annual Meeting by Annette Davis, CPhT and Rusty Kalmbach, CPhT on methods for pharmacy inventory management

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
MEDICATION USE SYSTEMS

The Medication Use Systems Pharmacy Services is based out of the B2 pharmacy area. This section of the Department of Pharmacy Services is responsible for a wide variety of services to both internal (inpatient satellite pharmacy staff) and external (Omnicell end users, clinic staff) pharmacy customers.

Medication Use Systems
Pharmacy Services Management Team

Members:
John Clark, Associate Director
Barb Higgins, Assistant Director, Medication Use Systems
Kim Landini, Manager, Medication Use Systems
Diane Shoemaker, Technician Coordinator
Trish Marion, Technician Coordinator
Susan Garrett, Purchaser
Jeremy Dornbos, Purchaser
Brian Brower, Purchaser
Paula King, Database Integration Technician
Dawn LaFever Technician Scheduler/Recruiter
MCIT Pharmacy—Russ Burnham, Robin Schmidt, Rob Hall, Pete Link, Todd Benner and Rick Rinke

Responsibilities of the Team:

- Procuring all medications from wholesalers and direct manufacturers
- Managing drug shortages and recalls
- Processing all medications into Omnicell Pharmacy Central (OPC) vertical carousels
- Maximizing the use of OPC software to better manage inventory turns and PAR levels
- Restocking majority of the over 130 Omnicell Unit Based Cabinets (UBC) with collaboration of staff in inpatient drug distribution area for stockouts in the 24 cabinets in the cardiovascular center (CVC).
- Processing, dispensing and monitoring all controlled substances through the B2 Vault
- Annual controlled substances inventory process for inpatient medication supplies and ambulatory clinics
- Packaging bulk doses of controlled and non-controlled substances
- 3 times per week bulk compounding activities
- Servicing all on site and offsite clinic medication needs through the requisition process
- RobotRx functionality and upkeep for filling the UH cartfill
- PACMED functionality and upkeep for packaging for RobotRx, OPC and Omnicells
- Maintenance of current line items, new additions, deletions and new templates for LabelSafe labeling software
- All filling and distributing of medication Kits and Boxes
- New entries, changes, and deletions in WORx pharmacy computer order entry system and Omnicell Pharmacy Central Carousel system
- Assistance with discrepancy resolution for Omnicell UBC
Use of Omnicell’s Executive Dashboard to optimize Omnicell UBC stocking and avoidance of stockouts

Accomplishments for 2008-2009

- Added a third purchasing position to assist with PAR level evaluation. With the new structure was able to save $750,000 by changing PARs in OPC, changing to alternative drugs or packaging by PACMED. This third purchaser has also allowed us to catch overbill errors and more closely evaluate items going to guaranteed returns.
- Clinic requisition system was modified to include formularies for certain clinics.
- Change to Borrow and loan processing through OPC so can track these much more closely.
- Increased Robot efficiency by performing a Rod-Rack Reconfiguration. This increased the number of rods by 33%. This required the UH cartfill to be filled manually one night to allow the Robot to be refilled after being reconfigured.
- Implemented a new HL7 real time interface between ConnectRx and WORx: gives us better data from the Robot dispensing. Lots of testing and database work to prepare for this new interface.
- Increased canisters from 225 to 318 in the PACMED. These are being used to package for Robot, OPC and Omnicell UBCs. We are also packaging approximately 54 drugs through the STS stray that do not have a canister.
- Beta site for Omnicell UBC software: Saved ~$300,000 in cabinet equipment purchases during testing time.
- Evaluated CVC Omni meds to add 40-70 new meds to CVC 4 and 5 to improve cartless model and reduce meds being dispensed from Robot.
- Omnicell—installed and implemented Omnicell equipment for Angio 2, MCRU, CVC Nuc Med, ER Pharmacy, Mott Preop Mott PICU 2, NIR #1, #2, #3, Radiology B2MRI SWAT, 5Rx 1cell, and 8Rx 1cell. Current cabinet totals: 129 Omnicells, 4 servers, 40 interfaces.
- Omnicell—relocated multiple cabinets for construction projects.
- November 2008 changed override status of 350 medications to non-override.
- Implemented several new process in Vault; including more stringent dispensing practices observation, accountability for daily activity, waste and expiration date processes.
- Outsourced Adult PCA cartridge compounding.
- Weekly Pharm-Omni meetings
- Weekly MUST OPS meetings
- LabelSafe changes, updates to templates.
- Scheduling changes including: 2nd year for tech Holiday selection process, improved directions and procedures for selecting holidays, implemented PTO approval guidelines
- Promotions: 8 technician to Tech II, 1 technicians to Tech III

Numbers At A Glance

* Installation of 12 Omnicell UBCs; current totals—130 cabinets, 4 servers, 2 test servers, 17 interfaces
* Reconfigured 15 Omnicell UBCs to move carriers around, add high security drawers
* Updated Robot rods, increasing space by 33%
* Integrated PACMED into day to day activities packaging bulk meds for Robot, OPC and Omnis; currently have 318 active canisters and 54 drugs packaged by STS.
* Saved ~$750,000 by reducing PARs in OPC, changing to alternative drugs or packaging thru PACMED
Clinical Pharmacy Services

The Department of Pharmacy Services provides pharmaceutical care to both inpatients and outpatients. Clinical pharmacists function as integral members of health care teams at University Hospital, C.S. Mott Children’s Hospital, the Cardiovascular Center, within the Cancer Center, and within the UMHHC Ambulatory Clinics, working with physicians to achieve desired therapeutic outcomes, prevent or minimize drug-related problems, and improve medication use. Currently, 35 clinical pharmacist specialists provide direct patient care services.

One of our major accomplishments this past year was the implementation of pharmacy services in the Emergency Department (ED). With a pharmacy satellite located in the ED, we provide distributive and clinical services to patients in this important practice area 24/7. Our pharmacists are now integral members of the ED team, participating in direct patient care (such as resuscitation and stroke responses), research studies and protocol development, and providing inservice education for ED staff. Work is underway to document the value and impact of our services in the ED.

This year, we initiated a Pharmacist Anemia Management Clinic in the Cancer Center. Pharmacists manage patients with anemia caused by cancer or cancer chemotherapy, using an evidence-based approach to optimize treatment outcomes and promote compliance with CMS requirements and guidelines.

Major changes in the integration of ambulatory clinical pharmacists occurred in FY09 under the direction of Hae Mi Choe, PharmD. Dr. Choe assumed the role of Director of Innovative Ambulatory Pharmacy Practice Models. These program changes are outlined in the section on Ambulatory Care.

We also continued to expand our clinical practice model for staff pharmacists, successfully rolling the model out to several additional patient care units at University Hospital and the Holden Neonatal ICU at Mott Hospital. This model extends the role of our pharmacists beyond operations and involves them in direct patient care activities.

Over the last year, clinical pharmacists lead several important initiatives to significantly reduce drug cost and help the department achieve budgetary targets. These initiatives, which included implementing a protocol to standardize dosing of rasburicase, converting to FreAmine III® 10% as the preferred parenteral amino acid product, restricting use of peripheral parenteral nutrition and converting our floor stock insulin supplies from regular insulin to Novolog insulin, resulted in significant cost savings to the institution while maintaining high quality care that meets the needs of our patients. Other long-standing departmental programs, such as our Antimicrobial Stewardship Program, continued help assure cost-effective and appropriate use of high-risk or high-cost medications and contributed significantly to the cost savings.

Our clinical 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. Clinical initiatives and quality improvement projects undertaken by clinical pharmacists this year are listed below Clinical Pharmacists –

- Assisted with revision of a VTE risk assessment tool for new admissions
- Collaborated with Clinical Affairs, Medical Staff, and Nursing to develop and implement strategies to meet the National Patient Safety Goals pertaining to anticoagulation.
- Collaborated with Nursing to implement fall reduction strategies for patients on the Psychiatric Unit.
- Completed a blood pressure study in the Turner Geriatric Clinic to improve accuracy of blood pressure readings.
- Completed an audit assessing compliance with appropriate medication storage, which led to changes in freezer storage temperatures in the clinic.
- Completed an audit of medication labeling by nurses in medication rooms and at the bedside.
- Completed an evaluation of clinical and economic outcomes of thymoglobulin induction in living unrelated kidney transplant recipients.
- Comprehensively reviewing the stewardship practices and providing feedback regarding issues and problems to the appropriate management staff.
- Conducted a CPR orientation for all new pharmacy staff.
- Conducted pharmacist inservices on surgical infection prophylaxis guidelines.
- Contributed articles to the Emergency Department newsletter, E-Mergent News.
- Coordinated BCLS training for staff.
- Coordinated revision, updating, and publication of the UMHS Guidelines for Antimicrobial Use.
- Coordinated the conversion to an online IV compatibility reference for pediatrics.
- Coordinated the Mott pharmacy redesign project.
- Coordinating pharmacy response to the rabies vaccine shortage, providing leadership to the ED group.
- Created an ARDS patient SICU admission order set.
- Created an educational video on the lung transplant process and an inhaler patient education handout for the Pulmonary Clinic.
- Created an SICU bowel management order set.
- Created naloxone instruction cards for Omnicells.
- Created neonatal epidural order sets.
- Decreased IVIG goal levels for bone marrow transplantation patients to reduce overall use of IVIG.
- Decreased utilization of galactomannan assays in bone marrow transplantation patients.
- Developed a metabolic monitoring alert for patients being treated with second generation antipsychotics.
- Developing ACLS code sheet that is now part of the pharmacy supplemental box.
- Developing an ED Pharmacy webpage for pharmacists/techs to also help with communication of ED pharmacy services.
- Drafted a policy on use of methylene blue for diagnosis of fistulas.
- Evaluated retrieval of medication returns from inpatient medication rooms on hourly runs, which resulted in changes in technician duties to improve compliance with existing policy.
- Evaluated the impact of pharmacist intervention on compliance with weight-based antimicrobial dosing in OR.
- Evaluating fosphenytoin ISMP issues as it relates to our stocking of fosPHT in CES and formulating recommended for response.
- Implemented a pediatric discharge Pharmacy program for the Mott OR.
- Implemented a quarterly QA monitoring program for narcotics.
- Implemented a Surgical Infection Prophylaxis Antibiotic Dose Optimization Program.
- Led management of several antimicrobial agent shortages (aztreonam, acyclovir).
- Participated actively in the Antimicrobial Subcommittee and facilitated numerous projects, including addition of rifaximin and ertapenem to the formulary; development.
- Participated in the health system’s response to the H1N1 pandemic, contributing to the development of prophylaxis and treatment guidelines, facilitating operational procedures to provide prophylaxis to exposed patients and staff, coordinating efforts with retail pharmacies.
- Participating in pandemic flu planning and developing a ED pharmacy workload model. The model included pharmacists exercising delegated authority according to a defined process to call in employee prescriptions for Tamiflu, implementing a process to ensure adherence with the SNS requirements for tracking medications dispensed, for communicating follow up information with ICE and EHS, and using this exercise to develop an expanded role for the ED pharmacists to assist with disasters.
- Participation in sentinel event reviews
- Performed a review of the crash carts
- Performed an audit to assess diversion of high cost drug items
- Prepared and presented a patient safety annual report
- Provided inservice education to Emergency Department nurses and technicians
- Provided staff education to improve compliance with the required chemotherapy double-check process.
- Reduced overall medication expenditures for the OR pharmacies and Anesthesia
- Reduced use of pulmozyme in patients with pneumonia/increased respiratory secretions
- Removed albumin from OR Omnicells
- Reviewed and assessed MedManager interventions
- Reviewed and consolidated the Medfusion pump library
- Reviewed droperidol use in the Medical Procedures Unit
- Reviewed fibrin sealants
- Reviewed heart trays for pediatric Interventional Radiology procedures
- Reviewed probiotics for treatment and prevention of *C. difficile* colitis
- Reviewed topical hemostats
- Reviewing the Emergency Department Nursing IV Infusion Handbook
- Revised and corrected patient education materials on immunosuppressant-fruit juice interactions
- Revised the extravasation policy to include the use of the newer formulation of hyaluronidase
- Revised the Pediatric CareLink CPR card
- Revised the protocol for use of hydrocortisone in critically ill infants in the neonatal ICU
- Standardized medication concentrations and dosing of continuous infusion in CareLink
- Standardized PICU and OR syringe pump libraries
- Updated preoperative assessment forms for better guide re-dosing of antibiotics during surgery
- Updated preoperative assessment forms for VTE risk assessment
- Updated red bag equipment and drug information for ambulatory surgery sites
- Updated the contents of the anaphylaxis kits
- Updated the CPR flow sheets
- Updated the CPR policy
- Updated the OR Vendor Visitation policy
- Updated the OR Visitation policy to include pharmacists and pharmacy students
- Updated the post-transplant patient education book
- Updated the website protocols and order sets for Adult Kidney and Pancreas Transplant
- Worked with medical staff to decrease use of levofloxacin in the ICU to help control *C. diff* outbreaks

**Formulary Changes and Other Initiatives to Achieve Cost Savings or Maximize Cost-effectiveness**
- Changed/revised enoxaparin dosing recommendations
- Eliminated induction valcyte dosing following after lung transplantation
- Switched from brand to generic epoprostenol
- Assessed use and costs bivalirudin
- Reviewed thrombin agents and recommended conversion to recombinant product to achieve cost savings
- Participated in the bid process for echinocandins
- Added additional dosage strengths of Seroquel IR to formulary to reduce costs by avoiding use of dispensing multiple tablets to meet patient needs. This avoided the addition of Seroquel XR to the formulary, which may have lead to issues upon discharge with outpatient prescription coverage, adherence, re-hospitalization, etc.
- Added ertapenem to formulary as a meropenem de-escalation therapy

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

Our clinical pharmacists initiated, conducted and/or completed the following medication use projects:
- Antimicrobial Utilization, including meropenem, gram-positive agents (vancomycin, linezolid, daptomycin), and restricted antifungal agents
- Compliance With Amiodarone Use Guidelines for Atrial Fibrillation Following Cardiac Surgery
- Evaluation of Antifungal Drug Costs and Utilization Following Implementation of a Posaconazole Prophylaxis Protocol in Patients with Acute Myelogenous Leukemia
- Evaluation of Dofetilide Use in Adult Patients Admitted to UMHS
- Evaluation of Heparin Use and Therapeutic Monitoring
- Evaluation of Ibutilide Use
- Prescribing Trends of Erythropoiesis-Stimulating Agents in a University Outpatient Oncology Center as a Result Of Changes In Labeling, Organizational Guidelines, and Reimbursement
- Re-evaluation of Current Warfarin Use Practices
- Retrospective Review of Sedation Algorithms for the Pediatric Cardiothoracic Unit (PCTU)
- Review of Recombinant Factor 7 Use in Pediatric Patients

**Guidelines/Treatment Algorithms**

Clinical pharmacists worked to develop, implement or revise the following medication use guidelines, protocols and algorithms:
- Amphotericin B Administration Guidelines
- Ceftriaxone Use Criteria
- Desflurane Use Restrictions for Bariatric Surgery Patients
- Dexmedetomidine Use Guidelines for Adult Intensive Care Units
- Diarrhea Management Algorithm for the Surgical Intensive Care Unit
- Factor VIIa Use Guidelines
- Guidelines for Antimicrobial Use
- Guidelines for Intraoperative Albumin Use
- Guidelines for Invasive Fungal Infection Prophylaxis for Lung Transplant Recipients
- Guidelines for Treatment of Proven or Probable Invasive Zygomycosis in Bone Marrow Transplant and Hematology Patients
- Heparin Use Guidelines in Neonatal Intensive Care Unit Patients, including use in ECMO patients.
- Heparin-induced Thrombocytopenia Algorithm
- Intraoperative Dosing Guidelines for Bivalrudin
- IVIG Use Guidelines.
- Lung Transplant Immunosuppression protocols
- Lung Transplant Infection Prophylaxis protocols
- Lymphazurin Use Restrictions (replacement with methylene blue)
- Pediatric Venous Thromboembolism guidelines
- Postoperative Nausea and Vomiting Guidelines for Adults
- Promethazine Use Restrictions for Mott Children's Hospital and Women's Hospital
- Propofol Use Restrictions in the OR
- Remifentanil Use Guidelines
- Surgical Infection Prophylaxis Guidelines
- Urinary Tract Infection Treatment Guidelines
- Vascular Access/Implanted Port Guidelines

**Committee Participation**

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

- Accreditation Regulatory and Readiness Council
- Adult CPR Committee
- Anesthesiology Quality Assurance Committee
- Anticoagulation NPSG 3E Task Force
- Anticoagulation Subcommittee of P and T
- Antimicrobial Stewardship Committee
- Antimicrobial Subcommittee of the P&T
- Barcode Technology Infusion Pump Committee
- BMT Guideline Review Committee
- BMT Infection Committee
- BMT Quality Control Committee
- Burn Quality Care Committee
- Cancer Pharmacy Committee
- Chemotherapy Policies Review Committee
- Critical Care Steering Committee
- Emergency Department Management Team,
- Emergency Medicine Bio-terrorism/Disaster Committee
- Equipment Management Committee
- Falls Committee
- Glycemic Management Subcommittee of the P&T Committee.
- Hemostasis Review Committee
- Infection Control and Hospital Epidemiology Committee
- Intrathecal Medication Committee
- Ketogenic Diet Team
- Kidney/Pancreas Transplant Operations Committee
- Liver Transplant Policy Committee
- Lung Transplant Patient Education Committee
- Medication Reconciliation Committee
- Michigan Congenital Heart Center Joint Practice Committee
- Michigan Congenital Heart Center Pain and Sedation Committee
- MICU Multidisciplinary Committee
- Mott Anesthesia Technical Support Committee
- Mott Hospital Design Committee
- Mott Pharmacy Redesign Project
- Mott Rounding Group for Family Centered Care
- Needlesstick Pain Committee
- Nursing Extravasation Committee
- Pain Steering Committee
- Pandemic Planning Group
- Patient Safety Committee
- Pediatric CPR Committee
- Pediatric Hematology-Oncology Guideline Development Committee
- Pediatric ICU Sedation Committee
- Pediatric Medication Safety Committee
Our pharmacists provided service and leadership to our profession by serving on a variety of external committees and work groups. These included:

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<tr>
<th>Organization</th>
<th>Involvement</th>
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<tr>
<td>American College of Clinical Pharmacists</td>
<td>Fellowship Review Committee</td>
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<td>Poster Judging Committee</td>
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<td>Secretary-Treasurer, GI/Liver/Nutrition PRN</td>
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<td>American Pharmacists Association</td>
<td>Advisory Board for Self-care Monographs on Treatment of Diarrhea</td>
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<td>American Society for Parenteral and Enteral Nutrition</td>
<td>Secretary-Treasurer, Pharmacy Practice Section</td>
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<td>Task Force for the Revision of the ASPEN Standards for Nutrition Support Therapy in Adult Hospitalized Patients</td>
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<td>American Society of Health-System Pharmacists</td>
<td>Board of Directors</td>
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<td>Commission on Affiliate Relations</td>
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<td>Council on Pharmacy Practice</td>
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<td>Michigan Delegate to the ASHP House of Delegates</td>
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<td>Section Advisory Group on Communications and Publications</td>
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<td>Keystone Group</td>
<td>Sepsis Committee</td>
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<td>Michigan Department of Community Health</td>
<td>Chair, Michigan Health Professional Recovery Committee</td>
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<td>Michigan Pharmacists Association</td>
<td>Budget Committee</td>
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<td>Professional Affairs Committee</td>
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<td>Michigan Society for Parenteral and Enteral Nutrition</td>
<td>President</td>
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<td>Michigan Society of Health System Pharmacists</td>
<td>Board of Directors, Treasurer</td>
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<td>Education Committee</td>
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<td>Multinational Association for the Supportive Care in Cancer</td>
<td>Abstract Review Committee</td>
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<td>National Comprehensive Cancer Network</td>
<td>Co-chair, Best Practices Committee on Standard Orders</td>
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<td>Chemotherapy Content and Knowledge Subgroup with the NCCN Orders Management Project</td>
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<td>Fever and Neutropenia Panel</td>
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<td>Society of Infectious Diseases Pharmacists</td>
<td>Chair, Membership Committee</td>
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<td>State of Michigan Disaster Planning Committee</td>
<td>R2S Advisory Board</td>
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<td>R2S Pharmacy Committee</td>
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<td>University of Michigan Board of Governors</td>
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<td>Washtenaw County EMS Regional Protocol Committee</td>
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<td>Washtenaw/Livingston Medical Control Board</td>
<td>Pharmacy Chair, EMS Services</td>
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</table>
AMBULATORY PHARMACY SERVICES

Ambulatory Pharmacy Services encompass three separate outpatient pharmacies as well as two infusion pharmacies. The infusion pharmacies are located in the Cancer Center and the Canton 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

Outpatient Pharmacies

The Ambulatory Care Pharmacy 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.

Of particular note this year has been the development and implementation of a solid organ transplant prescription drug program. This program, which is a collaborative effort between Pharmacy Services, Social Work, and the Transplant Department, provides comprehensive financial and insurance counseling for patients, ongoing prescription services (including adherence monitoring) through on-site or mail service, and clinical pharmacy support. This has been a very successful program with approximately 300 patients in the service in the first year. In addition to the high quality marks from patients and health care providers, this service has also contributed to the overall financial margin of UMHS.

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, has increased monthly site inspection compliance rates from 45% to 98%.

Ambulatory pharmacy representatives participate on several committees including:

- Ambulatory Formulary Committee
- Lean process improvement efforts in the following areas:
  - Discharge medication process
Cancer Center Infusion Pharmacy workflow

- Cancer Center Pharmacy Committee
- Cancer Center Clinical Operations Committee
- Cancer Center Operations Committee
- Cancer Center Quality Improvement Committee
- University of Michigan Pharmacy Benefits Advisory Committee
- Ambulatory Services JCAHO Readiness Committee

Of particular note in the past year has been the development and integration of clinical pharmacists in the ambulatory clinics into the University of Michigan Medical Home initiative. Under the direction of Hae Mi Choe, clinical pharmacists are now fully integrated members of our medical home structure and they are compensated as part of this model. These pharmacists all have collaborative practice agreements and are providing medication therapy management services to patients at their respective ambulatory clinic sites. In addition, the group has begun billing for these MTM services. Studies are underway to measure the impact that these pharmacists are having on the quality and costs of care.

In addition to these activities, ambulatory pharmacy staff are involved in the University of Michigan’s 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**

| 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 65% which exceeds benchmarks  
|                         | • Utilize coaster patient paging system to inform patients of prescription status. |
| Cancer Center Pharmacy   | • Prescription volume = 125/ day  
|                         | • Supports a high volume of investigational drug protocols  
|                         | • Generic dispense rate equals 60% which exceeds benchmarks  
| East Ann Arbor Pharmacy  | • Prescription volume = 175/ day  

| Transplant Specialty Pharmacy Services | Supports U of M Specialty Pharmacy program  
| Supports U of M Transplant Specialty Pharmacy program  
| Generic dispense rate equals 65% which exceeds benchmarks  
| • Currently support 375 patients  
| • Projected volume could grow to 2000 patients in 2014  
| • Pharmacy staff facilitate obtaining Prior Authorization if needed  
| • Proactively contact patients for refills  
| • Staffing  
| o Program Manager (1)  
| o Financial Counselors (2)  
| o Staff Pharmacist (1)  
| o Pharmacy Technician (1.5)  
| UMHS Employee/Retiree Specialty Pharmacy Services | • Current support approximately 200 patients  
| • Approximately 120 drugs designated as specialty product  
| • Proactively contact patients for refills  
| Cancer Center Infusion Pharmacy | • Supports 50 patient chairs/beds, representing 150-180 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 | • Opened in June 2006  
| • 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 |
**Current Initiatives**
- Planning for growth and expansion of the Transplant Specialty Pharmacy Services. Currently the service supports approximately 375 patients. Projections indicate that the program could have as many as 2000 patients by fiscal year 2014.

- Identifying opportunities for clinical involvement of staff pharmacists to monitor and improve adherence to medication regimen for Specialty Pharmacy patients

- Implement a pharmacy consultation prior to discharge for patients on the rehabilitation unit. The purpose is to reduce problems for patients when they have their prescriptions filled at either UMHS Ambulatory pharmacies or other retail pharmacies

- Support UMHS implementation of e-prescribing

- Support implementation of CPOE in the Cancer Center Ambulatory Infusion area

- Convert inventory management of controlled substance in the retail pharmacies from a manual to a computerized system.

- Participate in and evaluate the impact of a pharmacist anemia management service for ambulatory cancer patients

- Implement a pharmacist managed clinical service for ambulatory patients on oral chemotherapy.

- Evaluate the potential for implementation of Medication Therapy Management Services in the retail pharmacies.

- Participate in the planning of ambulatory pharmacy services in:
  - New Mott Children’s and Women’s Hospital
  - Kellogg Eye Center
  - Infusion Services at the East Ann Arbor Health Center
MEDICATION SAFETY

The Medication Safety Committee is a multi-disciplinary group of clinicians who are dedicated toward improving the safe use of medications throughout our healthcare environment. Led by Scott Ciarkowski, RPh, MBA, the department’s Medication Safety Coordinator, the committee was reorganized in December 2007 to obtain broader representation from nursing and input on medication safety issues affecting patient care.

In addition to nursing, the committee is represented by medical and pharmacy staff, as well as members from Risk Management, Quality Improvement, and HomeMed. Subcommittees are established to investigate issues and obtain data for the medication safety committee to review. The committee, which meets monthly, is advisory in nature and reports directly to the hospital’s Pharmacy and Therapeutics Committee.

Committee Membership:

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Dan Berland</td>
<td>Internal Medicine</td>
</tr>
<tr>
<td>Mary Berry-Bovia, RN</td>
<td>Nursing, Emergency Room</td>
</tr>
<tr>
<td>Julie Burgett, RN</td>
<td>Nursing (7 B/C)</td>
</tr>
<tr>
<td>Wendy Bussard, PharmD.</td>
<td>MCIT (UM-CareLink)</td>
</tr>
<tr>
<td>Bruce Chaffee, Pharm.D.</td>
<td>Clinical Pharmacist</td>
</tr>
<tr>
<td>Scott Ciarkowski, RPh, MBA</td>
<td>Medication Safety Coordinator</td>
</tr>
<tr>
<td>Katie Coldren, RN</td>
<td>Nursing Administration</td>
</tr>
<tr>
<td>Loree Collett</td>
<td>Mott Administration, Peds MedSafety</td>
</tr>
<tr>
<td>Elaine Commiskey, BS, MS</td>
<td>Risk Management</td>
</tr>
<tr>
<td>Heather Douglass, RN</td>
<td>Nursing (4 B/C)</td>
</tr>
<tr>
<td>Ronnie Downer, RN</td>
<td>Nursing (6B/C)</td>
</tr>
<tr>
<td>Rick Fiedler, RN</td>
<td>Nursing (MPU)</td>
</tr>
<tr>
<td>Beth Gomez</td>
<td>Risk Management</td>
</tr>
<tr>
<td>Jean Hensick, RN</td>
<td>Nursing (5B)</td>
</tr>
<tr>
<td>Barb Higgins, PharmD</td>
<td>Pharmacy Administration</td>
</tr>
<tr>
<td>Dr. Mark Kaplan</td>
<td>Internal Medicine</td>
</tr>
<tr>
<td>Hilary King, RN</td>
<td>Nursing Administration</td>
</tr>
<tr>
<td>Robin Marchio, RN</td>
<td>Quality Improvement</td>
</tr>
<tr>
<td>Marc Moote, PA</td>
<td>Physician Assistant, OCA</td>
</tr>
<tr>
<td>Dorinda Nance, RN</td>
<td>Nursing, (4A/B)</td>
</tr>
<tr>
<td>Denise O’Brien, MSN, RN, ACNS-BC</td>
<td>Nursing (PACU)</td>
</tr>
<tr>
<td>Renee Prince, RN</td>
<td>Nursing (OR)</td>
</tr>
<tr>
<td>Jamie Tharp, PharmD</td>
<td>UMHS Home Care Services- HomeMed</td>
</tr>
<tr>
<td>Maureen Thompson, MSN, RN, CCRN</td>
<td>Patient Safety Coordinator, OCA</td>
</tr>
<tr>
<td>Marc Whitted, RN</td>
<td>Nursing (Cardiology)</td>
</tr>
<tr>
<td>Sheryl Woloskie, RN</td>
<td>Nursing Education Services</td>
</tr>
</tbody>
</table>

Accomplishments:

- Omnicell over-ride medications / movement of medications to non-override status
  Approximately 350 medications were changed from override status to non-override status with the committee endorsing medications for non-override status that include routine, maintenance medications. Exclusions identified were: (bacitracin, collagenase, mystatin, and silver sulfadiazine) for wound management and monitored floors that require metoprolol, calcium
gluconate, magnesium sulfate, and potassium chloride for emergent situations that require immediate treatment for a symptomatic patient. Over-ride reports were reviewed for 3 months after the override changes are made on November 11th, 2008 with no evidence that medications were being overridden for routine use.

- **Constraints to Reporting & the Medication Safety Voluntary Reporting Tool**
  Constraints to self reporting in RiskPro were identified and changes made to the RiskPro system: Drug class field no longer required; Clinical Home page and Internal Home page web sites updated to list name as “Patient Safety Report Form (Incident); and modifying the Patient Safety Report Form (Incident) link to direct the individual to the log in page to enhance the reporting ease of the electronic reporting system.

- **“Watch the drip” Campaign**
  “Watching for the drip” campaign was implemented through inpatient units in UH, CVC, and Mott and Women’s hospitals via attaching of a picture (water drop hitting water) in patient rooms. The picture was attached to computer on wheels, IV polls, creating a visual picture near the patient to decrease errors related to not releasing the IV tubing clamp. In addition, nursing units educated personnel on the campaign and errors associated with the IV tubing clamp.

- **OmniceIl Medications (Equivalent Dosing and Look-alike / Sound-alike Opioids)**
  Morphine Sulfate 15 mg Immediate-Release Tablets - were added to formulary during this past year. A risk of confusion exists between sustained-release morphine sulfate (generic MS Contin®) and the immediate-release product in that the dosage strengths are the same. In order to minimize the potential for confusion, morphine sulfate SR (sustained release) will remain in all databases (including Omnicells) as it is currently named. Morphine sulfate immediate release will be named in all databases as "morphine IMMEDIATE", using tall-man lettering to distinguish it from the sustained-release product. In addition to the use of tall man lettering, an alert will appear on the Omnicell for the immediate-release product only. The flag will read, "Caution, you are pulling an immediate-release morphine product." In addition, Equivalent dosing was implemented and education providing to nursing to facilitate obtaining the correct medication for the patient.

- **Look Alike / Sound Alike Medications**
  A new policy was approved describing our actions to decrease the likelihood of an error due to confusion with look alike / sound alike medications: UMHHC Policy 07-01-008 [http://www.med.umich.edu/i/policies/umh/07-01-008.html](http://www.med.umich.edu/i/policies/umh/07-01-008.html). UM-CareLink, our computerized prescribing order entry system, utilizes tallman lettering for some look-alike/sound-alike medications and was compared against the FDA and ISMP recommended list for any deficiencies.

  Digoxin and heparin carpujects that look similar were reviewed and suggested that the digoxin be stocked in the omnicells and heparin delivered in the medication bins to avoid being co-located as look-alike medications.

- **Joint Commission Sentinel Alert on Anticoagulants**
  The Joint Commission’s recommendation for utilizing independent double checks on heparin drips was discussed. The committee reviewed information from the literature on the value of independent double checks, data from Mott & Women’s prior and after an independent double check was implemented. In addition, data was reviewed from the sub-committee review of our medication safety reports relating to heparin infusion. The sub-committee found wrong dose/rate for heparin infusions as the overwhelming problem. It was noted that
A communication failure on heparin therapy occurs with returning to the unit from the cath lab. A sub-committee assessed whether an independent double check could have the possibility of identifying the error at the start of the infusion, hanging of a new bag, rate change, restart of a drip, change of shift/nurse, and returning to the unit. The Medication Safety Committee requested feedback from the Clinical Nurse Specialist forum to discuss how a practice change would be implemented.

- **Home Care High Alert Medications Policy/UMHHC-HCS 253.087**
  The High Alert Medications Policy for Home Care was reviewed and rationale provided why the policy differs from Health Systems policy. It was suggested we investigate the possibility of creating a second list for our High Alert Medications that specifies the individual medications, for example, every chemotherapeutic agent would listed.

- **Metric Conversion on height, weight, and temperature**
  We converted inpatient units from the English unit of measurement to the Metric unit of measurement. The month of May was designated as metric month and time period for implementation of the metric measurement. Clinical nurse specialists, educators, and managers were briefed on the implementation and nurse educators rolled out education to their respective units. Future plans are for the ambulatory areas to utilize the metric system in some areas of the ambulatory workflow as a goal of standardization.

- **Proposal to remove propoxyphene from the formulary**
  A proposal to remove propoxyphene from the formulary was endorsed by the Medication Safety committee.
  Propoxyphene has been identified for its poor effectiveness for pain (similar response to acetaminophen) in a meta-analysis of 26 randomized controlled studies with safety concerns and possible inappropriate use. The goal was to remove propoxyphene from the UMHS formulary and use other agents with superior effectiveness and safety.

  Concerns were voiced with the amount of effort that would be spent for patients admitted to the hospital who have used propoxyphene successfully on an outpatient basis and would be ordered non-formulary. The committee acknowledged educating prescribers and patients would be an important component. The P&T Committee endorsed prohibiting new starts of propoxyphene products and allowing the continuation of home therapy and reviewing data within the next year.

- **Clarification of floor insulin infusion form**
  An incident was reviewed which illustrated confusion regarding the compatibility of Novolog (aspart insulin) and Regular insulin when administered together, the ability to administer aspart insulin IV and which insulin is in the infusion drip sent by pharmacy. Revisions were made to the insulin drip protocol for clarifying purposes such as aspart and regular insulin can be given IV and can be mixed together or given in same line, inserting regular into the insulin drip.

**Selected Departmental Medication Safety Initiatives**

- Multidisciplinary: The Pain committee was assigned with identifying and protecting high-risk patients with the potential for opiate-induced respiratory depression. An opioid policy was created and pain guidelines developed and approved by the P &T Committee.
Medication Incident Reports

- The committee selectively reviewed a number of the approximate 2,175 medication safety incident reports submitted in the past 12 months. A summary of the aggregate review:

a. Top 10 Specific Drug Classes Ordered
   i. Antibiotics
   ii. Analgesic – Opioid
   iii. Chemotherapy / Immunosuppressant
   iv. Anticoagulant
   v. Cardiovascular
   vi. IV Fluids
   vii. Insulin / Antidiabetic
   viii. Other
   ix. None
   x. CNS / Sedation

b. Top 10 Contributing Factors to Medication Incidents
   i. Checks not done
   ii. Communication failure
   iii. Policy/procedure/protocol/guidelines not followed
   iv. Prescribing error
   v. Human factor
   vi. Distractions
   vii. Pump/infusion settings (not PCA, not epidural)
   viii. Staff knowledge / experience
   ix. Order-missed
   x. Dispensing error (pharmacy)
RESEARCH AND EDUCATION

The Department's 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, the Department of Clinical, Social and Administrative Sciences in the College of Pharmacy, 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 and Policy Economics. Research areas of the individual clinical faculty members may be found at our Department website: http://sitemaker.umich.edu/csas/home (Department of Clinical, Social and Administrative Sciences).

B. Clinical Faculty Grants

The Department of Clinical, Social and Administrative Sciences' Faculty had intramural and extramural grants totaling $909,044 in fiscal year 2008-2009.

<table>
<thead>
<tr>
<th>Tenure Track Faculty</th>
<th>Non-Tenure Track Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td># of these faculty on funded grants</td>
<td>7</td>
</tr>
<tr>
<td># of unique funded grants</td>
<td>20</td>
</tr>
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</table>

# of grants does not include those submitted pending award notification.

Departmental Direct and Indirect Cost Trends:

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<th>FY 99-00</th>
<th>FY 00-01</th>
<th>FY 01-02</th>
<th>FY 02-03</th>
<th>FY 03-04</th>
<th>FY 04-05</th>
<th>FY 05-06</th>
<th>FY 06-07</th>
<th>FY 07-08</th>
<th>FY 08-09</th>
<th>10 Yr Totals</th>
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<tbody>
<tr>
<td>Type</td>
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<td>Indirect Cost</td>
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</table>

C. Clinical Faculty Publications

<table>
<thead>
<tr>
<th></th>
<th>Tenure Track (N= 17 faculty)</th>
<th>Non-Tenure Track (N= 28 faculty)</th>
</tr>
</thead>
<tbody>
<tr>
<td># of published peer reviewed articles</td>
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<td>53</td>
</tr>
<tr>
<td># of published books, book</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>
D. Impact Factor, 2008

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 2008-09 from Clinical Faculty peer-reviewed research manuscripts is depicted in the chart below.

<table>
<thead>
<tr>
<th>MEAN IMPACT FACTOR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Deviation</td>
<td>2.28</td>
</tr>
<tr>
<td>Range</td>
<td>1.0-17</td>
</tr>
<tr>
<td>Median</td>
<td>2.3</td>
</tr>
</tbody>
</table>
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 8 graduate students. Additionally, there were approximately 70 Pharm.D. student investigations projects last year within the College of Pharmacy precepted by members of our Department.

<table>
<thead>
<tr>
<th>UM Pharmacy Residency Class 2008-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy &amp; General Practice (PGY-1)</td>
</tr>
<tr>
<td>Stephanie Baringhaus</td>
</tr>
<tr>
<td>Maria Guido</td>
</tr>
<tr>
<td>Andrea Nigg</td>
</tr>
<tr>
<td>Natasha Pettit</td>
</tr>
<tr>
<td>Anna Sutherland</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>UM Pharmacy Residency Class 2009-2010</td>
</tr>
<tr>
<td>Pharmacy &amp; General Practice (PGY-1)</td>
</tr>
<tr>
<td>Rebecca Pettit</td>
</tr>
<tr>
<td>Ann Schwemm</td>
</tr>
<tr>
<td>Alexander Fohl</td>
</tr>
<tr>
<td>Marcy DelMonte</td>
</tr>
<tr>
<td>Melissa Carroll</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Fellows, 2008-9</td>
</tr>
</tbody>
</table>

Noha Salama, Ph.D. (Post-doctoral fellowship, preceptors: Mueller, Welage)

Mary Vilay, Pharm.D. (Critical Care Nephrology; preceptor: Mueller)
F. Clinical Faculty Awards and Highlights

Many of our faculty received prestigious and distinguished awards or contributed significantly to the profession of pharmacy.

Dr. Cesar Alaniz received the COP P4 Student Appreciation Award, presented at the annual student picnic.

Dr. Hae Mi Choe, Clinical Assistant Professor, has agreed to assume additional responsibilities as Director of Innovative Ambulatory Practice Models. In this role, she will work with our ambulatory care practitioners to develop a systematic and comprehensive approach to medication therapy management as well as facilitate collaboration on research and teaching. Dr. Choe will work with the University of Michigan Hospitals and Health Centers and other partners to develop contemporary outpatient pharmacy-based models of care to serve as progressive educational sites for our students and residents.

Congratulations to Dr. Hae Mi Choe on her acceptance to CEW's Advanced Leadership Seminar.

The Regents approved the promotion of Dr. Daryl DePestel to Clinical Associate Professor of Pharmacy.

Dr. Kristin Klein has been appointed the Chair of the Journal Advisory Board for the Journal of Pediatric Pharmacology and Therapeutics.

Dr. Kristin Klein has been appointed the Co-Chair of the Advocacy Committee for the Pediatric Pharmacy Advocacy Group for another year.

Dr. Bruce A. Mueller has been named a Fellow of the American Society of Nephrology.

Dr. Tami Remington, Clinical Associate Professor of Pharmacy received this year’s College of Pharmacy Teaching Excellence Award.

Dr. Jim Stevenson, Associate Dean for Clinical Sciences, was presented with the Michigan Pharmacists of the Year award at the Michigan Pharmacists Association Annual Convention and Exposition on February 28th. The Pharmacist of the Year Award is the highest award presented to a member of the Michigan Pharmacists Association. The recipient of this lifetime achievement award is selected for his or her professional excellence, exemplary service and dedication to advancing the profession and public health.

Michigan Professional Practice Award recognizes and honors a deserving pharmacist for involvement and participation in an innovative pharmacy project that contributes to professional practice. This year the award was given to Dr. Paul Walker for his conceptualization of the Pharmacist Facilitate Discharge Project.

G. Experiential Training Program and Community Engagement Program Activities

1. Development of standardized APPE syllabi (implementation planned for Fall 2009)
   • Subcommittees for each group, led by:
     Inpatient Care – Randy Regal
     Ambulatory Care – Leslie Shimp
H. Summary of the Pharmacy International Programs Accomplishments

Student and Faculty Exchange Program:

Fall of 2008:
- Student: Krishna Shah, from the University of Bath, England, September-December, 2008

Winter of 2009:
- Faculty: Robert Likic, MD, University of Zagreb School of Medicine, Croatia, nine days of rotations and appointments, February 3 – March 4, 2009

Summer of 2009:
- Faculty: Kallamparampil Revikumar, Ph.D. (FIP Pharmabridge Program), Amrita School of Pharmacy, Amrita, India, July 20th – August 14th, 2009
- Faculty: Ms. Sabitha Mangalathillam, (PhD Candidate) (FIP Pharmabridge Program) Amrita Vishua Vidyapeetham University, Kerala, India July 20th – August 14th, 2009, (withdrew from program 5 days before it commenced)
- Faculty: Abeer Zeitoun, Pharm.D. School of Pharmacy, Lebanese American University, Beirut, Lebanon, July 20 – August 14, 2009
- Student: Raya Zin Eddin, B.Sc., University of Kalamoon, Syria, July 1st – July 29th, 2009
- Student: Mohammad Kawsar Sherif (Siam), University of Bangladesh, July 1st – July 29th, 2009

Student Committee:
The “Student Committee for International Opportunities” have assisted several hosted students find residence, planned minor 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 on the CGH IAC and provides input on the Center’s direction, projects, and review of Faculty and student associate applications and appointments.

**International Contractual Agreement signed this Academic Year:**
The following contract has been signed:
- The Kwame Nkrumah University of Science and Technology (KNUST)

**International Contractual Agreements in the signature Queue at the University Counsel’s office:**
- Lebanese American University
- University of Barcelona
- University of Puerto Rico
- Bath University

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**Appendix A**

**Department of Clinical, Social and Administrative Sciences**

**Publications Highlights, 2008-2009**

**BOOKS, BOOK CHAPTERS and BOOKS EDITED:**


8. **Frame, D.** Pain and Palliative Care Handbook Chapter on Drug INteractions and Metabolism.


PUBLICATIONS


38. Erickson SR. Updating the evidence on allergic rhinitis management. Focus on evidence-based treatment approaches, medication adherence, and patient outcomes. CE J Managed Care Pharmacy 2008.


72. **Sweet BV.** IVIG order form implemented at University of Michigan. MSHP Monitor 2008;27:2.


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Electronic Publications


Video

Letters:


The Drug Information Service (DIS) provides pharmaceutical, pharmacological, and therapeutic information to the University of Michigan Hospitals and Health System and to health practitioners in the local area. In FY09, 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 clinic formularies, and participating in the development of clinical guidelines as requested. DIS staff are very 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 support functions of the UMHHHC Pharmacy and Therapeutics (P&T) Committee and several of its subcommittees. In this capacity, they are responsible for conducting a thorough review 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. The P&T Committee is supported through several subcommittees including the Ambulatory Formulary Committee, Antimicrobial Subcommittee, Cancer Pharmacy Committee, Drug Use Evaluation Committee, Glycemic Management Subcommittee, Medication Safety Committee, Pediatric Medication Use Committee, and the Product and Vendor Selection Committee. Some of the key accomplishments of the Committee in FY09, either directly or through the subcommittees, include:

- Reviewed 35 new pharmaceutical agents and conducted several class reviews
- Implemented over 140 medication line item reviews that resulted in nearly $1 million in savings
- Implemented and/or modified restriction criteria for several agents due to safety concerns
- Developed a policy to ensure safe initiation of buprenorphine therapy in patients with chronic pain and perioperative management of patients already receiving buprenorphine therapy
- Developed guidelines to standardize the management of adult patients with DKA
- Approved guidelines to standardize the management of adult patients with alcohol withdrawal
- Established prescribing guidelines for safe use of analgesic agents
- Managed several critical drug shortages, many of which required identification of alternate therapies
- Endorsed a pilot program for a pharmacy-based anemia management clinic run through the Cancer Center
- Established two new subcommittees to ensure safe use of anticoagulant therapies: VTE Subcommittee (designed to ensure a VTE assessment occurs for all inpatients and to define standard management of those at risk); and, Anticoagulation Subcommittee (designed to standardize protocols involving the therapeutic use of anticoagulant agents within the institution).
- Implemented several cost-containment initiatives including optimizing LMWH dosing regimens, revising the preferred amino acid solutions in TPN, changing floor stock insulin from regular to Novolog, restricting peripheral parenteral nutrition use, moving to fixed dosing of rasburicase in adults, and changing vendors for formulary products as market changes occur.
- Developed and posted several new policies to ensure safe use of medications

Gundy Sweet, Pharm.D.  Coordinator, Drug Information Service
• Reviewed several safety alerts on medications issued by the FDA and implemented appropriate corrective action plans

The **Ambulatory Formulary Committee** is a multidisciplinary group with representation from several physician leaders, pharmacy services, Blue Care Network, and the pharmacy benefits program. It is responsible for determining drug use policy and evaluating drug therapy within the ambulatory practice component of the University of Michigan Health System. Its purpose is to provide a high degree of coordination and seamless care between the inpatient and outpatient environment and to coordinate between health care plans, whenever possible.

Accomplishments of this group in FY09 include:

• Maintained a centralized voucher distribution program run through pharmacy services, and reviewed 27 new vouchers submitted for consideration
• Implemented active conversion programs for intranasal steroids (to generic fluticasone)
• Distributed 7 targeted email communications (FGP-Grams) to medical staff about timely drug-related topics
• Implemented standardized formularies for ambulatory care clinics, with one standard formulary developed for each primary care practice area (general medicine, family medicine, pediatrics, and ob/gyn)
• Developed a policy to allow physicians to request new drugs for consideration for the ambulatory care clinics
• Implemented a web-based ordering system for medications going to clinic areas
• Implemented a structured medical lexicon in CareWeb to improve medication profiles through standardization of nomenclature
• Maintained the BlueCaid product line, reviewing new agents as appropriate, revising the preferred drug list, and establishing prior authorization criteria for select agents
• Developed and made available to the UMHHC community several clinical resource documents including oral contraceptive nomenclature, statin drug interactions, standardized bowel preparation regimens, and influenza treatment guidelines

Health care staff are kept informed of Pharmacy and Therapeutics Committee decisions and new information regarding medications by means of the monthly, web-based Pharmacy ForUM Newsletter. In addition to announcing formulary changes, each monthly issue 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 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 Formulary Committee</td>
<td>Charged with developing an ambulatory formulary and impacting physician prescribing in the ambulatory environment to reduce ambulatory pharmaceutical expenditures while maintaining optimal clinical care</td>
</tr>
<tr>
<td>Antimicrobial Subcommittee</td>
<td>Advises P&amp;T Committee on issues related to antimicrobials</td>
</tr>
<tr>
<td>Cancer Pharmacy Committee</td>
<td>Advises P&amp;T on issues related to cancer therapy</td>
</tr>
<tr>
<td>Drug Use Evaluation Committee</td>
<td>Reviews drug use within the institution in order to</td>
</tr>
<tr>
<td>Committee</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Glycemic Management Subcommittee</td>
<td>Reviews medications and treatment protocols designed to improve and standardize glycemic control processes.</td>
</tr>
<tr>
<td>Medication Safety Committee</td>
<td>Reviews the medication use process to improve medication safety.</td>
</tr>
<tr>
<td>Pediatric Medication Safety Committee</td>
<td>Reviews issues specific to medication use in pediatric patients.</td>
</tr>
<tr>
<td>Product and Vendor Selection Committee</td>
<td>Reviews market changes in formulary products (new formulations, generics or pricing) to continually enhance formulary effectiveness.</td>
</tr>
</tbody>
</table>
INVESTIGATIONAL DRUG SERVICES

The Investigational Drug Service (IDS) is a required service for research protocols involving human subjects who receive study medications not yet approved by the FDA. In addition, the Service handles multiple other protocols involving commercially available drug. The goal of the IDS is to ensure that investigational drug studies and other drug-related research at the UMHHC are conducted in compliance with the requirements of the FDA, study sponsors, Michigan State Board of Pharmacy Regulations, and the Joint Commission. IDS staff works with investigators to improve study design and ensure feasibility of the study, establish randomization procedures, prepare/dispense study drug, and monitor progress of the study through completion.

IDS Vital Statistics FY09:
- 280 active protocols
- Total dispensing: ~9500 orders/prescriptions
  - Central IDS dispensing: ~4800 orders/prescriptions
  - Satellite dispensing: ~4700 orders/prescriptions
- Protocols reviewed for IRBMED: 160
- New studies opened: 120
- Sponsor monitoring visits: 575
- Studies Audited (internal and external): ~ 35

Major Initiatives for FY09:
- Continued full implementation of study protocols in UM-CareLink.
- Reorganization of satellite inventory and documents for improved safety and protocol compliance.
- Revision of institution accountability forms to ensure regulatory compliance.
- Expansion of TempTrak monitoring to all drug storage locations.
- Addition of dedicated IDS support technician in the Cancer Center Infusion Pharmacy.
- Expansion of IDS webpage to include support documents for all Cancer Center protocols.
- Successful completion of many audits, by both internal and external organizations, including the FDA.

Publications:

IDS pharmacists continued their participation in research oversight activities to include two appointments to IRBMED (as regular voting member and Vice-Chair of Board C1, and as regular voting member on Boards A2 and B1), appointment to the Protocol Review Committee (PRC), and representation to the Michigan Clinical Research Unit (MCRU). Finally, the pharmacists continued their support of the teaching mission of the health system via their role as preceptors for pharmacy students and residents, supervision of the IDS pharmacy interns, and provision of a number of education programs for staff throughout the institution.
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 PharmDoc, WebIDS 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 CGC 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.
- SecureMed – Narcotic Vault management system
- ECHO – Amerisource/Bergen purchasing system
- PharmDoc.Net – Clinical pharmacy management system
- WebIDS – Investigational Drug Service management system

Pharmacy automated dispensing systems

- **Omniceell** – 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 2009 Activities

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

- **Bosswalk**
  - Completed development of a financial crosswalk web based application referred to as the Bosswalk system.

- **Omnicell Pharmacy Central**
  - Installed new OPC Client Application on Pharmacy workstations

- **QS/1 Outpatient system**
  - Implemented the QS/1 C-II Electronic Inventory functionality

- **Omnicell**
  - Installed new & redeployed Omnicell cabinets in: CVC MCRU, ANGIO#2, NIR#1, NIR#2, NIR#3, CVC NUCMED, ER Pharmacy, Kellogg OR #1 (Anes Workstation), Mott Pre-Op, Mott PICU #2, RAD B2MRI
  - Upgraded our existing server and cabinets to the Omnicell software version 12000
  - Served as beta site for Omnicell version 14000 software
  - Converted the Omnicell Database from Visual Foxpro to SQL Server.
  - Tested and converted our existing Omnicell interfaces to Omnicell’s new OIS interface engine.
  - Carrier upgrade project. Moved and added 9-drawer carriers and drawers to 15 cabinets to allow for better access to medications by nursing staff and provide more space for medication storage.

- **ROBOT**
  - Performed a Robot rod and rack reorganiztion
  - Performed an upgrade to the WORx to Robot interface

- **Scriptpro**
  - Performed a ScriptPro automation Interface Upgrade

- **SecureVault**
  - Served as Beta site for Omnicell SecureVault software only product

- **WORx in patient Pharmacy system**
  - Performed a production AIX database server upgrade for WORx
  - Performed a WORx Database facility conversion
  - Developed an ADT log history program
Key Automation projects planned for FY 2010

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

- Support requirements analysis and implementation of a bedside bar code medication administration system
- Support implementation of ePrescribing
- Upgrade the QS/1 outpatient Pharmacy system to version 19.1.x
- Implement the QS/1 SystemOne application to facilitate Medicare billing in the ambulatory care pharmacies
- Upgrade WORx, inpatient Pharmacy system to version 3.6
- Act as Omnicell system Beta partner
- Implement Amerisource electronic control substance ordering system
- Implement an RFID based Drug kit tracking system
- Support expanded use of QS/1 system in Ambulatory Care Pharmacies. Assist Ambulatory Care Manager in implementing functions such as Workflow, prescription scanning and Inventory management
- Upgrade the Amerisource Echo Purchasing application
UM-CARELINK PHARMACY TEAM FOR CPOE+CDS

The UM-CareLink Pharmacy Team 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 UM-CareLink Pharmacy Team strives to achieve patient-centric management and optimization of UM-CareLink as an enterprise component of our Electronic Patient Care Environment (EPCE).

UM-CareLink Pharmacy Team Members:
Karen Amman, Manager, Clinical, UM-CareLink
Allen Flynn, Team Lead, Medication Management, UM-CareLink
Stephanie Brooks, Clinical Analyst, Pharmacotherapy, UM-CareLink
Mary Jo Bucrek, Clinical Pharmacist Analyst, Chemotherapy, UM-CareLink
Wendy Bussard, Clinical Pharmacist Analyst, Pediatrics, Chemotherapy, UM-CareLink
Susan Crowe, Clinical Pharmacist Analyst, Pharmacotherapy, UM-CareLink
Annie Martin, User Liaison/Coordinator, UM-CareLink
Shilpa Nadgir, Quality Assurance Engineer, UM-CareLink
Lisa Poon-Konrad, Clinical Pharmacist Analyst, Pharmacotherapy, UM-CareLink
Jennilyyn Suhajda, Clinical Pharmacist Analyst, Pediatrics, Clinical Decision Support, UM-CareLink
Nancy Whitney, Clinical Analyst, Formulary and Investigational Drug Services, UM-CareLink
Chris Zimmerman, Clinical Pharmacist Analyst, Clinical Decision Support, UM-CareLink

Scope of our work | Teams’ Responsibilities

We manage more than 4000 medication order items which may exist independently or within 1500 online order sets and which are ordered and managed online by more than 12,000 UM-CareLink users overall.

We use Eclipsys’ 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.

The UM-CareLink Pharmacy Team is responsible for supporting, maintaining, optimizing and extending computerized provider order entry, clinical decision support and electronic documentation of medication administration for all inpatients at University Hospital, the Cardiovascular Center (CVC) and the Mott Children’s Hospital.

Support
• We provide 24x7x365 3rd and 4th level pager-based, oncall support for medication CPOE and CPOE integration 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-omp@med.umich.edu
• We review responses to phone calls and other documented issues from the UM-CareLink Support Center (6-2222) 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 to ordering clinicians online
- 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 to 10 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, e.g., automatically discontinuing orders from particular order sets upon transfer

Extension
- We are preparing to implement UM-CareLink in the UM Cancer Infusion Center
- We are investigating bar-coding at the point of care functions
- We are participating in a clinical documentation software component evaluation

COMMITTEE PARTICIPATION
As a team we participate in the following committees:
- UM-CareLink/Pharmacy Global Issues
- Pharmacy and Therapeutics Committee
- Clinical Decision Support and Outcomes Committee
- Medication Safety, Adult
- Medication Safety, Pediatrics
- Cancer Pharmacy Committee
- Pharmacy UM-CareLink Integration Team (PCIT)
- Pharmacy Operations Committee
- Venous Thrombo-embolism (VTE) Prophylaxis Committee
- Anticoagulation Committee
- UM-CareLink Information Management Oversight Committee (CIMOC)
- UM-CareLink Steering

KEY ACCOMPLISHMENTS, 2008-09

OUR TEAM
- Implemented infusion rate clinical decision support (Dec 2008)
- Began Process Improvement Circle to improve configuration processes (Jan 2009)
- Upgraded UM-CareLink software from version 4.5 to 5.0 (May 2009)
- Re-engineered Patient Controlled Analgesia workflow and configuration (Jun 2009)
- Delivered Cancer Infusion Center project scope document (Jun 2009)
- Implemented electronic entry of VTE risk assessment for adult patients, decision support for guidance of selection of optimal VTE prophylaxis and missing VTE risk assessment (May 2008)
- Implemented hard-stop for entry of VTE risk assessment on admission-related order sets (June 2009)
- Implemented automatic discontinuation of post-operative medical orders (July 2009)
- Built and implemented various complex chemotherapy and investigational drug service order sets
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 the Associate Director of Pharmacy Services.

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 this data to respective staff members, and provided aggregate data to both the department and the institution.
- Replaced the bacterial surveillance program for intravenous product with the media fill testing for all designated staff as required by USP 797 on Pharmaceutical Compounding – Sterile Preparations.

Regulatory Activities

- Extensive planning took place to meet Joint Commission requirements for compliance with the medication management standards and the medication-related National Patient Safety Goals (for 2008 and 2009).
- Accreditation was issued from ASHP for our specialty residency in Cardiology. This was added to our already accredited programs in Infectious Diseases, Oncology, Informatics, Critical Care, and Pediatrics. Our PGY-1 Pharmacy residency is also accredited by ASHP.
- The recommendations from the December 2007 Joint Commission Survey have been implemented.

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
- Conducted of Periodic inpatient and outpatient pharmacies surveys and audits
- E-mail communications to staff and management on compliance issues
- Preparation and dissemination of reports as requested
• Insulin storage compliance audits were established and tracked
• Policy and procedures review and coordination
• IV Clean Room is maintained USP 797 compliant and ensured all regulatory requirements are considered
• Monitoring initiated for USP 797 compliance in pharmacy satellite areas
• Participated in implementation of PACMED to ensure regulatory compliance
• Omnicell System:
  o Rate and reasons for overrides
  o Controlled substances discrepancies within pharmacy

**Proposed Goals for FY10**
  o Inspection rate of medication storage areas in Omnicells and outpatient clinics will continue to be measured
  o Inventory management improvement
  o Develop inpatient operational dashboard
  o Areas outside of omnicell use for narcotics will have additional measures developed to prevent diversion
  o Engage in the implementation of Verify use in the preparation of IV therapies, so all components are identified positively by bar code scanning prior to preparation of the medication. This will improve the safety of our patients.
  o Work in the development of bar-code medication administration system to ensure compliance with regulatory and safety requirements
HONORS AND AWARDS

The following department members received the listed honors and awards during the previous year:

Certification by the Board of Pharmaceutical Specialties:

- **Curtis Collins**: Board Certification in Pharmacotherapy with Added Qualifications in Infectious Diseases
- **Daryl Depestel**: Board Certification in Pharmacotherapy with Added Qualifications in Infectious Diseases
- **Michael Kraft**: Board Certification in Nutrition Support
- **Melissa Pleva**: Board Certification in Nutrition Support
- **Stephanie Taber**: Board Certification in Oncology
- **Carrie Nemerovski**: Board Certification in Pharmacotherapy
- **Sacha Pollard**: Board Certification in Pharmacotherapy
- **Kathryn Schultz**: Board Certification in Pharmacotherapy
- **Mei Jorgenson**: Board Certification in Pharmacotherapy
- **Petrea Cober**: Board Certification in Nutritional Support
- **Jolene Bostwick**: Board Certification in Psychiatric Pharmacy

Other

- **Cesar Alaniz**
  - Research Citation Finalist for Abstract submitted to Society of Critical Care Medicine Congress
- **Curtis Collins**
- **James G. Stevenson**
  - Pharmacist of the Year, Michigan Pharmacists Association
- **Paul C. Walker**
  - Michigan Society of Health System Pharmacists Professional Practice Award
  - Fellowship Recognition, Michigan Pharmacist Association
  - Fellowship Recognition, American Society of Health System Pharmacists
- **Marcy DelMonte**
  - Student Scholarship, Southeastern Michigan Society of Health-system Pharmacists
- **Carrie Nemerovski**
  - Resident of the Year, Southeastern Michigan Society of Health-system Pharmacists
- **Shannon (Bauer) Hough**
  - UM College of Pharmacy Lyons Leadership Scholar
- **Linda Stuckey**
  - Transplant Center Employee of the Year
PURCHASING AND CONTRACTING

The Department of Pharmacy Services provides direction and oversight of pharmaceutical purchasing and contracting activities for the University of Michigan Hospitals and Health Centers.

These activities include:
- Coordination of the pharmaceutical and prime vendor bid processes
- Management of the Public Health Service (PHS) 340B Drug Pricing Program
- Monitoring purchases for contract compliance, enhanced savings opportunities and correct billing
- Identification of potential purchasing cost reduction opportunities
- Troubleshooting identified product shortages, recalls and market withdrawals

The Department of Pharmacy Services (DOPS) experienced a 5% increase in total pharmaceutical purchases in FY09 as compared to FY08. Pharmaceutical purchases for the year totaled approximately $91,000,000. Outpatient areas (traditional retail and infusion centers) accounted for 57% ($52,000,000) of total purchases for FY09, while purchases made for all hospitals and health centers reached nearly 43% ($39,000,000). Through aggressive cost savings initiatives, FY09 drug costs/discharge for the inpatient pharmacy areas actually decreased by 3% over costs in FY08.

Significant cost saving initiatives implemented in FY09:
- Continued conversion to various generic products in the inpatient and outpatient setting due to patent expirations (e.g. levetiracetam, topiramate)
- Competition in the seasonal flu vaccine market lead to bids from multiple vendors with final award going to incumbent vendor with significant savings over previous year.
- Contracts negotiated and signed with several previously non-contracted vendors
- Continued success in the negotiation of “inpatient PHS” and “PHS-like” pricing from various pharmaceutical manufacturers for products used in inpatient areas
- Inpatient therapeutic interchange initiative (e.g. insulin, nicardipine)
- Identified additional contract savings with outsourced products

Management of the 340B Program
- Implementation and maintenance of 340B splitting software upgrade
- Utilization of software to identify optimal purchases and follow regulatory guidelines
- Monitor and identify drugs new to the 340B program with significant savings potential (e.g. Lucentis and Ventavis)

Drug recalls and shortages
- Manage critical drug shortages through consolidation of product, therapeutic substitutions and/or alternative therapies
- Provide up-to-date communication to staff regarding drug shortages and recalls
- Drug procurement during stock-out(s)
BUSINESS OPERATIONS

Budget performance

Pharmacy services had total gross revenue of $381 million in FY09, and $114 million in expenses.

- The inpatient and OR areas combined had $58 million expenses, unchanged from the prior year.
- UMH qualified in January 2004 as a Disproportionate Share Hospital for 340b discounts, which continue to reduce outpatient drugs costs by up to 30%.
- The Retail Pharmacy area, experienced a 7% increase in prescription revenue, driven in part by expanded services to post-transplant patients.
- The Infusion area experienced a 14% revenue increase.

UMH Pharmacy Services FY08 Revenue and Expenses

<table>
<thead>
<tr>
<th></th>
<th>Inpatient &amp; OR</th>
<th>Retail</th>
<th>Infusion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08, July 2008 - June 2009 (in 000s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td>208,801</td>
<td>28,120</td>
<td>144,159</td>
<td>381,081</td>
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<tr>
<td>Salary/Benefits</td>
<td>18,471</td>
<td>2,260</td>
<td>2,114</td>
<td>22,844</td>
</tr>
<tr>
<td>Supplies/other</td>
<td>39,334</td>
<td>17,056</td>
<td>35,257</td>
<td>91,647</td>
</tr>
<tr>
<td>Total exp</td>
<td>57,805</td>
<td>19,316</td>
<td>37,371</td>
<td>114,491</td>
</tr>
<tr>
<td>Gross margin %</td>
<td>72%</td>
<td>31%</td>
<td>74%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Percent Change from Previous Year

|                        |                |        |          |       |
| Revenue                | 0%             | 7%     | 14%      | 5%    |
| Salary/Benefits        | 9%             | 8%     | 3%       | 8%    |
| Supplies/other         | -3%            | 4%     | 17%      | 5%    |
| Total exp              | 0%             | 5%     | 17%      | 6%    |

Statistical Information

The Department of Pharmacy monitors several key performance ratios.

- Inpatient drug costs per patient day have risen on average 4%/yr the past five years. However, in FY2009, inpatient drug cost/discharge actually declined by 3%
- Inpatient personnel costs have risen by an average of 13%/year per patient day over the past five years to address additional medication complexity and patient safety issues, as well as to address market increases in salaries.
- Retail area personnel costs have risen by an average of 4%/year per prescription over the past five years, driven by an increase in the ratio of new-to-refill prescriptions and more time spent processing discharge prescriptions.
- Infusion area personnel costs per infusion have risen on average 18%/yr per infusion visit over the past five years to address additional medication complexity and patient safety issues.
**Staffing Levels**

Department of Pharmacy staffing levels have increased over the past five years to address issues of increased volume and complexity and to better address patient safety issues. The growth over the past five years has been mostly in pharmacists, both staff and clinical. This segment of the staff has grown 11%/year over five years, compared to the pharmacy technician growth of 9%/year over that same time period.

**UMH Pharmacy Services Staffing Levels, One Year and Five Year Average Trend**

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
<th>FY07</th>
<th>FY08</th>
<th>FY09</th>
<th>1 year change</th>
<th>Avg Yrly Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacists</td>
<td>70</td>
<td>84</td>
<td>88</td>
<td>98</td>
<td>108</td>
<td>108</td>
<td>0%</td>
<td>11%</td>
</tr>
<tr>
<td>Technicians</td>
<td>92</td>
<td>100</td>
<td>107</td>
<td>120</td>
<td>130</td>
<td>133</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Residents</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>Management</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td>12</td>
<td>9</td>
<td>-8%</td>
<td>-1%</td>
</tr>
<tr>
<td>Office</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>-10%</td>
<td>-3%</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>215</td>
<td>228</td>
<td>251</td>
<td>270</td>
<td>272</td>
<td>1%</td>
<td>8%</td>
</tr>
<tr>
<td>All Pharmacists</td>
<td>70</td>
<td>84</td>
<td>88</td>
<td>98</td>
<td>108</td>
<td>108</td>
<td>0%</td>
<td>11%</td>
</tr>
<tr>
<td>Tech and Office</td>
<td>102</td>
<td>110</td>
<td>117</td>
<td>130</td>
<td>140</td>
<td>142</td>
<td>2%</td>
<td>8%</td>
</tr>
</tbody>
</table>
In the beginning of Fiscal Year 2009, the Home Care Services (HCS) leadership engaged in a retreat with the intent to achieve full and coordinated integration of our 5 services lines (HomeMed, MedEQUIP, Michigan Visiting Nurses, Michigan Visiting Care, & Wheelchair Seating Services). As a result of this effort, a new Mission and Vision were created which represents a unified voice working toward the future in the spirit of collaboration and coordination of efforts and resources.

**UM Home Care Services Mission**
The University of Michigan Home Care Services enhances the quality of life for our patients and their families by designing and providing innovative, high quality programs and services extending the continuum of care into the home and community.

**UM Home Care Services Vision**
We will be the provider of choice for high quality, coordinated, safe and cost effective patient care by creating an environment that inspires trust, creativity, and commitment in our employees.

**HomeMed Service Provision**
HomeMed is a licensed pharmacy and home infusion provider that is uniquely positioned within the UMHS continuum and is a program partner with the University of Michigan Hospitals and Health Centers (UMHHC). Together with other physicians, clinicians and programs at UMHHC we are able to effectively contribute to a comprehensive and coordinated continuum of care as patients and their families’ transition from the inpatient and outpatient settings to the home environment. Our team provides comprehensive and individualized in-home pharmacy infusion products, services, and training throughout Michigan, Northern Ohio and Northern Indiana.

HomeMed staff consists of academic experts whose knowledge is complimented with clinical experience. Pharmacists, nurses, and dietitians comprise our clinical compendium of health care professionals, many of whom serve as national committee board members, are published authors, known researchers in the medical field, and have long term experience caring for infusion patients. These clinicians along with pharmacy and service technicians, reimbursement specialists, and both departmental and division office staff operate a business model that is adaptable to meeting the ever changing challenges in health care today.

We foster life-long and lasting relationships. Our clinicians work collaboratively to craft individualized treatment plans and communicate effectively to execute them. With collaboration, physicians and our clinical staff finalize therapy regimens. Our staff addresses psychosocial and economic needs. And together, all of these individuals work with the patient and their family to make them educated and compliant consumers of health care. Our on site hospital based training and education team works directly with the discharging or clinic staff to facilitate smooth transitions to home care. Our highly trained and infusion certified in-home nursing staff continues to support the education and practice habits necessary for a sustainable home infusion environment.

Although HomeMed resides within the Home Care Service division in the Hospital and Health Centers corporate structure an administrative relationship exists between HomeMed and the Department of Pharmacy Services. Thus many administrative, pharmacy practice and educational activities are collaborative and integrated. There is HomeMed representation on multiple Department of Pharmacy and Health System committees.

We are motivated and driven to succeed. Our pride, reputation and commitment to all stakeholders prohibit us from providing anything less than the highest quality of patient care.
HomeMed experienced a 6.7% increase in Gross Revenue ($39,548,080), a 10.4% increase in Net Revenue (Figure 1. $20,382,962) and an 84.3% increase in Net Margin (Figure 2. $1,742,072) in FY ’09 compared to the previous fiscal year. This increase in margin was influenced by increases in activity, and changes in therapy mix, most notably in our Hemophilia patient population.

FY ’09 cash collections totaled $19,235,605 which represented 48.6% of charges (i.e., gross revenue) and is increased from cash collection performance in FY ’08 which represented 47% of charges. The total Allowance Balance as of June 30, 2009 was $937,357. The adjusted Days Sales Outstanding (DSO) demonstrated a decrease to 74 days as of June 30, 2009 and is 6 days lower than FY ’08 DSO of 80 days (Figure 3). Staffing changes in billing personnel assignment to payer accounts were made in FY ’09 to more closely align skill sets. Following this change, DSO within select payer groups realized a favorable decrease.

HomeMed realized a positive net margin of $1,742,072 (8.5%) which was favorable to the FY ’09 Annual Plan net margin of $352,828 (1.9%). The year end allowance reserve balance of $937,357 is increased compared to FY ’08 ($648,590) and provides for robust coverage for potentially uncollectible revenue. Total operating expenses were unfavorable to the FY ’09 Annual Plan ($514,676; 2.8%) and predominantly driven by unfavorable variances in Pharmacy Supplies ($633,063); Contract Nursing ($103,297); and Equipment Maintenance ($69,680). While an unfavorable variance was evidenced in Contract Services of Others primarily driven by the labor expense of Manpower employees, this was off set by the favorable variance achieved in Contract Services – Other wherein delivery courier expense is captured. The use of Manpower employees facilitated a shipping model which allowed for an increase in deliveries by internal HomeMed staff and a decrease in the use of outsourced courier options (see Operations Metrics section). Overall, total operating expenses relative to gross revenue remained unchanged from FY ’08 (47.2%) compared to FY ’09 (47.1%). Again, this is attributed to the 6.7% increase in activity experienced in FY ’09.

The financial climate in the United States and in Michigan in particular, coupled with decreases in payer reimbursement rates, continue to pose challenges for meeting financial targets consistently.
HomeMed Fiscal Year 2009 in Review

Referral Activity

An average census of 1,395 patients was maintained by processing 1,988 (43%) new patient therapy referrals and 2,625 (57%) existing patient therapy or existing patient new therapy referrals (Figure 4).

Figure 4
FY '09 HomeMed Referral Activity by Typ

HomeMed referrals are obtained exclusively from UMHS where on average 72.2% of patient referrals (an average 72.4% of therapies) processed by Discharge Planning were referred to HomeMed opposed to other home infusion providers (Figure 5).

Figure 5
HomeMed Referral Capture Tracking
FY '09 New Patients and Capture Rate

The majority of home infusion therapy referrals originate from inpatient hospital discharges. Approximately one-third of HomeMed referrals come from ambulatory care areas with the Cancer Center being the predominant origin of referrals in this category. The remaining referrals originate in either the emergency department, primary care sites or in the home where typically a previous patient is restarted on a therapy previously administered in the home.

Of 530 patients not referred to HomeMed, the majority (42%) were referred elsewhere by Discharge Planning for reasons not documented; 37% of those not referred to HomeMed were due to previous provider relationships and preferred provider payer agreements as assessed by the discharge planning clinician (Figure 6).
HomeMed continued to receive the majority, albeit not all, of its FY '09 referrals via *Allscripts™*, the electronic, web based, discharge management software application. Reports generated through *Allscripts™* demonstrate that there were 2,928 home infusion referrals placed by UMHHC Discharge Planning in FY '09. Of these, 2,155 referrals (73.6%) were placed with HomeMed (Figure 7). This is consistent with HomeMed data indicating a 72.2% overall referral capture rate which includes, but is not exclusive to, referrals obtained through *Allscripts™*. An analysis of data conducted in the first 6 months of FY '09 revealed that the majority of *Allscripts™* referrals not placed with HomeMed were placed with Walgreens Optioncare; 81% of which HomeMed was eligible to service.

In FY '09 the collaborative HomeMed – Cancer Center Lean initiative facilitated process change such that HomeMed became the infusion provider for all continuous (home) infusion chemotherapy patients in order to ensure coordinated, safe, and efficient patient care in this population. As a result of this change, HomeMed successfully negotiated out-of-network service agreements for patients on a case-by-case basis, thereby increasing the number of referrals processed through this pathway.

**Operations Metrics**

**Distribution**

Selected metrics are presented which illustrate an overall increase in HomeMed activity during FY '09 which correlates with the increase in revenue realized. The average monthly number of active patients on service increased by 7.6% in FY '09. Operations metrics can be further classified into those which represent distributive functions and clinical services.

Pharmacy distribution activity increased in all areas other than units admixed (compounded) in FY '09 (Table 2). Contributing influences on admixture activity include frequency of drug administration (i.e., trend changes in number of infusions in a given day), and clean room activity relative to wasted or canceled orders. The percentage of deliveries completed by internal HomeMed staff significantly increased in FY '09 and is reflective of a change made in the shipping staffing model whereby temporary staff was maximized in the warehouse to allow HomeMed drivers more time for delivery activities. This change resulted in a favorable variance in the financial FY '09 Annual Plan with an overall cost savings in delivery expense achieved.
Clinical Pharmacy Care Management

Pharmacy clinical service activity is tabulated for FY ’09 (Table 3). Comparison data for FY ’08 is included and should be considered in lieu of a change in the HomeMed care management model which occurred on June 9, 2008 (FY ’08) and was finalized to its current state on October 1, 2008 (FY ’09).

Specifically, clinical referral processing work became and is now distinct from follow up care management work.

Overall, of the selected clinical interventions reviewed, there was no change in care management activities in FY ’09 compared to FY ’08 (17,780 versus 17,598 or 1% variance). Of note however is the change in clinical intervention reporting by staff. In the four major categories (assessment/care planning, care coordination, clinical monitoring, laboratory analysis) activity decreased in FY ’09 in all cases. In the intervention category of “other” there was a dramatic increase in activity in FY ’09. This would suggest that a review of clinical interventions by type is necessary in order to accurately capture the nature of clinical interventions being provided. This change is likely related to the implementation of the new business model for separation of work between referral processing and follow up care management.

Table 2:

<table>
<thead>
<tr>
<th>FY ’09 HomeMed Distribution Activity</th>
<th>FY ’09 Total</th>
<th>% ▲ vs. FY ’08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orders Processed</td>
<td>47,511</td>
<td>5.9 ▲</td>
</tr>
<tr>
<td>Prescriptions Filled</td>
<td>52,189</td>
<td>12.2 ▲</td>
</tr>
<tr>
<td>Units Admixed</td>
<td>110,877</td>
<td>7.1 ▼</td>
</tr>
<tr>
<td>Infusion Days</td>
<td>386,379</td>
<td>3.0 ▲</td>
</tr>
<tr>
<td>New Therapy Starts</td>
<td>5,711</td>
<td>14.2 ▲</td>
</tr>
<tr>
<td>Active Patients (month)</td>
<td>1,395</td>
<td>7.6 ▲</td>
</tr>
<tr>
<td>Total Deliveries</td>
<td>27,841</td>
<td>2.5 ▲</td>
</tr>
<tr>
<td>% Deliveries HomeMed</td>
<td>68.9%</td>
<td>9.78 ▲</td>
</tr>
</tbody>
</table>

Infusion Nursing

A total of 5,946 in-home infusion nursing visits were made by a combination of HomeMed infusion nurses (16.1% or 960) and subcontracted nursing agencies (83.9% or 4,986) to fulfill payer-contract...
requirements (Figure 8). This distribution in provision of infusion nursing services is consistent with FY '08. Michigan Visiting Nurses (MVN) continues to be the primary subcontracted nursing agency for HomeMed (51%), followed by Advanced Professional (14%). This assessment of nursing activity does not include patients receiving nursing services wherein the home health agency billed the payer directly for services rendered.

**Figure 8**

FY '09 HomeMed Subcontracted Nursing Activity

<table>
<thead>
<tr>
<th>Agency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan Visiting Nurses (MVN)</td>
<td>51%</td>
</tr>
<tr>
<td>Other</td>
<td>24%</td>
</tr>
<tr>
<td>Advanced Professional</td>
<td>14%</td>
</tr>
<tr>
<td>Gentiva</td>
<td>2%</td>
</tr>
<tr>
<td>Mid-Michigan</td>
<td>2%</td>
</tr>
<tr>
<td>Promedica</td>
<td>3%</td>
</tr>
<tr>
<td>Residential Home Care</td>
<td>4%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
</tr>
</tbody>
</table>

HomeMed in-home infusion nurses provide nursing care for patients in the home and in alternate settings. In FY '09, these staff (4.5 FTE) completed a total of 960 visits. These visits are typically associated with more complex therapies such as chemotherapy and immune globulin administration (Figure 9).

**Figure 9**

**Figure 10**

HomeMed in-home infusion nursing visits (Figure 10) are most commonly provided for patients with a bundled bill nursing benefit coverage plan (41%); the remaining visits were made to assist the HomeMed Training Team in workload distribution (22%), to accommodate a patient's lack of home bound status (25%) and to bridge a gap in home health agency service provision (12%). Of the visits made to accommodate a gap in home health agency service provision, the most common reason was related to compensating for skill set deficiencies necessary to provide care.
Of the 960 visits made to patients in FY ’09, the most common service provided to patients was that of drug administration, followed by on going monitoring / teaching, and intravenous access placement (Figure 11).

HomeMed also employs a dedicated group of skilled nurses to provide patient education and training prior to discharge (1,086 training sessions). This staff, known as the HomeMed Training Team, also accommodates clinic visits (5 visits) for care coordination, chemotherapy connections (1,619 connections) in the Cancer Center and first dose administration of medication in the vascular access unit (81 encounters).

**Inventory Management**
HomeMed inventory, defined as pharmacy and medical / surgical supplies, contributes 47.9% ($8,934,154) to the overall operating expense base. In FY ’09, the pharmacy supplies or drug expenditure totaled $7,714,342 (41.4% of operating expenses) and is an 18.1% increase from FY ’08. Similar to previous fiscal years, expenditures related to anti-hemophilia factor (HEM 31%), antibiotics (ABT 26%) and immune globulin (IVIG 17%) comprise the top tier of expenses by therapy type (Figure 12).
A notable change in FY ’09 is the expense related to drug purchases for catheter care (CCO) therapy. Previously inconsequential, the expense for catheter care this year was 4% of the overall drug expenditure. This change is multi-factorial in origin. On January 5, 2009, HomeMed changed its clinical protocol for catheter flushing to include a sodium chloride flush both before and after drug administration as a standard of practice to match home health agency community practice. Previously, a saline flush was only used pre and post medication administration for medications incompatible with heparin flush. Now also captured within the catheter care drug therapy code is Alteplase® and Ethanol used for occlusion resolution and infection prophylaxis, respectively. These
two drugs in combination with the increased use of saline flushes have influenced the increase in expense related to catheter care therapy.

**Figure 12**

FY '09 Drug Expenditure by Therapy

Ten pharmaceuticals comprise 50.1% of the total drug spend as illustrated graphically (Figure 13). This drug expense correlates with the drug expenditure by therapy type and is similar to FY '08 with minor variation noted. Eight drugs from FY '08: Advate, Gammagard, Novoseven, Gamunex, Recombinate, Meropenem, Daptomycin, and Piperacillin/Tazobactam are positioned in the top ten drug spend in FY '09.

**Figure 13**

FY '09 Top Ten Drug Expenditure

HomeMed purchasing pathways have remained consistent with previous fiscal years (Figure 14). HomeMed purchases the majority (64%) of its pharmaceuticals from the health system’s primary drug wholesale company, AmerisourceBergen. A lesser percentage (2.5%) is procured from the Department of Pharmacy with the remaining drugs obtained directly from the manufacturer or secondary wholesaler (primarily biologics).
HomeMed realized a cost savings of $533,747 through purchasing pharmaceuticals (exclusive to anti-Hemophilia product) at 340B pricing from AmerisourceBergen (Figure 15). An additional $601,790 in savings was achieved through purchasing anti-hemophilia and IVIG products at 340B pricing directly from the manufacturer. A sum total of $1,135,537 in annual cost savings was realized in FY ’09 through the 340B purchasing program.

This savings is essentially unchanged from a total savings of $1,135,731 achieved in FY ’08. This degree of savings does not reconcile with the increase in activity and drug expenses evidenced in FY ’09. The 340B purchase eligibility determination is achieved using an electronic database which extracts data from the CHIP and ECHO software systems.

Database integrity has not been optimized this year as a result of software instability. This will be corrected in FY ’10 with HomeMed’s conversion to new operational software, Homecare Net (HcN).

The annual HomeMed physical inventory was completed on June 27, 2009 and revealed an inventory value of $581,478. This computes to an annual inventory turn rate of 15.4 turns which is higher than the turn rate of 11 experienced in FY ’08. While documented product outages and shortages appeared to decrease in FY ’09 (102) compared to FY ’08 (130) there was a preponderance of core inventory item outages in FY ’09. While a turns rate of 15.4 is desirable and reflects a ‘just in time’ inventory management practice there remains the need to balance this with ongoing problems with product outages and back orders at both the wholesaler and manufacturer levels.
Billing and Reimbursement
Payer Demographics
Blue Cross Blue Shield of Michigan (BCBSM) is the primary payer (50%) to HomeMed using a series of plans (HIT, Basic, Premier Care, BlueCaid). Medicare and Medicaid business was relatively unchanged from FY ’08 although a demonstrated decrease in Medicare Part D business was appreciated. The payer distribution profile excluding charity is below (Figure 16).

**Figure 16**
FY ’09 Invoiced Sales Per Payor Group

![Pie chart showing payer distribution](image)

Billing Performance
In FY ’09 a total of 15,875 claims were generated; of these, 90% were sent to the payer amounting to $36,840,404 in charges and $170,870 (3%) in pending as of June 30, 2009. The percent accounts receivable exceeding 120 days was 24% while cash collections increased by 12% in FY ’09 compared to FY ’08. HomeMed continues to effectively manage and minimize its bad debt. Actual bad debt incurred in FY ’09 was favorable to the Annual Plan ($393,481) at 0.3% and reflects the collective strength inherent to HomeMed billing operations.

Select HomeMed Programs
Intestinal Rehabilitation
In FY ’09 HomeMed, in partnership with UMHHC Pediatric Surgery and Pediatric Gastroenterology, launched the Children’s Intestinal Rehabilitation Program (CHIRP). This program serves a population of patients with intestinal failure be it related to short bowel syndrome or motility disorders, many of whom rely upon parenteral and enteral nutrition therapy to support growth and development.

A HomeMed clinical pharmacist fulfills the key liaison role between this program (e.g. outpatient clinic setting) and HomeMed. This position was specifically designed and tailored to facilitate effective and efficient communication, care coordination, and resource allocation for these patients in the provision of home nutrition.

The CHIRP provided comprehensive care to 34 patients receiving a total of 10 therapy types in FY ’09. While every patient received either enteral (32 of 34 patients) and / or parenteral (22 of 34 patients) nutrition, other therapy types are also included (Figure 17). The majority of patients received catheter care therapy which would be expected. Injectable, antibiotic and hydration therapies were most commonly provided in addition to nutrition.
In FY '09 this program was associated with $2,045,318 in gross revenue and a corresponding $1,110,653 in net revenue for the HomeMed sector of the program.

**Investigational Studies**
HomeMed works in a supportive role to bridge the service gap for UMHS patients enrolled in investigational studies as they transition from UMHHC settings to the home. In FY '09 HomeMed continued to provide equipment and ancillary supplies to cancer patients enrolled in the ET-743 protocol through the Comprehensive Cancer Center. Additionally, HomeMed also provided home catheter care therapy for pediatric patients participating in the Pediatric Infectious Disease Ethanol Lock study. In both cases, HomeMed staff work closely with primary investigators to ensure that protocol guidelines are followed and no interruptions in therapy occur.

**LEAN Performance Improvement Initiatives**
HomeMed endeavored to participate in the HCS Central Intake LEAN initiative for FY '09. This project remains active and will continue for FY '10 with the goal of establishing a central repository for all referrals sent to and accepted by Home Care Services.

In November 2008, a LEAN project was initiated to improve the process for the initiation of home chemotherapy continuous infusions (CI) due to patient complaints of long delays. Root cause analysis indicated that one of the primary reasons for delays was due to continuous infusions connected late in the day. Note that infusion cycles are in increments of 24 hours, so a late initial connection will result in the need for a late disconnection. The result of this LEAN initiative was process change. Currently, all CI connections are performed Monday through Friday from 8 AM to 5 PM in the Cancer Center. This has improved patient satisfaction and allows for disconnections in the home during day time hours when a visiting nurse is more readily available.

Additionally, HomeMed staff partnered with MVN staff to address process deficiencies in the joint provision of bundled bill home infusion nursing services. Using LEAN strategies and tools, this group created current and future value stream maps to add clear definition to the current and proposed processes. The group crafted a future state which will be fully implemented in September of FY '10. This LEAN project was submitted to the UMHHC Michigan Quality System (MQS) and was accepted for formal presentation during the institution’s quality month in October 2009.

**Patient Care & Satisfaction**
HomeMed receives and reviews patient (customer) satisfaction data quarterly (Figure 18). Data is obtained through direct telephone dialogue with patients using a survey template of questions and through mail back responses to printed surveys. Results are compared to national benchmarks obtained through Strategic Healthcare Programs (SHP). HomeMed consistently met or exceeded satisfaction benchmarks throughout FY '09; HomeMed failed to consistently meet the benchmark in some areas.
Recognized opportunities for improvement exist relative to communication with patients in the areas of: Patient Rights & Responsibilities, Patient Financial Responsibility, Disaster Planning, Infection Prevention and On Call Responsiveness. These areas will serve as source material for FY '10 performance improvement projects and process change.

Quality & Compliance
The Quality and Compliance Program provides leadership and support services for accreditation readiness, performance improvement initiatives, health care compliance, and educational programming for the five departments of Home Care Services - HomeMed, MedEQUIP, Michigan Visiting Nurses (MVN), Michigan Visiting Care (MVC), and Wheelchair Seating Service.

Accreditation Readiness
Further enhancements have been utilized within V Survey, the UMHHC selected electronic tool for tracking and documenting ongoing readiness, e.g., selected audits, Facilities Rounds documentation. A new Joint Commission (JC) Work Team was organized in early 2009 to enhance involvement of
various levels of leadership and staff in the ongoing readiness activities of each department and the quality of documentation provided.

The annual self assessment (PPR) was completed in November of 2008. Action Plans over the year pertaining to home infusion focused on: patient assessment & reassessment, pain assessment, and medication & enteral product storage.

Core accreditation activities have included: JC Readiness Workgroup activities, participation on the UMHHC Accreditation & Regulatory Readiness Council, tracer activities, updated facility rounds, updated HIPAA Notice integrated into the Patient Handbooks, consultation & support to JC chapter leads, and enhanced department staff orientation and education offerings. A major construction project at HomeMed was completed and ensured compliance for medication and enteral formula storage.

**Health Care Compliance**

Corporate compliance activities have included: participation on the UMHHC Facility Billing Committee, review & prioritization of the 2009 OIG Work Plan institution wide & home care specific risk assessment and reduction initiatives. Improvements were made in the credit card processes. Additional safeguards will be implemented with the roll-out of the new Red Flag Rules in FY 2010.

The HCS Compliance Committee’s charge for FY 2009 was focused on reviewing billing audits, trends in errors and resultant improvements (a JC focus), review and update of the external audit process, and preparation for the new Recovery Audit Contractors audit activities to begin in FY 2010. There was additional compliance consultation completed to review computer system access with appropriate resolution including staff education.

**Performance Improvement**

The HCS Departmental Performance Improvement Plan outlines annual goals with established measurement outcome criteria. HCS partners with external organizations to benchmark performance, e.g., Strategic Health Care Programs (SHP), Fazzi, Solucient. 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 pertinent to home infusion are summarized below (detail reports are available for reference):

**Service**

The overall HomeMed average measure of “willingness to recommend” (95%) was positive to the institutional benchmark (93%). The average mean scores for HomeMed (4.8) exceeded the institutional goal and the external SHP national benchmark for home care services (Figure 19). HomeMed managers implemented an improvement plan to address the entire patient survey report.
Quality Care

Selected quality of care measures

- Medication error rate average (1.2 errors/1000 Rx filled) was favorable to target (Figure 20).

- The HCS Medication Safety Coordinator analyzed medication error and adverse drug event data and made recommendations for improvements. Improvement Activities included:
  - Standardization of PCA Rx template, compounding document & pump program practice.
  - Revision of the enoxaparin prescription template.
  - Investigation of the use of low dose insulin syringes and/or revision of patient education materials related to TPN insulin dosing.
  - Encouraged use of the new quick tool to report near misses.
  - Focus on error prevention and improved reporting by staff.

- Blood stream infection rate average (0.74 infections/1000 therapy days) was slightly above the FY2008 performance, but below the external benchmark (Figure 21).
A project is underway collaborating with UMHHC Infection Control Services (ICE) to analyze HCS patient readmission data to validate reporting capture and identify any other opportunities for improvement.

Nosohusial pneumonia rate average (0.48 infections/1000 ventilator days) was just slightly above the target 0.4 infections.

This is above the 2008 VAP rate of 0.33, but the VAP rate has remained low and relatively stable.

**People**
- HCS staff willingness to stay within the health system (81.8) was just slightly below the internal benchmark (83.5). Willingness to recommend the department (65.1) remained stable with no statistical difference from previous year (63.9) and was below the UMHHC measure (71.5). Data analysis has been completed & improvement planning is underway.
- Work related injuries at HCS are tracked institutionally via the DART Rate reporting process. The overall HCS rate was 4.10 above the institutional target, though lost work days continue to be generally short term absences.

**Education & Employee Safety**
A major project was completed creating two separate pathways for regular and non-regular staff orientation. A 13-hour time savings was created for non-regular staff increasing flexible hiring. A total package of new on-line education resources was implemented.

The annual HCS Education Blitz was held in late April. Processes continued to be improved to address job specific learning plans, ease of access and navigation of MLearning, and improved custom reports for managers. Significant work was done to automate the blitz and tailor learning plans. There was a formal evaluation of the blitz completed with recommendations for improvements for FY 2010. Our Training Specialist Lead partnered with UMHHC Safety Services to create five new safety competencies.

**Employee Engagement**
In FY ’08 (March 2008) HomeMed management appreciated two primary areas of opportunity in employee job satisfaction: flexibility in scheduling and supervisor-subordinate relationships. In FY ’09, the management team endeavored to focus on these two areas for change and improvement. Specifically, results from the engagement survey were shared with all staff.

A staff forum was held which allowed staff vociferous debate and discussion over the advantages and disadvantages of eight hour and ten hour workdays. This forum was pivotal in helping staff recognize
that both schedules have positive and negative consequences and that flexibility in supporting both options provides a potential win-win situation for all.

Secondly, the HomeMed administrative staff provided all staff the opportunity to participate in an anonymous, electronic ‘supervisor’ survey. This survey was designed by the HomeMed management team to specifically identify what elements of the supervisor / employee relationship were valued, significant, and in need of repair. Each manager/supervisor then shared the aggregate results with their staff and designed a personal improvement plan which was also communicated to their staff members.

The results from the FY ’09 employee engagement survey demonstrated an increase in score in all six questions related to the staff to supervisor relationship. Results overall for the majority of survey questions did not significantly change. A staff member’s willingness to recommend HomeMed as a “good place to work” decreased from 60.6% in March 2008 to 58.3% in March 2009. Notable too, is the increase in percentage from March 2008 (24.1%) to March 2009 (54.5%) of employees who recall having survey results shared with staff. In FY ’09, the HomeMed management team identified a manager champion to investigate and facilitate employee engagement for FY ’10 such that tailored and specific action steps can be taken to improve employee engagement.

**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. In FY ’09, the calculated turnover percentage was 9.3% or 10 persons out of base headcount of 107.5. Of these 10 individuals, one person retired and then came back to work in FY ’09 as a regular employee for HomeMed; two staff members converted to temporary employment status with HomeMed; 2 employees worked in a shared service area (finance and IT) and not HomeMed directly or solely. In consideration of this information, the adjusted turnover rate specific to HomeMed is 4.6% or 5 employees.

**Technological Advances**

In January 2009, HomeMed contracted with Healthcare Automation Inc (HAI) to procure and customize new operational software – Homecare Net (HcN). In the last six months of this fiscal year, the software database has been built, extensive testing as occurred, upgrades have been applied and standardized templates for work processes have been created. The targeted launch date for implementing HcN operationally remains November 1, 2009.

**Community Benefit Initiatives**

HomeMed has supported through participation and sponsorship, the Hemophilia Foundation of Michigan Camp Bold Eagle and Annual SpringFest, the Trail’s Edge Camp for Ventilator Dependent Children, the Crohn’s Enterocolitis Foundation of Michigan, The Michigan Fall Harvest Food Gathering and the Michigan Society of Parenteral and Enteral Nutrition (MSPEN).

**Sales & Marketing**

A major marketing objective for FY’09 was to increase revenues from hemophilia and bleeding disorders patients. This goal was accomplished by improving the communications and working relationship between the UMHS Hemophilia Treatment Center (HTC) and HCS. The HTC is an important referral source for HomeMed and the improved relationship with them has resulted in an improved rate of referrals. In FY ’08, HomeMed received 18.8% of the referrals originating in the HTC, while in FY ’09 HomeMed received 23.9% of the patient referrals from the HTC. Twenty-five pharmacy providers comprised the list of companies patients chose for the provision of anti-
hemophilia factor replacement. Of these, HomeMed was chosen most frequently as the provider of choice.

Some of the key factors in the noticeable improvement in the HTC relationship were: the creation of a liaison team comprised of a billing expert, an infusion nurse and a pharmacist (all of whom provided very strong support for the HTC), assisting the HTC with marketing collateral, i.e. HTC brochure and the Lifetime of Care document, assisting the HTC with formulating their FY ’10 HCS funding needs, and sponsoring the second HTC / HCS Summit held on May 27, 2009.

Additional marketing activities supporting HomeMed during FY09 were: attending the annual National Home Infusion Association conference to learn new sales and marketing tactics, and coordinating our participation at the Pain Management Conference in Plymouth which was attended by 350+ health care professionals involved in infusion services.

**Academic & Professional Achievements**

HomeMed continues to contribute to the education of Health Science students. There were seven student placements at HomeMed (i.e., 5 Pharmacy, 2 Nursing, 1 Dietetics) in FY ’09 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. Two pharmacy interns were employed at HomeMed.

Professional staff made presentations at the local, regional, and national level. Three staff members serve as professional association board of directors (ASPEN, MHHA, NHIA) and three staff members serve on various national professional association committees. Two pharmacists are board certified in nutrition support; four of five home infusion nurses are certified registered nurses of infusion (CRNI). In FY ’10, 100% of the home infusion nursing staff will possess CRNI status.

HomeMed hosted two groups of international pharmacy professionals consisting of students, pharmacists and professors in FY ’09 through the College of Pharmacy International Exchange Program. Additionally, through networking, HomeMed staff visited infusion providers in other states for purposes of appreciating and gaining from “best practices:” Chartwell of Pennsylvania, Chartwell of Wisconsin, and Johns Hopkins Baltimore Maryland.

**FY ’09 Accomplishments**

- The FY ’09 net margin target of 5.2% was exceeded.
- Greater employee satisfaction and engagement with a demonstrated improvement in the employee to supervisor relationship was achieved.
- A policy and plan was implemented to achieve certification for all pharmacy technician staff. At FY ’09 end, a total of 14 technicians were certified (64%) and the remaining technicians were in the process of renewing their certification or were scheduled to complete the certification exam in FY ’10.
- The partnership with the HTC was fortified and a comprehensive treatment program from cradle to rocking chair was forged.
- LEAN thinking was incorporated into process redesign and practice changes were made to eliminate duplicate work and areas of waste.
- A favorable BCBSM Hemophilia Network Provider contract was sustained.
- JC Survey Readiness was sustained.
- Friends of the University awarded $4,000 to fund the development of a Catheter Care Template which is used jointly by HomeMed and other institutional nursing areas.
- The HCS Event Tracking system was changed with strengthened reporting to the UMHHC Patient Safety system.
- Electronic documents were created in CareWeb for HomeMed: UMHHC coordination.
- GPS mapping units in HomeMed vehicles increased efficiency, safety & worker satisfaction.

**FY ’10 Goals and Initiatives**
♦ Demonstrate a successful conversion to HcN with a Go Live date of November 1, 2009.
♦ Increase HomeMed activity by therapy and through institutional targeted initiatives (Hemophilia program, Immunoglobulin therapy class, referral capture, contribution to centralized care paths).
♦ Decrease expense within Medical/Surgical supplies by 15% or $165,000.
♦ Improve key service areas to attain efficiency, increase quality, improve customer satisfaction and clinical care based on data driven decisions.
♦ Participate in the UMHS Ambulatory Care e-prescribing initiative
♦ Implement the College of Pharmacy Direct Patient Care experience for third year pharmacy students.
♦ Complete process changes to increase revenue capture from BCBSM for enteral therapy provision and home infusion nursing services.
♦ Expand the provision of specialty injections to include Xolair (Omalizumab) and Synagis (Palivizumab) thereby increasing referral capture for these patient populations.
♦ Establish and maintain a 100% certification percentage for pharmacy technician staff.
♦ Identify and employ productivity metrics to incentivize staff to achieve efficiency in work performance.
HomeMed Management Team

Director
Christopher J. Maksym
HomeMed, MedEQUIP, WSS

Assistant Director HomeMed
Tricia Sirois
Clinical Services & Pharmacy Operations

Managers
Terrilyn Cook – Facilities & Health Information
Warren Deppong – Billing & Reimbursement
Lisa Klein – Pharmacy
Debbie Kovacevich – Infusion Nursing

Supervisors
Eric Korte – Inventory, Warehouse, Shipping
Aaron Markham – HCS Equipment Systems
Mary Quick - Billing