



ANNUAL REPORT

# Department of Pharmacy

Fiscal year 2016



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**Duke Pharmacy**  
Duke University Hospital



**Message from the Chief Pharmacy Officer**

Paul Bush



It is my pleasure to present the 2016 Annual Report for the Department of Pharmacy. This annual report highlights the exceptional work that the Duke pharmacists and staff accomplish on a daily basis and the successful initiatives that transform the quality of pharmaceutical care for our patients. These exceptional accomplishments are detailed in the report under the respective service areas and program categories.

It has been a busy and productive year. I will highlight several accomplishments but suggest that you review the entire report to fully understand all that has been accomplished.

The department implemented several programs to support high quality, safe, compliant and efficient care. A regularly convening, interdisciplinary 340B Oversight Committee was formed to provide important guidance for the 340B program which provides reduced pricing for medications administered to outpatients. A health system level drug diversion prevention program was launched with a dedicated resource. Medication stewardship continued as the Pharmacy Utilization Management Program (PUMP) recorded financial savings of \$4.3 million through 30 operational, procurement, and utilization initiatives and the department's core safety team expanded the scope of oversight and membership.

The focus on training and development continued through 2016. A professional development program for technician staff was launched. Through the leadership of a dedicated group of pharmacy technicians a monthly continuing education program is now provided as a live presentation available to all health system technicians via WebEx. The residency program was enhanced through addition of a second resident for the PGY2 oncology program. This addition has allowed expanded patient care coverage and provides an additional oncology-trained pharmacist after graduation to meet future health system workforce needs. We were extremely pleased to add a teaching and learning certificate program for PGY1 and PGY2 residents and continue to work with Durham Technical Community College to establish a health system pharmacy technician educational track.

Staffing was expanded based on inpatient, outpatient and retail growth. Specialty pharmacy services were implemented for the abdominal transplant, cystic fibrosis, neurology, and rheumatology patients. From an operational perspective, the department continued investments in resources and technology for the expanding health system supply chain and established an oral solid and liquid repackaging and distribution program for the health system which generated a savings of \$60,000 in the first full year.

The 2015 Milton W. Skolaut Leadership Award recognizing the leadership and professional contributions of a past resident of the Duke University Hospital Pharmacy Residency Program was awarded to Elizabeth Dodds Ashley, PharmD, MHS.

All of this work directly supports our mission and vision for pharmacy services at Duke University Hospital. These accomplishments would not be possible without the commitment and personal dedication of the Duke University Hospital pharmacy leadership team and staff members.

I would like to thank each and every member of the staff for their commitment to the profession and dedication to the care of Duke Health patients.

Sincerely,

A handwritten signature in black ink that reads "Paul W. Bush". The signature is written in a cursive, flowing style.

Paul W. Bush, PharmD, MBA, BCPS, FASHP  
Chief Pharmacy Officer

## II. Departmental Overview

### Mission

We deliver exceptional pharmacy services for a healthier tomorrow

### Vision

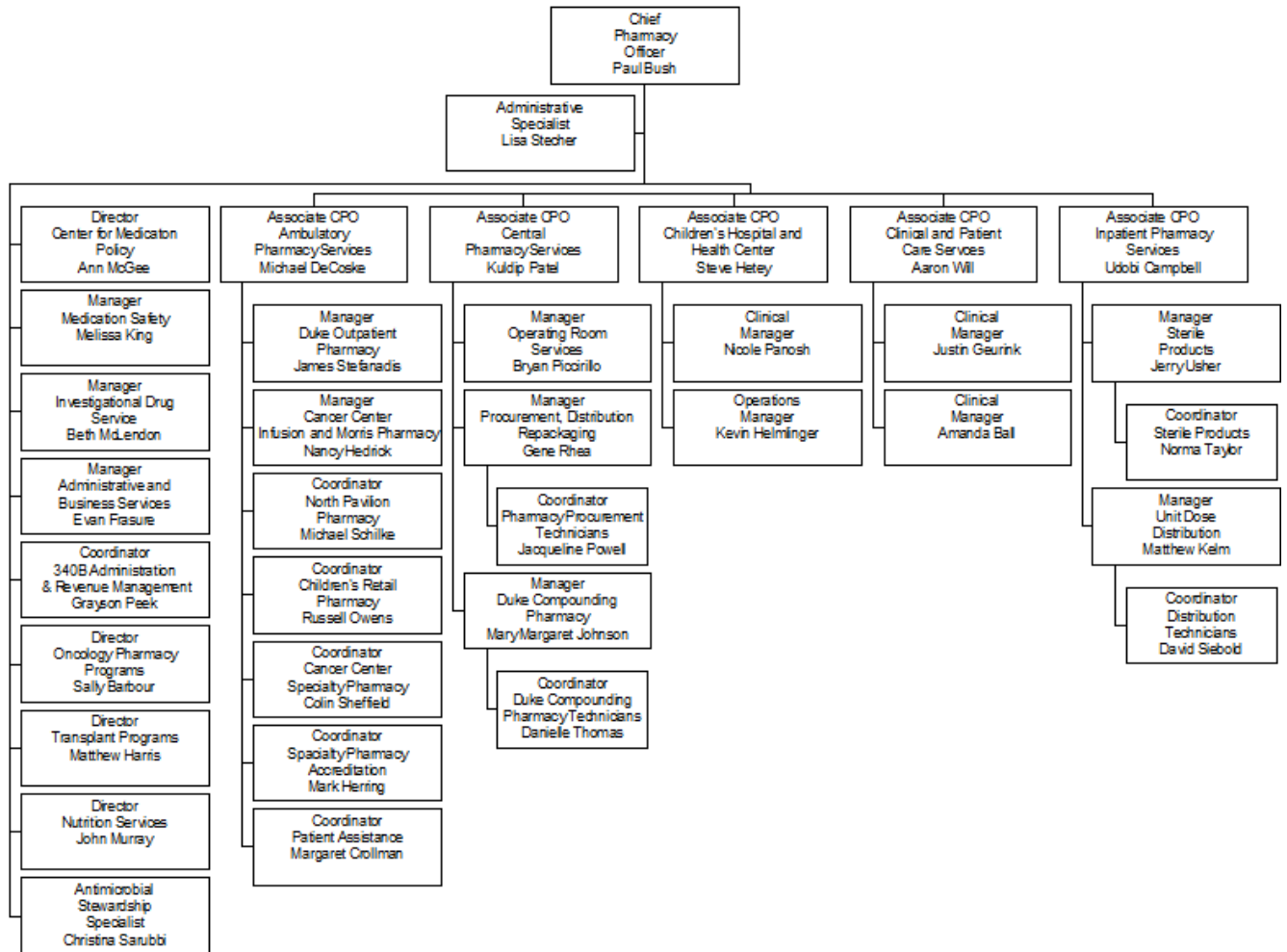
To be a distinguished global leader in pharmacy care

### Goals


- To improve patient outcomes and provide the highest standards of pharmacy care,
- To foster a collaborative approach to medication safety among all disciplines,
- To provide an exceptional work environment that will establish Duke as the pharmacy employer of choice,
- To integrate new technological developments which improve efficiency and safety,
- To promote research to improve patient outcomes and the efficiency of care, and,
- To expand and promote excellence in pharmacy education.



### III. Organizational Chart



## IV. Balanced Scorecard

 <b>Duke University Hospital/Pharmacy (2016-12 Jun)</b> <b>Balanced Scorecard - All</b>					
Measure	Actual	Target	YTD Actual	YTD Target	Freq
<b>QUALITY AND PATIENT SAFETY</b>					
ADM Override Rate (ICU)	5.22%	7.00%	5.36%	7.00%	M
ADM Override Rate (Non-ICU)	0.35%	1.00%	0.43%	1.00%	M
Formulary Compliance Post-Verification	99.72%	99.60%	99.72%	99.60%	M
Medication Turnaround Time - High Priority	9.3	10.0	12.5	10.0	M
Pharmacy Sourced Preventable Medication-related SRS Events with Patient Impact (E-I)	2.0	2.3	28.0	27.0	M
<b>PATIENT EXPERIENCE</b>					
HCAHPS: Communication About Medicines <sup>CSF</sup>	65.6%	65.8%	66.6%	65.8%	M
Percent OmniceII Stock-outs	0.50%	0.55%	0.54%	0.55%	M
Retail Pharmacy Customer Satisfaction	87.60%	80.00%	87.10%	80.00%	Q
<b>FINANCE AND GROWTH</b>					
Direct Contribution Margin for Outpatient Pharmacy	\$1,615,293	\$1,477,384	\$33,381,874	\$17,728,608	M
Flex Expense Percent Variance <sup>CSF</sup>	-15.93%	0.00%	-8.13%	0.00%	M
Flex FTE Percent Variance <sup>CSF</sup>	-2.68%	0.00%	-2.26%	0.00%	M
Pharmaceutical Utilization Management Program (PUMP) Program Savings	\$1,388,385	\$500,000	\$4,332,827	\$2,000,000	Q
<b>WORK CULTURE</b>					
Percent Terminations Annualized: Overall <sup>CSF</sup>	10.69%	15.20%	10.69%	15.20%	M
Work Culture Power Item Score	3.97	4.06	3.97	4.06	YTD
Work Culture: Commitment Indicator	4.14	4.23	4.14	4.23	YTD
Lighting Scheme: Blue = Exceeds Expectations; Green = Fully Achieves; Yellow = Between prior year's avg performance (or similar) and Fully Achieves; Red = Below prior year's avg performance, budget, or similar					
DUHS Performance Services, 11/30/2016 6:19:10 AM					



**Duke Pharmacy**  
Duke University Hospital

## **V. Overview of Pharmacy Services: Scope and Accomplishments**

Duke University Hospital (DUH) is an academic learning center and serves as the flagship for Duke University Health System. A tertiary and quaternary care hospital, the 943-bed DUH is consistently rated as one of the top hospitals in the United States. It offers comprehensive diagnostic and therapeutic facilities, including: a regional Level 1 emergency trauma center; multiple surgical platforms including a major surgery suite containing 50 operating rooms; an endosurgery center; an ambulatory surgery center with nine operating rooms; an eye center with five operating rooms; and extensive diagnostic and interventional radiology facilities. DUH also functions as a research facility where innovations in medicine are consistently achieved and implemented. It is a teaching hospital for students of medicine, pharmacy, nursing, and the allied health sciences. The Department of Pharmacy provides a broad range of advanced pharmacy services. The mission of the Department of Pharmacy is to deliver exceptional pharmacy services for a healthier tomorrow.

To achieve this mission, the department employs multiple pharmacy practice models:

- Decentralized clinical practitioners;
- Specialized pharmacy services operating from discrete areas (e.g. Ambulatory pharmacies, Infusion pharmacies, Operating Room pharmacies, Investigational Drug Services, Production and Packaging and Sterile Products);
- Targeted patient care services (e.g. pain management, nutrition support, anticoagulation, transplantation, pharmacokinetic dosing consults, population health management); and
- Program-based services (e.g., performance improvement, medication safety, medication stewardship, antimicrobial stewardship, drug information and support to medical staff committees including the DUHS Pharmacy and Medication Management, DUHS Medication Safety Committee, DUH Pharmacy and Therapeutics Committee, DUH Medication Safety Committee, DUH Patient Safety and Clinical Quality Committee, Duke Medicine Institutional Review Committees, DUH Infection Control Committee and DUH Ethics Committee).

### **Services Provided to Duke Patients**

- Admission
  - Assure a complete and accurate medication history and reconcile prescribed medication
  - Develop, document and initiate the medication-related components of the patient care plan
- Services
  - Review and approve medication orders before the first dose is administered
  - Review patient-specific medication profiles on a daily basis
  - Monitor the patient's response to medication therapy and adjust medication doses based on response or pharmacokinetic characteristics of the medication
  - Participate in the nutritional support of patients working collaboratively with team members to initiate parenteral nutrition and adjust formulations based on patient response
  - Monitor critically important medication serum concentrations and other clinically important laboratory analyses
  - Participate in patient care rounds
  - Participate in rapid response and resuscitation
- Discharge (Transition)
  - Educate patients about their medication, and establish processes to ensure complete and accurate prescriptions and medication-related continuity of care for discharged patients
  - Provide medications for home use





### Overview of services

The following areas represent the major Ambulatory Pharmacy presence at Duke University Hospital and the primary patient populations served within each area:

- CHC Retail Pharmacy
  - Pediatric patients, Duke employees, Discharge patients
- Duke Cancer Center Specialty Pharmacy
  - Patient Assistance Programs
    - Patient prescription enrollment for Duke Hospital Based Clinics
    - IV Drug Replacement for Duke Infusion Center patients
- Duke Cancer Center Infusion Pharmacy
  - Oncology Treatment Center, Oncology Clinics, Radiation Oncology
- Duke Outpatient Retail Pharmacy (OPD)
  - Duke Clinic patients, Duke employees, Duke University Students
- Morris Pharmacy
  - Non-Oncology Infusion Center, Duke Hospital Based Clinics
- North Pavilion Pharmacy
  - Ambulatory Surgery Center, Outpatient Bone Marrow Transplant
- Clinic Pharmacists
  - Oncology Clinics
    - Breast, Brain Tumor, HOA, GU, Sarcoma, BMT, Thoracic, GI
    - Oncology Treatment Center
  - Duke Outpatient Clinic
  - Duke Family Medicine Clinic
  - Anticoagulation Clinic
  - Infectious Disease Clinic
  - Abdominal Transplant Clinic
  - Thoracic Transplant Clinic
  - Neurology Clinic
  - Hepatology Clinic
  - Rheumatology Clinic

### Mission

- Provide excellent clinical patient care in accord with accepted best practices
- Maintain fiscal responsibility over medication use
- Maintain compliance with all pertinent regulatory requirements
- Expand services in response to society's changing health care needs and the shift towards ambulatory care

### Goals

- To foster an environment for responsible medication use
- To develop a business model for self-sustaining clinical pharmacy services within Hospital Based Clinics, specifically in high acuity areas such as primary care, transplant, and oncology
- To ensure continuity of care as patients transition from inpatient to outpatient and to strengthen the collaboration between inpatient and outpatient pharmacy services
- To optimize the use of technology and automation to support pharmacy services
- To support pharmacy practice and clinical research, residency training and student clerkships

- To serve as the preferred retail pharmacy for all Duke University Hospital patients and employees
- To positively contribute to the direct contribution margin for Duke University Hospital
- To ensure that pharmacists will be available, visible, and serve as the primary resource for all medication related issues across Duke University Hospital Outpatient Areas

**Locations and Hours of Operation**

- CHC Retail Pharmacy: 8:30 AM - 8:00 PM M-F; 8:30 AM -4:30 PM Sat & Sun
- Duke Cancer Center Specialty Pharmacy: 8:30 AM - 6:00 PM M-F; 24/7 On-Call
- Duke Cancer Center Infusion Pharmacy: 7:30 AM - 6:30 PM M-F
- Duke Outpatient Retail Pharmacy (OPD): 8:30 AM - 6:00 PM M-F
- Morris Pharmacy: 7:30 AM - 4:00 PM M-F
- North Pavilion Pharmacy: 6:30 AM - 5:00 PM M-F; 7:00 AM – 11:00 AM Sat & Sun

**Major Accomplishments**

- Targeted service enhancements to improve retail pharmacy access and customer satisfaction
- Expanded CHC Retail Pharmacy Hours of Operation on Saturday and Sunday
- Implemented new specialty pharmacy services with the Duke Abdominal Transplant Clinic
- Implemented for new specialty pharmacy services to support Cystic Fibrosis, Neurology and Rheumatology
- Expanded Patient Assistance Program and implemented a Prior Authorization Support model for select clinics
- Partnered with Student Health Leadership to design a new Retail Pharmacy for Duke University Campus
- Implemented Omnicell cabinets in Duke Pain Clinic and Anesthesia Work Stations in outpatient GI Endoscopy Suite
- Further expanded pharmacy services within Duke Connected Care (accountable care)
- Optimized sample medication use within DUHS
- New DUHS Safe Opioid Prescribing Guideline Approved
- Installed ivStation ONCO in Cancer Center Infusion Pharmacy
- Initial implementation of Therigy software in Duke Specialty Pharmacy
- Completed URAC Specialty Pharmacy Accreditation Gap Analysis
- Completed ASHP Ambulatory Care Pharmacy Practice Self-Assessment
- Tier One Work Culture on annual employee engagement survey

*205,206  
prescriptions filled  
between three retail  
pharmacies*

*Retail  
pharmacies  
record revenue  
of \$85.7 million*

*Retail Pharmacy  
Customer  
Satisfaction =  
87.1%*

**Team Members**





### **Overview of services**

Central Pharmacy Services is composed of three separate operating departments inclusive of the Duke Compounding Pharmacy, Perioperative Pharmacy Services, and Pharmacy Procurement, Repackaging, and Distribution.

- *The Duke Compounding Pharmacy* prepares Compounded Sterile Preparations (CSPs) in compliance with the United States Pharmacopeia – National Formulary compounding standards to support DUH and DUHS Pharmacies and Clinics. Duke Compounding Pharmacy supports the organizational mission to support patient safety by preparing medications in ready to use medication packages, and the research mission of DUH by supporting specialized pharmaceutical needs in collaboration with investigational drug services.
- *Perioperative Pharmacy* serves pre-, intra-, and postoperative patients at DUH by providing highly specialized clinical and technical pharmacy services to enhance surgery outcomes. The staff support this goal by collaborating with surgeons, anesthesiologists, nurse anesthetists, nurses, and other ancillary staff to deliver patient centered care, by facilitating safe and appropriate use of medications.
- *Pharmacy Procurement, Repackaging, and Distribution* services provide logistical support by being responsible for purchasing and distributing medications to DUH and DUHS Pharmacies and Clinics. Annual drug expense for DUH Pharmacies in 2016 was over \$200 million. The department uses highly innovative inventory management systems and high-speed solid and liquid packaging technology to organize and manage the supply chain efficiently.

### **Locations and Hours of Operation**

The Duke Compounding Pharmacy operates 5:00 AM – 10:30 PM (M-F). Designated pharmacists and technicians are available for afterhours emergency support for patient care needs. The pharmacy is located in Duke South, room 0010, Davison Building.

Perioperative Pharmacy services operate two shifts (6:00 am – 9:30 pm) via the decentralized pharmacy satellites located on the 3<sup>rd</sup> Floor in the Duke North and Duke Medicine Pavilion. The Eye Center Perioperative Pharmacy services are available 6:00 AM – 3:15 PM (M-F). Designated support is available for afterhours emergency support via the Duke North Pavilion Perioperative Pharmacy.

The Pharmacy Storeroom (procurement) is open 24 hours and staffed from 5:00 AM – 11:30 PM (M-F) and 6:30 AM – 3:00 PM (Weekends).

### **Major Accomplishments**

*Duke University Health System:*

- Secured funding to purchase and implement the Axway<sup>®</sup> software system for DSCSA (Drug Supply Chain and Security Act of the Federal Food and Drug Administration - FDA) compliance.
- Executed the sterile preparations insourcing project for the health system.
- Successfully managed the transition of the biannual inventory vendor from RGIS<sup>®</sup> to Capital Inventory (Inmar<sup>®</sup>).

- Established a health system oral solid and liquid repackaging and distribution program providing a net estimated savings of \$60,000 annually.
- Collaborated with DUHS Procurement to optimize the wholesaler drug ordering database in order to identify and make it easy for DUHS pharmacy staff to consistently select the formulary lowest cost alternatives when ordering drugs.

*Optimized the wholesaler drug ordering database in order to consistently order formulary lowest cost alternatives*

*Duke Compounding Facility:*

- Established a dedicated training space and workroom for pharmacy technicians.
- Achieved the successful inspection of the pharmacy and cleanroom by the North Carolina Board of Pharmacy.
- Increased security and storage space for management of scheduled drugs by installing a dedicated narcotics vault.

*Perioperative Services:*

- Implemented the Omnicell® Controlled Substance Management system in Duke North OR Pharmacy.
- Initiated a pilot of the Codonics® safe labeling system in 13 operating rooms.
- Implemented preparation of moxifloxacin (intracameral) unit of use injection at the Eye Center Pharmacy providing and estimated cost avoidance of \$195,000.
- Executed the transition of night shift pharmacists from MMC to the DMP OR Pharmacy
- Constructed a new office for the Pharmacy Manager of Perioperative Services.

*Implemented the Axway® software system to achieve Drug Supply Chain and Security Act (DSCSA) compliance.*

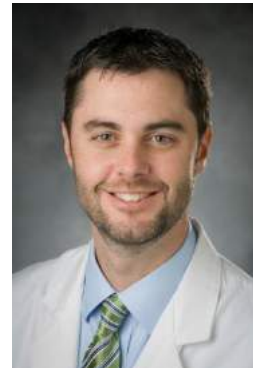
*Pharmacy Procurement, Repackaging, and Distribution*

- Installed a large walk-in refrigerator in the pharmacy storeroom.
- Executed sun setting of the Aesynt® Packplus contract and initiated in-house repackaging program for DUH – estimated cost savings of \$60,000/year.
- Developed a user/training manual for operating the Pentapack® repackaging technology.
- Transitioned 340B related tasks and resources to the newly hired 340B Pharmacy Coordinator.

**Team Members**

The Central Pharmacy Services team is made up of highly experienced, skilled and committed managers, coordinators, pharmacists, and pharmacy technicians who work collaboratively with internal and external customers to meet the needs of patients at Duke Hospital and Health System. Staff members actively support the department's mission by participating in clinical quality and process improvement efforts, promoting and fostering a positive work culture, and making the best use of medications to produce positive patient and customer experiences.





**Overview of services**

The Clinical and Patient Care Services Division (CPCS) comprises all adult inpatient medical and surgical areas and their related specialty areas.

- The pharmacy practice model employed within CPCS is an integrated model consisting of team-based services (e.g. nutrition support, anticoagulation, transplantation), and unit-based services for all inpatient care areas.
- Clinical services include medication monitoring programs and pharmacist protocols, provider order verification, targeted patient education, emergency response, and verification of patient medication histories.
- Clinical pharmacists participate in daily patient care rounds for most medical and selected surgical services.
- Pharmacists maintain competency to recognize and manage the pharmacotherapy needs of adult and geriatric patients.
- Pharmacists serve as primary and team-based preceptors for the University of North Carolina Eshelman (UNC) and Campbell University Schools of Pharmacy and for our Duke University Hospital Pharmacy Residency Programs.
- Clinical services, including clinical monitoring and order verification, operate from the Medication Management Center on evenings, overnights, weekends, and holidays.
- Clinical pharmacists also participate actively on departmental, hospital, and health-system committees involving quality improvement initiatives, informatics, medication policy, clinical research, and medication safety.

**Availability:**

Pharmacists provide services during day shift, Monday through Friday in direct patient care areas, and through order verification and clinical services in the Medication Management Center during weekday evenings, weekends, holidays, and overnight.

**Major Accomplishments**

- Added additional DMP support through additional evening and weekend resources.
- Optimized resources to provide more consistent services to surgical lung transplant patients.
- Provided support to the profession through publications, posters, and presentations.
- Staff recognized as outstanding preceptors by the Duke University Hospital Pharmacy Residency Programs and by the Campbell University and UNC Eshelman Schools of Pharmacy.
- Supported staff member attendance at regional and national conferences.
- Improved the Pharmacy Resident orientation process through our orientation taskforce.
- Developed and initiated the Early Immersion student rotations in coordination with the UNC Eshelman School of Pharmacy Curriculum 2015 redesign.
- Numerous pharmacists have attained or recertified Board Certification in their respective practice areas.

*Transitioned to an iVent system for Anticoagulation Daily Monitoring*

*Developed Maestro Care documentation of clinical activities through iVent*

- Developed and mentored PY4 pharmacy students through our Clinical Intern Program
- Developed Quality Improvement assessments for many of our clinical programs

*Improved High Priority Medication Verification Turn-a-Around Time*

**Our Team**

The CPCS team consists of well-trained, highly-committed pharmacists who work collaboratively with internal and external customers to meet medication needs of adult patients at Duke University Hospital. Most staff members have greater than 5 years of experience at Duke, and many are trained to work in their specialty area as well as other areas within the division. Many pharmacists have completed one or two residency programs, and are board certified in their practice area. Several pharmacists hold full-time or adjunct faculty appointments at the UNC Eshelman School of Pharmacy and/or the Campbell University College of Pharmacy and Health Sciences. CPCS staff members also actively support the department’s mission through ongoing participation in quality, safety, and process improvement efforts, research activities and resident and student education. Many CPCS staff are active members or hold leadership roles in state and national pharmacy organizations. Others have made contributions to the profession through publications and presentations at both local and national organizational meetings.







### **Overview of Services**

The Department of Pharmacy Inpatient Operations Division provides an array of services which support care of patients in both the inpatient and outpatient arenas. These services include:

- Sterile preparation and distribution of both hazardous and non-hazardous medications in a USP 797-compliant environment
- Unit dose medication distribution utilizing a hybrid model which involves the use of patient care unit-based automated dispensing cabinets (ADC), unit dose cart-fill, and first dose dispensing
- Comprehensive ADC management
- Controlled substance management
- Code cart procurement, assembly, distribution and maintenance
- Night shift medication preparation, verification and distribution

### **Locations and Availability:**

Duke University Hospital, zero level, room 0415 and Duke Medicine Pavilion, room 6W60. Services that are provided by the Inpatient Operations Division are available 24 hours a day, 7 days a week.

### **Methods of Drug Distribution**

Our goal is to have the medication available at the patient care unit before the care nurse needs it for a patient. To meet this goal, we use different mechanisms to transfer medications from central pharmacy to the patient care unit. The most common methods, however, involve the use of highly motivated pharmacy technicians, who make routine deliveries, and STAT technicians who deliver urgent and emergent medications. The pneumatic tube system is another means by which medications are delivered to the patient care unit.

### **Use of Technology to Enhance Safety and Operational Efficiency**

Several technology systems and software are utilized daily by staff members to accomplish the division tasks. Some of these key systems include:

- Automated compounding devices primarily used to support parenteral nutritional admixtures, eliminating the need for multiple manipulations.
- Dispense Prep and Dispense Check barcode scanning solution which complements the work of both the technician and the pharmacist by providing added verification that drug product selection is accurate.
- Automated dispensing cabinets which provide secure storage of medications while supporting timely availability of medications to the nurse following verification by a pharmacist.
- Controlled substance monitoring software used for tracking movement of scheduled medications and report generation for monitoring and quality assurance.
- Targeted barcode verification of specific high alert medications prior to dispensing or loading into an automated dispensing cabinet
- The i.v.STATION robot assures accurate preparation of sterile products through the use of gravimetric technology. Currently utilized for non-patient-specific preparations.
- Carousel technology is used for drug storage and dispensing. Includes guiding light and barcode technology which help assure accurate medication dispensing practices.
- PharmTrac.PD technology is used for tracking the location of medications once dispensed from the central pharmacy.

## **Major Accomplishments**

- Collaboration with the Duke Compounding Facility on production on non-patient specific infusions.
- Significant contributions to the Pharmaceutical Utilization Management Program
- Unit-based Omnicell cabinet optimization
- Transition from 50mL Mini-Bag Plus systems to 100mL Mini-Bag Plus system with significant increase in BUD
- Support for pharmacists with employee vaccination initiative.
- Increased use of barcode scanning technology for oral syringes and unit doses dispensed from the Central Pharmacy

## **Our Team**

The Inpatient Operations team is made up of well trained, highly-committed pharmacists and technicians who work collaboratively with internal and external customers to meet the needs of patients at Duke Hospital. Many of the staff members have greater than 5 years of experience at Duke and are cross-trained to work across different areas of the division. Staff members actively support the department's mission through ongoing participation in quality and process improvement efforts, resident and student education, as well as, research activities.





### **Overview of services**

The Department of Pharmacy, Women's and Children's Hospital (~240 licensed beds) provides clinical and distributive services which support care of pediatric patients, obstetrics-gynecology, and 10 adult internal medicine patients in the inpatient setting. Distributive services are supported on the inpatient side by the 5th floor pediatric satellite pharmacy. The McGovern-Davison Children's Health Center ambulatory pediatric pharmacy services are supported by an infusion center pharmacy located on the 4th floor of the health center.

### **Inpatient pharmacy services**

- Practice models within the pediatrics division are both integrated as well as specialized. Clinical pharmacists participate in daily patient care rounds to develop individual pharmacotherapy plans, provide medication and dosage recommendations/adjustments, pharmacokinetic evaluation and dosing, parenteral nutrition management, code blue and rapid response participation, education, research and publication.
- Specialized practice areas include pediatric bone marrow transplant (16 beds), pediatric intensive care (16 beds), pediatric cardiac intensive care (13 beds), and neonatal intensive care (60 beds) units.
- General pediatric pharmacists participate in rounds daily on 3 general pediatric services, infectious diseases, hematology-oncology, cardiology, neurology, gastroenterology, solid organ transplant and allergy/immunology.
- The 5th floor pediatric satellite pharmacy supports the medication needs of these patient populations in collaboration with the Inpatient Operations Division.

### **Ambulatory pharmacy services**

- The Children's Health Center Pharmacy is a sterile compounding facility located on the 4th floor of the Children's Health Center building.
- Both low and medium risk doses of hazardous and non-hazardous compounded sterile preparations are provided to ambulatory pediatric patients.
- Clinical pharmacists, in collaboration with providers, monitor appropriateness of drug, dosage, frequency, and adherence to protocols. Additionally, clinical pharmacists and technicians support investigational drug use.

### **Mission**

To deliver optimal patient- and family-centered pharmaceutical care through evidence-based practice.

### **Goals**

- To optimize medication therapy
- To prevent adverse effects
- To continuously improve medication safety for our patients and families
- To be a leader in best practices
- To be a leader in innovative research that contributes to prevention and effective treatment of childhood diseases
- To contribute to the overall body of knowledge

## Availability

Women's and children's inpatient pharmacy services are provided 24 hours per day, 7 days per week through the clinical and distributive staff and satellite pharmacy. The pediatrics division collaborates with Inpatient Operations to provide comprehensive services. The Children's Health Center Ambulatory Pharmacy operates 8:00 AM to 5:00 PM, Monday through Friday. Weekend coverage is provided through inpatient services.

## Major Accomplishments

- Review and update of pediatric chemotherapy policy
  - Policy updated to allow non-attending providers to prescribe continuation of chemotherapy for non-oncologic indications
  - Standardized language between adult and pediatric policies
- Expansion of clinical services in CHC infusion center
  - Shift description created
  - Start of program: 8/25/15
- Standardized narcotic infusion implementation
  - Phase I (morphine 1 mg/mL, 10 mL syringes) complete
  - Phase II – (morphine 1mg/ml, 3ml syringes and ketamine 10mg/ml, 10ml syringes)
- Pediatric Cardiac Intensive Care Unit (PCICU) move to 4200
- Pediatric Progressive Care Unit (PPCU) opening
- Standardization:
  - Cyclosporine IV doses  $\leq 20$  mg preparation standardization
  - Pediatric Hyperkalemia Order Panel Addition
  - Long Acting Reversible Contraceptive (LARC) program + order set
  - IV potassium standardization
  - Chemotherapy
    - Beacon release and chemotherapy verification standardized and tip sheets created and distributed
  - Included in onboarding of new pharmacists and residents
  - Lidocaine for pain entry added to all pediatric libraries except the ICN
    - Also added to Epic
  - Ketamine for pain entry added to all pediatric Alaris libraries except the ICN
    - Also added to Epic
  - Entries built for each pediatric library (except ICN)
  - Alaris "therapies" implemented
  - Pediatric Alaris library expanded to include intermittent antibiotic infusions and fluids
  - Development of total parenteral nutrition, pharmacokinetic and anticoagulation guidelines and competencies
    - Reviewed with staff in May and June
- Staff picture board created
- Laptop carts procured for pharmacist rounding
- Expansion of pediatric residency program to include 2 residents
- Pharmacy involvement in the Worley team (newly created complex care team)
- Beacon Protocol Review

*Expanded clinical services in the CHC Infusion Center*

*Significantly expanded standardization of parenteral preparations*

- CHC Pharmacy Clean Room Redesign
  - Added Zebra Printer
  - Touch-screen in Negative Pressure room
  - Relocated BCA computer
  - Added work station cart and shelving unit
  - Created a new work station for pharmacists
- Implemented rounding with Environmental Services
- Pharmacy Technician Development Series
- Extended stability testing for emergency stock bags
- Full implementation of barcode scanning for chemo and non-chemo preparations
- Noise reducing wheels added to carts
- Shift descriptions created for Technicians
- CHC weekend admissions process improvement
  - Decreased inventory sent from the CHC to NCP for Admissions
  - Created communication tool for handoff
  - Implemented scanning for road maps to provide easier access for all pharmacy staff
- Creation of Pre-pen order set for penicillin allergy testing
- Continued weekly Pharmacy and Nursing rounds
- Implemented Axway program for inventory receiving in the CHC

*Redesigned the CHC  
Pharmacy Clean  
Room*

**Our Team**

The pediatrics team is comprised of well-trained, highly committed pharmacists and technicians who collaborate with medical and nursing staffs and colleagues to optimize medication use among a high-risk, vulnerable patient population. Many staff members are tenured and cross-trained to function and support multiple sub-specialty practice areas. A number of pharmacists have completed one or two residencies and/or fellowships. Many pharmacists are and have been board certified in pharmacotherapy as well as oncology pharmacy and look forward to board certification in pediatrics which is now offered through The Board of Pharmacy Specialties. Staff members actively support the department’s mission through ongoing participation in quality and process improvement efforts, resident and student education, as well as, research activities.

**Committee Memberships**

CH Pharmacy and Therapeutics Committee  
 Children’s Core Safety Team  
 Anticoagulation Task Force (DUHS)  
 Formulary and Informatics Committee  
 Birthing Center Executive Committee  
 ICN Executive Committee  
 ICN Mortality and Morbidity Committee  
 Infusion Pump Quality Oversight Committee

Institutional Review Boards  
 DUH Medication Safety Committee  
 Pediatric ADE Review Committee  
 Pediatric Chemotherapy Safety Committee  
 Pediatric Sedation Committee  
 Pediatric Nutrition Support Committee  
 PICU/PCICU Mortality and Morbidity  
 PICU/PCICU Patient Safety and Clinical  
 Quality Committee



**Overview of services**

The administrative and business services team strives to improve quality and perform essential administrative and business functions within the department of pharmacy at Duke University Hospital. The team is comprised of one (1) pharmacy manager, sixteen (13) pharmacy technicians, and three (3) support personnel. Services provided include:

- Participate in the Pharmacy Admission process through Interviewing patients admitted to Duke University Hospital (DUH) and in the Emergency Department (ED) at DUH to gather information regarding medications taken at home.
- Monitor the patient-pharmacy hotline and online contact us link established to allow direct access to a pharmacist to answer questions or respond to concerns regarding any medication related issues
- Perform monthly medication area inspections to improve patient safety and regulatory compliance
- Conduct routine and random environmental and personnel testing for the 11 sterile preparation areas at Duke University Hospital
- Human resource and payroll processes
- Pharmacy administration office management
- Coordination of educational efforts including the pharmacy resident teaching certificate program, Joint accreditation/ACPE activities, out of state student rotation requests, and shadowing opportunities
- Manage the departmental intranet and internet sites. Maintaining up to date information and responding to various inquiries
- Administrative oversight for smart pump drug libraries, Joint Commission readiness, and performance metric tracking
- Expense trending and cost accounting

**Our Team**

The administrative and business services team was formed in July 2014 through uniting of several areas and includes:

- Eleven (11) Continuity of Care technicians
- Three (3) Pharmacy Administration office staff including an administrative assistant, HR Coordinator, and department Accountant
- Two (2) Quality Assurance technicians – Sterile Preparations and Medication Area Inspector

Our team highlights the many advanced pharmacy technician roles available within the Department of Pharmacy at Duke. Our highly trained and skilled technicians perform many critical functions to help the department better serve our patients. The Pharmacy Administration office staff serve the department of pharmacy through administrative functions such as payroll, badges, and supplies among many other daily functions.

**Availability**

Our office-based team is available during regular business hours. The continuity of care technicians visit patients every day of the year. They are available Monday through Friday from 7 AM until 10 PM and on the weekends and holidays from 8 AM until 6 PM. The Continuity of Care team can be reached via our triage pager at 970-0357. Other members of the team can

be reached by calling the Pharmacy Administration office during normal business hours at 681-2414.

### **Major Accomplishments**

- Continual performance improvement for the Continuity of Care team and pharmacy admission process.
- Trained fourth year pharmacy students to assist with the pharmacy admission process in collaboration with the COC team and pharmacy preceptors
- Continuous optimization of the COC team workflow, scheduling, and services
- Successful medication management session and overall presence during The Joint Commission survey
- Expanded our continuing education activity offerings for staff
- Improved visibility and other enhancements for the pharmacy dashboard for better tracking and trending of data
- Implementation of “Therapies” and intermittent antibiotics to the Smart pump library
- Established the pharmacy resident Teaching and Learning Certificate Program

*Established the  
pharmacy resident  
Teaching and  
Learning Certificate  
Program*

### **Coordinator – 340B Administration and Revenue Management**

**Grayson Peek**



### **Overview of services**

The 340B Administration and Revenue Management team is responsible for performing all duties associated with administering the 340B program at Duke University Hospital in alignment with current rules and regulations outlined by the Health Resources and Services Administration (HRSA) and the Office of Pharmacy Affairs (OPA). Additionally, the team is responsible for ensuring integrity of pharmaceutical prices for the purposes of billing for services in alignment with DUH revenue management and cost accounting principles. Specific functions of the 340B Administration and Revenue Management team include:

- Plan, develop, organize, implement, evaluate and communicate the organization’s compliance and continuous effectiveness of the 340B program
- Ensure alignment with applicable federal, state, and local laws and regulations regarding 340B and charging for pharmaceuticals
- Complete quarterly comprehensive self-audits, and scheduled, or ad hoc, targeted audits of various aspects of DUH’s 340B program
- Monitor and manage 340B split billing software to ensure appropriate application of multipliers and proper matching of NDCs
- Collaborate with DUH Finance and Maestro Care Willow to complete comprehensive annual pharmaceutical price and charge updates
- Provide staff education regarding DUH’s 340B program
- Conduct daily review of missing charges across all non-retail pharmacy areas at DUH
- Conduct daily review of outlier charges across all non-retail pharmacy areas at DUH
- Perform billing audits for Retina Injection and Neurology Clinics
- Respond to requests for pharmacy charge information



## **Our Team**

The 340B and Revenue Management team was formed in July 2015 and includes:

- Coordinator – 340B Administration and Revenue Management
- Revenue Management Pharmacy Technicians (2)
- 340B Specialist Pharmacy Technician

## **Availability**

Our team is available during normal business hours by calling the Pharmacy Administration Office at 681-2414.

## **Major Accomplishments**

- Recruited and trained 2 new Pharmacy Revenue Management Technicians
- Established the role of the 340B Specialist Pharmacy Technician
- Completed the annual pharmaceutical price update and validation
- Implemented Maestro Care 1567 work que (WQ) to ensure appropriate application of UD modifiers for 340B medications billed to Medicaid
- Created a DUH 340B Drug Pricing Program LMS training module
- Established a regularly convening, interdisciplinary 340B Oversight Committee
- Implemented quarterly comprehensive 340B self-audits
- Created a 340B dashboard for tracking of program metrics
- Enhanced the of agreement with Verity Solutions to include AutoSplit+

*Established the 340B Oversight Committee*

## **Center for Medication Policy**

## **Ann Scates McGee**



## **Overview of services**

The Center for Medication Policy (CMP) is a team within the Department of Pharmacy that collaborates with healthcare professionals across the health system to promote safe, effective and fiscally responsible use of medications. The CMP integrates its activities with the clinical, safety, informatics, administrative, and drug distribution systems of the Department to optimize drug therapy for patients.

Services include:

- Respond to patient specific and general inquiries regarding all aspects of medication use.
- Provide accurate, timely, unbiased evidence based drug information in support of rational medication therapy and policy.
- Provide support to the Pharmacy & Medication Management Committee, Pharmacy & Therapeutics Committee (P&T), and the respective subcommittees (Formulary Evaluation Teams, Formulary & Informatics Subcommittee, and Medication Safety Subcommittee).
- Participate in formulary management activities. Support the dissemination of drug information and medication policy updates via the Center for Medication Policy webpage, electronic newsletters, and staff meetings.

- Participate and support the conduct of medication use evaluations (MUEs). Query the MUE Universe tool to collect retrospective and real time medication utilization data for analysis for a variety of stake holders including P&T, Pharmaceutical Utilization Management Process (PUMP) and Value Analysis Team (VAT).
- Monitor and assist with the implementation of drug shortage action plans.
- Track and develop medication specific Risk Evaluation and Mitigation Strategies (REMS) programs.
- Review FDA safety communications to facilitate changes to formulary policies and informatics systems.
- Review and track departmental drug information reference subscriptions.
- Provide a learning environment in which pharmacy students and residents can acquire or enhance skills necessary to research and respond to medication related queries and review and develop formulary related policies.
- Provide a learning environment for the drug information resident to acquire and develop skills integral to the practice of hospital based drug information.

### **Major Accomplishments**

- Lead formulary review through a health system process
- Medication Stewardship pharmacist coordinated the Pharmacy Utilization Management Program (PUMP). In FY16, 30 operational, procurement, and utilization initiatives were actively tracked.
- Implemented therapeutic interchange programs as a means to guide the use of formulary medications.
- Supported Care Redesign Teams
- Supported the drug shortage policy by participating in the development and implementation of drug shortage action plans.
- Maintained an up-to-date Center for Medication Policy website that provides current medication formulary and policy information. This website is accessible across DUHS
- Supported the 9 Formulary Evaluation Teams (FET) to meet the desired health system goals as outlined in the FET charter.
- Collaborated with pharmacists and technicians from IT, operations, procurement and business finance to devise processes for implementing formulary changes and policy updates into IT systems in a timely manner.
- Monitored the volume of medication alerts firing via Maestro Care. Actions approved at PMMC to reduce non-essential alerts.
- Monitored non-formulary medication use and made suggestions for change to reduce overall utilization. Contributed to achieving the balanced score card performance target for non-formulary medication use.
- Collaborated with the Pharmacy Education Committee to develop research project ideas for 13 UNC students to complete research projects at Duke.

*FY16: More than 20 drug shortage action plans implemented*

*FY16: CMP supported the formulary review of 45 medications, 6 class reviews, completion of 15 MUEs, and 3 REMS policies.*

*FY16, the CMP precepted 15 pharmacy students and 5 pharmacy residents on rotation.*

### **Our Team:**

The CMP team is made up of well trained, highly-committed pharmacists who work collaboratively with those in the Department and throughout DUHS to help in the review and development of processes that help meet the medication needs of patients. All team members have completed one or two residency training programs. Some team members are Board Certified Pharmacotherapy Specialists. All support the department's mission through ongoing participation in quality and process improvement efforts, resident education, and research activities. Team members are members of state and national pharmacy organizations. The team makes contributions to the profession through internal and external publications and presentations.



### **References:**

The CMP maintains an up-to-date core library of medical, pharmacology, and pharmacy practice texts and electronic references. Drug information references are evaluated as needed for suitability and need for purchase or renewal.

### **Locations and Hours of Operation**

The CMP is located in the 0 level of Duke North across from North Central Pharmacy, and is staffed Monday through Friday from 8 AM to 5 PM. After hours consultations are provided by an on-call system (pager 919-970-8110). Non-emergency requests may be left on voicemail (919-684-5125) or shared via email.

## **Investigational Drug Services**

**Beth McLendon-Arvik**

### **Overview of services**

The Department of Pharmacy Investigational Drug Services supports clinical research involving study drugs for Duke Investigators and supports safety and care for subjects in both the inpatient and outpatient care areas as well as Duke Clinical Research Unit Phase I Studies. The Investigational Drug Services integrates its activities with the clinical, safety, informatics, administrative, and drug distribution systems of the Department to optimize study drug therapy for patients.

These services include:

- Creation of study drug orders in Maestro Care
- Integrity of blinding
- Regulatory compliance



- Prevention of errors involving study drugs
- Dispensing of investigational products in a timely manner
- Contribution to study design and data integrity
- Randomization and study drug accountability
- Aseptic preparation of IV's in a USP 797-compliant environment and distribution of both hazardous and non-hazardous study drugs
- Procurement of drugs and supplies for studies as needed
- Preparation of Drug Data Sheets for study drugs used for inpatients
- Inservices and education for inpatient studies
- Collaboration with DUH pharmacies to prepare and dispense study drugs as appropriate for patient care
- Education of Pharmacy students and residents regarding the research process, IDS team member roles and evaluation of literature

### **Our Team**

The Investigational Drug Service teams are made up of well trained, highly-competent and committed pharmacists, clinical trial specialists, clinical research coordinators, a technician and an accounting clerk II. These members work collaboratively with internal and external customers to meet the needs of study coordinators, investigators and subjects throughout the Duke Health System. Most of the staff members have greater than 15 years of experience at Duke and have worked with research for at least 6 years. IDS, ICS and IDRPs Team members actively support the department's mission through IRB membership, Clinical Research Unit membership, participation in quality and process improvement efforts, resident and student education, as well as, research activities.



### **Availability and Location**

Study drugs are received and dispensed from three primary areas, the Investigational Drug Service (IDS), the Investigational Chemotherapy Service (ICS) and the Infectious Diseases Research Pharmacy (IDRP). The Investigational Drug Services are staffed Monday through Friday from 8 AM to 5 PM. Arrangements are made to ensure study success for subjects needing study drugs outside of these hours. A team member from all services is on-call 24/7. (IDS on-call pager 970-8392; ICS and IDRP: individual team members via paging web). Non-emergent requests may be left on voicemail (IDS: 684-3543; ICS: 668-0657; IDRP: 681-1788). The IDS is located on the basement level of Duke Clinic at 0101b, Yellow Zone. The ICS is located within the Cancer Center Infusion Pharmacy on the fourth floor, room 4N33, of Duke Cancer Center. The IDRP is located within the infectious disease clinic, 1K room 1346.

## **Major Accomplishments**

- **Maestro Care:**
  - Created study drug builds for all IRB approved studies using our service
  - Validated over 150 order sets/protocols containing study drugs
  - Ongoing collaboration with DOCR, IRB and study teams for validation of study drug order sets/protocols and study drug for standardization and enhanced safety
  - Education and collaboration of study coordinators and investigators regarding study drug order entry options for Maestro Care
- **Baldrige Award**
  - Created 3D stories for IDS and ICS to showcase safety initiatives with study protocols
  - Participated in preparation activities and for the on-site visit
- **ICS and IDS:**
  - Prepared for 2 FDA audits
  - Participated in many National Clinical Trials Network (NCTN) audits (CITN, NCE and CTSU SWOG)
  - Participated in multiple pre-audits with DCI to prepare for the Alliance audit
  - Created Willow builds for 177 separate protocols
  - Procured and installed new -80 freezer - ICS
  - Gained access to the DOCR redcap site for Willow build management and began tracking list
  - Hosted 8 students/visitors (3 residents, 6 students, visiting nurse and new regulatory/coordinators)
  - Hosted OLLI tour for Cancer Center (Duke Osher Lifelong Learning Institute)
  - A team member won the Outstanding Coworker award from ONC CRU and DCI Superstar award for Outstanding Colleague
  - Presented a poster to highlight the work and support provided by the ICS for oncology research studies at the Basic Science Day DCI Scientific Retreat
- **IRB Coverage:** with the help of department of pharmacy pharmacists, 80% (74/92) IRB meetings were covered by a pharmacist

*Validated over 100 order sets/protocols containing study drugs*

## **Medication Safety**

**Melissa King**



### **Overview of services**

Three pharmacists and one full-time data administrator comprise the dedicated and experienced staff in the Medication Safety division. Services provided include:

- Management, investigation, and scoring of medication-related events reported via the Safety Reporting System (SRS)
- Administration of peer review process for medication-related SRS events
- Generation of monthly and quarterly reports which permit ongoing monitoring, trending, and analysis of medication related safety issues
- Preparation of ad hoc and custom reports to support the safety efforts at local, clinical service unit, institution and health system levels
- Facilitation of discussions around trends or specific medication related events which lead to actions aimed at addressing system failures and associated root causes
- Biweekly distribution of the Institute for Safe Medication Practices Newsletter

- Development of formal and informal safety data presentations tailored to audiences across the health system
- Consultations regarding specific safety issues, new products, and label changes
- Education and promotion of safe medication practices

**Locations and Hours of Operation**

The Medication Safety Office is located on the ground floor of Duke North Hospital across from the North Central Pharmacy and is staffed weekdays 7 AM to 5 PM. Services are covered by pager at all times.

**Major Accomplishments**

- Maintained an active and engaged Medication Safety Committee
- Continued to lead and participate on multiple CSU level safety committees
- Participated in medication-related root cause analyses or learning from defects meetings
- Encouraged and recognized pharmacy department participation in SRS reporting which resulted in a 21% increase in number of individuals reporting medication related events who identified themselves as pharmacists or pharmacy technicians (from 238 in FY15 to 289 in FY16).
- Generated over 99 adhoc reports used for quality improvement and medication safety initiatives used to identify actions to address system failures (6% increase)
- Provided education and guidance to file managers interested in RL Solutions report writing tools, created safety reporting templates to be utilized by file managers and refined multiple file manager scopes.
- Used refined trigger tool to identify suprathreshold INRs (>5) associated with warfarin. The Medication Safety Pharmacists submitted these events via the Safety Reporting System for peer review, aggregate analysis and further dissemination. Between July 2015 and June 2016, 125 patient charts were reviewed with 92 adverse warfarin events identified (73% positive predictive value). 35 of the 92 warfarin events (38%) were considered potentially preventable. Risk reduction strategies have been piloted and implemented and as a result of lessons learned.

*Maintained "Good Catch" reporting at 45% of medication-related safety events*

*Implemented 79 documented system improvements, enhancements and optimizations resulting in safer medication use*

*Reviewed, investigated, and analyzed 5167 medication-related SRSs in FY16*

**Our Team**





### Overview of services

The Antimicrobial Stewardship and Evaluation Team (ASET) is dedicated to enhancing the quality of antimicrobial use throughout Duke University Hospital. ASET works collaboratively with clinical pharmacists, medical staff and other healthcare workers to provide safe, efficacious, and cost-effective drug therapy to optimize outcomes in patients with infectious diseases.

Functions of ASET include:

- Performing hospital-wide prospective and retrospective antimicrobial review, feedback and intervention
- Participating in the development of infectious-diseases related protocols and order sets
- Updating DUH infectious diseases guidelines to improve antibiotic decision-support for clinicians relating to the selection, dose, duration, and monitoring of antimicrobials
- Analyzing prescribing and utilization patterns to identify trends and improvement opportunities
- Working to ensure optimal compliance with anti-infective related clinical pathways and guidelines
- Participating in the conduct of didactic and experiential training of present and future physicians and pharmacists in principles of antimicrobial stewardship

### Availability

An ASET member is available Monday through Friday 8 AM to 5 PM.

### Major Accomplishments

- Successfully hired an additional ID-trained pharmacist to further expand our program and continue to meet national and organizational stewardship requirements
- Approved the Stewardship Allergy Assessment protocol, expanding ASET's role in the management of patients with reported penicillin allergies
- Developed and implemented the following policies and guidelines: pharmacist-managed Antimicrobial Dose Adjustment Guideline for Adults, inhaled ribavirin guideline for adults and pediatrics, DUHS Antiretroviral medication guideline, and adult ethanol lock policy
- Reviewed numerous drug monographs and MUEs pertaining to antimicrobials
- Collaborated with Surgery, Anesthesia, and OR pharmacy to update Antibiotic Prophylaxis in Surgery Guidelines for adults and pediatrics
- Participated in internal medicine, pharmacy, pediatric, and surgery educational conferences

*Facilitated over 300 ID Consults for patients with Staphylococcus aureus bacteremia and fungemia*

### Our Team

Christina Sarubbi, PharmD, BCPS  
Deverick Anderson, MD, MPH; ASET Medical Director  
Coleen Cunningham, MD  
Rebekah Moehring, MD, MPH  
Richard Drew, PharmD, MS



### Overview of services

The Duke University Hospital Adult Nutrition Support-Total Parenteral Nutrition Team (NSS-TPN) is a multidisciplinary collaboration between physicians, pharmacists, dietitians and nurses. It is a consult service for TPN that works in concert with the primary team, as well as the patient, to evaluate the need for specialized nutrition support for the adult patient population. Once the patient is determined to require specialized nutrition therapy, the team:

- Evaluates and determines the appropriate route of therapy including enteral or parenteral therapy
- Develops a nutrition care plan; verifying proper type, placement, and care of parenteral or enteral access including inserting enteral feeding tubes with a specialized device (Cortrak)
- Documents nutrition care plan and goal of therapy in the electronic medical record as agreed upon by the ordering team
- Initiates and manages patient specific parenteral nutrition for adult inpatients, including nutrition product evaluation and management of significant product shortages
- Initiates and manages patient specific enteral nutrition or diet until deemed appropriate to sign over to unit-based registered dietitians
- Evaluates drug therapy (including antibiotic therapy, prokinetic and antimotility agents, opioid sparing pain management, appetite stimulants, short bowel drug therapy, iron replacement, etc.), electrolytes, fluid and recommending changes as it pertains to nutrition care for the patient
- Reevaluate patient periodically to transition patient to a lower level of support, as appropriate (eg. Return to oral diet or transition from TPN to tube feeds)
- Coordinate transition to home or facility (when applicable including proper patient transport and providing guidance to other institutions for making TPN with their available products and vice versa)
- Manages patients receiving parenteral nutrition at home

For patients who require parenteral support after discharge, the NSS-TPN Team plays an integral role in evaluating the adult patient for appropriate therapy and providing guidance to discharge planners to request financial approval and home health services. The NSS-TPN Team provides support for Home Total Parenteral Nutrition (HTPN) patients by:

- Coordinate training to the patient and/or caregiver to be independent with the therapy in the home environment
- Monitor patient clinical condition for response to therapy
- Adjust TPN therapy as appropriate
- Wean TPN once goals of therapy have been achieved.
- Document all interventions in the electronic medical record.

The education of future nutrition support practitioners is facilitated through mentoring of pharmacists, dietitians, students, residents and other multidisciplinary staff

### Major Accomplishments

- The decentralized nutrition support model integrates the floor pharmacist with dietitians and the primary team for nutrition therapy. Five TPN/NSS clinicians completed the initial credentialing process by passing the ASPEN TPN clinician certification exam. This forms a strong core of practitioners for nutrition therapy, and validates the training process implemented to build expertise.



- Practical Applications for TPN therapy is provided to the pharmacist and TPN dietitians in the Pharmacy Pocket Guide and the TPN Dietitian Pocket Guide, respectively. In addition, an adult TPN Verification Tip Sheet was constructed to assist floor pharmacist in verification of orders.
- Enteral feeding is advocated over the use of TPN by our NSS clinicians. Our decentralized nutrition support model allows the opportunity to emphasize this concept with the primary teams. Yearly placement for Cortraks is 700-800 tubes, up from 300-400 in 2011.
- Continuing the partnership with Duke Home Care and Hospice to enhance the HTPN programs safety, quality and excellence. The merger provides all Duke TPN patients the benefits of better coordination of care, insuring Duke standards of care are adhered to, and the ability to review the home care process to identify areas that need improvement and implement changes that insure maintaining a high standard of care. Enhancements to process have occurred with modification of the Home TPN workflow, education on the evaluation process for qualifying for HTPN therapy and development of a HTPN FAQs list for improved discharge and management.
- Central venous catheter infection is the number one cause of Home TPN hospital readmission. Prevention of recurrence of central venous catheter infections in the HTPN patient requires constant vigilance. The use of ethanol lock therapy has been shown to decrease the rate of catheter infections. In April, ethanol lock therapy for the prevention or adjunctive treatment of central venous catheter infections became available for the continuity of care of the adult patient.
- Continuing pharmacy led monthly multidisciplinary Nutrition Council meetings to assist with the development of and maintenance of skilled Nutrition Support practitioners for adults and pediatrics so that participants from several disciplines can come together to discuss ways to provide safer, more effective TPN therapy. An invitation was extended and accepted by the DUHS campuses, Duke Regional Hospital (DRH) and Duke Raleigh (DRaH) and Duke Home Care and Hospice (DHCH) to participate in the Nutrition Council. The availability of WebEx made it possible for all of DUHS to participate in the Nutrition Council meetings. Multidisciplinary professional continuing education was added to the Formal Nutrition Council presentations. Topics of presentations included: Pros and Cons of Tapering TPN for Surgery, Feeding in the ICU: Examining Myths and Controversies, Estimating Nutrition Needs in the Morbidly Obese, Home TPN Process, Pediatric Inflammatory Bowel Disease Nutrition and Pharmacotherapy for Inborn Errors of Metabolism.
- Continued to build on the nutrition support forum providing availability of nutrition therapy resources on the Pharmacy Department website.

*Provided 6 multidisciplinary continuing education programs available across the health system*



### Overview of services

Oncology pharmacy specialists at Duke provide patient care to adult and pediatric cancer populations in both the inpatient and outpatient settings. Clinical services are tailored to patient care needs and include but are not limited to pharmacotherapeutic medication management, therapeutic drug monitoring, pharmacokinetic dosing, nutrition support, drug information, symptom management, supportive care, and patient education. The pharmacy team is also responsible for safely compounding and dispensing chemotherapy. Pharmacists work collaboratively with other health care providers to provide safe, efficacious, and cost-effective drug therapy to optimize outcomes in patients with malignant diseases. Oncology practitioners are involved in the development, support, and management of research/investigational protocols. Additionally, the education of future pharmacy practitioners is facilitated through mentoring of pharmacy students and residents in a variety of clinical settings.

### Locations and Hours of Operation

Currently, oncology pharmacists practice in the following areas:

- Ambulatory Oncology Clinics
  - Hematologic Malignancies, Genitourinary, Gastrointestinal, Thoracic, Breast, Sarcoma, Brain Tumor, Adult Bone Marrow Transplant (BMT), Pediatric BMT
- Inpatient Oncology Services
  - Hematologic Malignancies, Solid Tumors, Adult BMT, Pediatric BMT, Pediatric Oncology
- Infusion Pharmacies
  - Cancer Center Infusion Pharmacy
  - North Pavilion
  - Rainbow Day Hospital
- Investigational Chemotherapy Services

### Major Accomplishments

- Continued support and development of Beacon templates supporting standardization and enhanced safety with chemotherapy regimens
- Continued development of standardized chemotherapy patient education materials
- Continued the Duke Oncology Pharmacy Oral Chemotherapy Management Program
- Continuation of call back program for patients at high risk for chemotherapy induced nausea and vomiting
- Continuation of monthly oncology pharmacy meetings
- Provide clinical review and justification for Medicare audits
- Increase to 6 Clinical pharmacist practitioners (CPP's) within the oncology group
- Participation in the Duke Oncology Network Pharmacotherapy Updates in Cancer Series
- Providing dinner at Caring House
- Creating and sending a quarterly newsletter to oncology practitioners across Health system
- Participation in teaching daily Chemotherapy Education Class

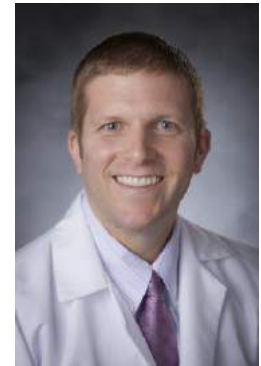
*5200+ patient encounters in ambulatory oncology clinics with pharmacists*

*300+ standardized chemotherapy regimen education sheets developed*

- Participation in the development of standardized chemotherapy education information sheets
- Increased the PGY2 Oncology residency program from 1 to 2 residents
- Continued to encourage oncology prescriptions to the filled by the Duke Cancer Center Specialty Pharmacy

## Transplant Pharmacy Programs

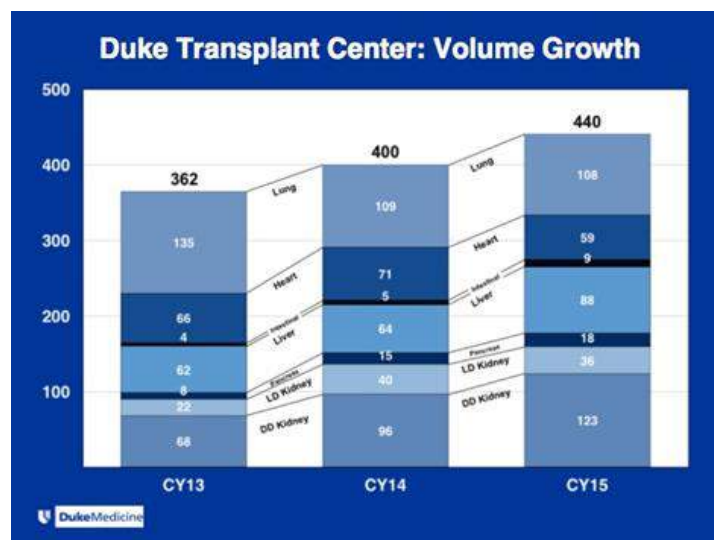
Matt Harris



### Overview of services

Clinical pharmacy services are provided for heart, intestine, kidney, liver, lung, pancreas, and vascularized composite tissue transplant patients across the continuum of care at Duke Hospital. Seven full time pharmacists and one PGY2 transplant resident comprise the pharmacy transplant team. Services provided include:

- Involvement in the care of patients and donors in the pre-, peri-, and post-operative settings
- Identifying, solving and preventing medication-related problems or deficiencies in the solid organ transplant population and living donors for the abdominal and thoracic transplant programs
- Documenting pre- and post-transplant immunosuppressive plans
- Providing education regarding the safe and effective use of medications in the post solid organ transplant population to patients/families and the healthcare team
- Assisting the transplant teams in medication protocol development, review, and revision on an on-going basis
- Development and management of investigator initiated research and Pharmacy Utilization Management Programs
- Training students and residents in a variety of clinical settings
- Transplant center growth year over year



### Locations and Hours of Operation

Inpatient services are provided by a Transplant Clinical Pharmacist seven days a week and all of the pharmacists are available by pager for after-hours questions or concerns. Currently transplant pharmacists practice in the following areas:

- Ambulatory Clinics
  - Abdominal Transplant
  - Hepatology/Hepatitis C
  - Thoracic Transplant
- Inpatient Coverage (CPCS)
  - Adult and pediatric abdominal transplant
  - Heart transplant/heart failure/VAD
  - Medical and surgical lung transplant
- Ambulatory Pharmacy
  - Duke Cancer Center Specialty Pharmacy

**Care Redesign Updates**

The abdominal, heart, and lung transplant groups are all going through the care redesign process. Improvements related to pharmacy include:

- Creation of protocols for anticoagulation management in LVAD patients
- Flowsheets to streamline the discharge process
- Collaboration on the development of a rounding tool to standardize rounds and enhance communication among providers
- Reviewed and updated documents provided to patients to improve consistency among the information provided to patients
- Transplant overview screen to help organize and present information relevant to transplant
- Reviewed outcomes of lung transplant patients after a protocol change aimed to limit the use of IVIG and decrease cost

**Major Accomplishments**

- The Duke Transplant Center celebrated its 50<sup>th</sup> anniversary
- Worked with the vascularized composite tissue transplant team to develop and implement a protocol for the first successful hand transplant in the state of North Carolina
- Tracking CMS required documentation and activities through iVents
- Successful implementation of pharmacist led services in the outpatient abdominal transplant and hepatology clinics – which has led to improvements in continuity of care and expanded access for patient care
- For the ninth year in a row the PGY2 Transplant Resident became a board certified pharmacotherapy specialist
- Continued to encourage post-transplant prescriptions to be filled by the Duke Cancer Center Specialty Pharmacy generating significant organizational revenue
- One manuscript published and three others currently under peer review
- Pharmacist initiated research projects presented at the American College of Cardiology Scientific Session, the International Society of Heart and Lung Transplant Annual Meeting, and the American Transplant Congress

**Team Members**

Matt Harris, PharmD, MHS, BCPS	Director Transplant Pharmacy Programs
Jennifer Gommer, PharmD, BCPS	Inpatient Abdominal Transplant Clinical Pharmacist
Jennifer Byrns, PharmD, BCPS	Ambulatory Abdominal Transplant/Hepatology Pharmacist
Mara Watson, PharmD	Inpatient Heart Transplant Clinical Pharmacist
Clark Benedetti, PharmD, CPP	Ambulatory Thoracic Transplant Clinical Pharmacist
Amanda Hulbert, PharmD, BCPS	Inpatient Medical Lung Transplant Clinical Pharmacist
Kristi Beermann, PharmD, BCPS	Inpatient Surgical Lung Transplant Clinical Pharmacist
Amanda Szczepanik, PharmD	PGY2 Transplant Resident

## **VI. Research Program**

### **Pharmacy Research Committee**

#### **Purpose**

The Pharmacy Research Committee is a scientific advisory committee designed to enhance pharmacy staff, resident and student knowledge and participation in research.

#### **Committee Function**

The scope of the committee responsibilities shall include:

- **Oversee, guide and facilitate research activities to include:**
  - study feasibility assessment
  - compliance with Investigational Review Board requirements
  - adherence to data security requirements via review of the Research Data Security Plan
  - compliance with institutional training requirements
- **Identify and arrange extra-departmental research support resources which may include:**
  - statistical consulting services
  - Clinical Research Unit /Institutional Review Board protocol review
  - Duke Office of Clinical Research (DOCR) review
- **Issue a call for research project ideas on an annual basis and maintain a directory of interested research preceptors and their areas of research interests**
- **Establish guidelines/timelines for research projects**
- **Provide assistance to preceptors in developing suitable research projects**
- **Review and provide feedback to study investigators on Research Project Outlines and Research Protocols (including evaluation of scientific merit, design, feasibility, relevance to internal/external audiences, resources and regulatory compliance)**
- **Make recommendations to the Pharmacy Senior Management Group (SMG) regarding approval of projects**
- **Review and provide feedback on abstracts and presentations. Specific feedback shall be provided to pharmacy residents in preparation for the University Healthsystem Consortium (UHC) meeting and Southeastern Residency Conference (SERC)**
- **Review and provide feedback on final research report in manuscript format prior to publication**
- **Perform an annual assessment of the effectiveness of the resident research process**
- **Assess pharmacy staff and residents' learning needs regarding necessary research skills and facilitate the scheduling of research training sessions to meet these needs and those required by the institution**
- **Ensure that investigators maintain a regulatory file, which may be held electronically. Recommended contents of the files could include documents such as a project staff list and training updates, all IRB communications, a copy of the protocol and if applicable, consent templates.**

#### **Membership**

Meredith T. Moorman, PharmD, BCOP - Chair  
Clinical Pharmacist, Adult Hematology/Oncology Clinic

Udobi Campbell, PharmD, MBA  
Associate Chief Pharmacy Officer

Justin Geurink, PharmD, BCPS  
Pharmacy Manager, Clinical and Patient Care Services

Matt Harris, PharmD, MHSc, BCPS  
Director of Transplant Pharmacy Programs  
Clinical Pharmacist, Abdominal Transplant  
PGY2 Transplant Residency Program Director

Stephen W. Janning, PharmD  
Director of Clinical Development  
GlaxoSmithKline  
(Formerly, Clinical Coordinator, Duke University Hospital Department of Pharmacy)

Bridgette Kram, PharmD, BCPS  
Clinical Pharmacist

Beth McLendon-Arvik, PharmD  
Manager, Duke Investigational Drug Service and Investigational Chemotherapy Service  
Director, PGY1 Pharmacy Residency

Russell Moore, PharmD, BCOP, CPP  
Clinical Pharmacist, Genitourinary Medical Oncology

Cathy Vaughan, PharmD  
Drug Information Specialist  
Center for Medication Policy

Jennifer Bryns, PharmD, BCPS  
Clinical Pharmacist, Ambulatory Abdominal Transplant



## **VII. Educational Program**

### **Pharmacy Education Committee**

#### **Purpose**

To promote and support educational activities of the department of pharmacy

#### **Committee Function**

- To establish and maintain an education committee,
- To support the educational needs of department of pharmacy staff (including residency programs offered by Duke University Hospital) and learners from affiliated schools/colleges of pharmacy through sub-committees charged with specific responsibilities and accountabilities

#### **Subcommittees**

Subcommittees for the following areas will assume accountability and responsibility for assigned educational needs:

- Residency Program Noon Conference: Grand Rounds and Case Conferences
- Annual Winter/Spring Symposium
- Preceptor Development
- UNC ESOP APPE Student Learning Experience Scheduling and Support
- UNC ESOP 4th Year Student Clerkship Research Projects
- UNC ESOP 4th Year Seminar Class: Fall and Spring Semester activities
- UNC ESOP Early Immersion Clerkships
- Campbell University COP IPPE Student Clerkships
- Campbell University COP 4th Year Student Learning Experience Scheduling and Support
- Pharmacy Internship Program
- Teaching Certificate Program
- Technician Training Program
- Technician Professional Development Committee

#### **Membership**

Jenny Mando-Vandrick, PharmD, BCPS  
Clinical Pharmacist – Emergency Services  
Chair – Residency Noon Conference Subcommittee

Doug Raiff, PharmD, BCPS  
Clinical Pharmacist – Medication Policy  
Chair - Annual Winter/Spring Symposium Subcommittee

Dustin Wilson, PharmD, BCPS  
Clinical Pharmacist – Medicine  
Assistant Professor, Campbell University College of Pharmacy and Health Sciences  
Chair – Preceptor Development Subcommittee

Kristen Bova Campbell, PharmD, BCPS, AQ-Cardiology, CPP  
Clinical Pharmacist - Cardiology  
Chair - UNC ESOP APPE Student Learning Experience Scheduling and Support Subcommittee

Ann McGee, PharmD  
Director, Center for Medication Policy  
Chair - UNC ESOP 4th Year Student Clerkship Research Projects Subcommittee

Justin Geurink, PharmD, BCPS  
Manager, Clinical and Patient Care Services  
Chair - UNC ESOP 4th Year Seminar Class: Fall and Spring Semester activities

Kevin Helmlinger, PharmD, BCPS  
Manager, Children's Hospital Pharmacy  
Chair – UNC ESOP Early Immersion Clerkships

Mary Margaret Johnson, PharmD, MBA, MSCR  
Clinical Pharmacist – Duke Compounding Pharmacy  
Chair - UNC ESOP and CU COP IPPE Student Clerkships

Mary Durham, PharmD  
PGY II Health System Pharmacy Administration Resident  
Chair – Pharmacy Internship Program

Evan Frasure, PharmD, BCPS  
Manager, Administrative and Business Services  
Chair – Teaching Certificate Program

Mathew Kelm, PharmD, MHA  
Manager, Unit Dose Drug Distribution  
Chair – Pharmacy Technician Training

Malphus Stroud, CPhT  
Clinical Research Specialist, Investigational Drug Service  
Chair – Technician Professional Development Committee

Paul Bush, PharmD, MBA, BCPS, FASHP - Chair  
Chief Pharmacy Officer





## VIII. Residency Programs

For over 40 years our program has been training residents to become exceptional pharmacy practitioners and leaders. Residents who complete our program have experienced success in obtaining competitive specialty residencies, fellowships, academic, clinical and pharmacy leadership positions.

A testament to their success is the exemplary institutions that which Duke Pharmacy residents begin their post-residency careers.

We extend our gratitude to our residency program directors:

- |                              |   |
|------------------------------|---|
| ▪ Beth McLendon-Arvik        | Post Graduate Year (PGY) 1*   |
| ▪ Paul W. Bush               | PGY1-2 Health-System Pharmacy Administration*   |
| ▪ Kimberly Hodulik           | PGY2 Ambulatory Care*   |
| ▪ Kristen B. Campbell        | PGY2 Cardiology*  |
| ▪ Jennifer Mando-Vandrick    | PGY2 Critical Care*   |
| ▪ Ann Scates-McGee           | Drug Information (with Glaxo Smith Kline)   |
| ▪ Richard Drew/Dustin Wilson | Internal Medicine/Infectious Diseases/Academia<br>(with Campbell University School of Pharmacy) |
| ▪ Sally Barbour              | PGY2 Oncology*  |
| ▪ Julia (Jill) Lawrence      | PGY2 Pediatrics*  |
| ▪ Matthew T. Harris          | PGY2 Solid Organ Transplantation*   |

\*ASHP-Accredited

### **2015-2016 Residency Graduates and Current Positions**

The 2015-2016 residents successfully completed all requirements for graduation from the Duke program. These graduates include:

#### **PGY1:**

Katie Lentz	PGY2 Oncology Resident, Duke University Hospital
Katelyn Harsh	PGY2 Pediatric Pharmacy Resident, Duke University Hospital
Andrew McRae	PGY2 Critical Care Resident, Duke University Hospital
Victoria Reynolds	PGY2 Ambulatory Care Resident, Duke University Hospital

#### **PGY1-2 Health-System Pharmacy Administration:**

Mary Durham (PGY1)	PGY2 Health-System Pharmacy Administration Resident, Duke University Hospital
Laura Meleis (PGY2)	Pharmacy Operations and Compliance Coordinator – Florida Hospital in Orlando, FL

#### **PGY2 Ambulatory Care:**

Emily Peedin	Clinical Pharmacy Specialist, Ambulatory Care – Raleigh Veterans Affairs Outpatient Clinic in Raleigh, NC
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#### **PGY2 Cardiology:**

Debbie Yen	Clinical Pharmacist, Cardiology – Massachusetts General Hospital in Boston, MA
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#### **PGY2 Critical Care:**

Brittainy Allen	Clinical Pharmacist, Critical Care and Surgery – Johns Hopkins Hospital in Baltimore, MD
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**Drug Information:**

Rebecca Call

Medical Science Liaison, Rare Disease Fellow – Sanofi Genzyme in Cambridge, MA

**Internal Medicine/Infectious Diseases/Academia:**

Travis Jones

Fellow, Duke Antimicrobial Stewardship Outreach Network, – Duke University Hospital Division of Infectious Disease in Durham, NC

**PGY2 Oncology:**

Prakirithi Yerram

Clinical Pharmacy Specialist, Neuro Oncology – Memorial Sloan Kettering Cancer Center in New York, NY

**PGY2 Pediatrics:**

Lisa Hutchins

Clinical Pharmacy Specialist, Pediatric Emergency Medicine – Johns Hopkins Hospital in Baltimore, MD

**PGY2 Solid Organ Transplantation:**

Bryant Summers

Clinical Specialist, Solid Organ Transplant – Henry Ford Health System; Adjunct Faculty – Wayne State University College of Pharmacy; Detroit, MI

**Chief Resident**

Laura Meleis

**Preceptor of the Year**

Paul Pleczkowski

**Residency Advocate Award**

Michael Wolcott



**Duke University Hospital Pharmacy Residency Class of 2015-2016**  
(Residents and Program Directors Pictured)

### **2016-2017 Resident Class**

The 2016-2017 recruiting campaign successfully filled 17 residency positions offered at Duke. Listed below are the current residents and their College of Pharmacy or previous PGY1 residency program:

#### **PGY1:**

Sebastian Cerdena	University of North Carolina Eshelman School of Pharmacy
Stephanie Dougherty	University of Wisconsin School of Pharmacy
James Henderson	University of Tennessee College of Pharmacy
Shane Salimnejad	University of Kansas School of Pharmacy

#### **PGY2 Ambulatory Care:**

Victoria Reynolds	PGY1 Pharmacy Residency – Duke University Hospital
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#### **PGY2 Cardiology:**

Cody Carson	PGY1 Pharmacy Residency – Tampa General Hospital
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#### **PGY2 Critical Care:**

Andrew McCrae	PGY1 Pharmacy Residency – Duke University Hospital
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#### **Drug Information:**

Sandra Hanna	University of North Carolina Eshelman School of Pharmacy
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#### **PGY2 Emergency Medicine: (new)**

Emily Perriello	PGY1 Pharmacy Residency – Hartford Hospital
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#### **Internal Medicine/Infectious Diseases/Academia:**

Clara Ni	PGY1 Pharmacy Residency – Emory University Hospital
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#### **PGY1-2 Health-System Pharmacy Administration/M.S.:**

Andrew Wright (PGY1)	Campbell University School of Pharmacy
Mary Durham (PGY2)	PGY1 Pharmacy Residency – Duke University Hospital

#### **PGY2 Oncology:**

Katie Lentz	PGY1 Pharmacy Residency – Duke University Hospital
Ama Marfo	PGY1 Pharmacy Residency – Bronx-Lebanon Hospital

#### **PGY2 Pediatrics:**

Katelyn Harsh	PGY1 Pharmacy Residency – Duke University Hospital
Mallory Muller	PGY1 Pharmacy Residency – Duke Regional Hospital

#### **PGY2 Solid Organ Transplant:**

Amanda Szczepanik	PGY1 Pharmacy Residency – University of Cincinnati
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#### **Chief Resident**

Mary Durham



**Duke University Hospital Pharmacy Residency Class of 2016-2017**

## IX. Milton W. Skolaut Leadership Award

### Overview

The Milton W. Skolaut Leadership Award is awarded to a past resident of the Duke University Hospital Pharmacy Residency Program. This award recognizes an individual for outstanding leadership and contributions to the profession of pharmacy.

### About Milton W. Skolaut

Milton W. Skolaut was born in San Antonio, Texas and earned a bachelor's degree in 1941 from the University of Texas College of Pharmacy. In 1952, Skolaut became Director of Pharmacy Services at the National Institutes of Health (NIH) Clinical Center in Bethesda, Maryland. While at the clinical center, Skolaut established the pharmacy as the central supply point for drug distribution, a relatively new concept at the time but one that quickly became the norm for hospitals nationwide.



Skolaut joined the staff of Duke Hospital in 1970, where he served for 17 years as Director of Pharmacy until his retirement in 1987. During Skolaut's tenure at Duke, the pharmacy established services that included the preparation of unit dose medication packages, intravenous admixtures, and total parenteral nutrient solutions. He was also responsible for the expansion of a pharmacy within the operating room suites, supplying all materials and medications to the Anesthesia Department. The Department of Pharmacy also instituted clinical services and a residency program under his leadership.

Mr. Skolaut was an active member of ASHP for many years, including serving as president from 1963-64. In 1968, he was one of the three visionary leaders that started the ASHP Research and Education Foundation. In 1979, Skolaut earned hospital pharmacy's highest honor, ASHP's Harvey A. K. Whitney Lecture Award.

### Past Recipients

**2014:** Jill S. Bates, PharmD, MS, BCOP

**2015:** James C. McAllister III, MS, FASHP

**2016:** Elizabeth Dodds Ashley, PharmD, MHS, FCCP, BCPS

Elizabeth (Libby) Dodds Ashley received her Doctor of Pharmacy degree from the Bouvé College of Pharmacy and Health Sciences at Northeastern University, Boston, Massachusetts. She completed her pharmacy practice residency at Duke and a specialty residency in adult internal medicine/infectious disease with Duke University Health System and Campbell University before joining the Department of Medicine. She completed her Masters in Health Science in Clinical Research at Duke University School of Medicine in 2006.



Libby served as the Clinical Pharmacist for the Infectious Diseases Transplant Consult Service and Co-Chair of the Antibiotic Evaluation Team at Duke and Clinical Assistant Professor of Pharmacy Practice at the Campbell University School of Pharmacy. She left Duke in 2008 to join the University of Rochester as Associate Director for Clinical Pharmacy Services and as an Infectious Diseases Pharmacist until June 2015 when she accepted her current position. Libby

is currently a liaison pharmacist with the Duke Antimicrobial Stewardship Outreach Network (DASON) based at Duke University.

## **X. Preceptor Awards**

Student Preceptor of the Year – Michael Campbell, PharmD



Resident Preceptor of the Year - Paul Pleczkowski, PharmD, BCPS



Resident Advocate of the Year – Michael Wolcott, PharmD, BCPS



## XI. Grants and Publications

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**Hetey, SK.** *Dealing with Latex Allergies.* In: Buchanan EC, Forrey RA, Schneider PJ, eds. *Compounding Sterile Preparations*, 4<sup>th</sup> Edition. 2016.

Ku LC, Simmons C, Smith PB, Greenberg RG, **Hornik CD**, Cotten CM, Goldberg RN, Fisher K, Bidegain M. *Intranasal Midazolam and Fentanyl for Analgesia and Sedation in Infants in the Neonatal Intensive Care Unit.* American Academy of Pediatrics National Conference. San Francisco; 2016.

Parker W, **Hornik CD**, Bilbo S, Holzknecht ZE, Gentry L, Rao R, Lin SS, Nevison CD. The Role of Oxidative Stress, Inflammation and Acetaminophen Exposure from Birth to Early Childhood in the Induction of Autism. [Accepted for publication]

Edwards L, Hutchison L, **Hornik CD**, Smith PB, Cotten CM, Bidegain M. A Case of Infant Delirium in the Neonatal Intensive Care Unit. *J Neonatal Perinatal Med.* 2016. Epub ahead of print.

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**Hornik, CD.** Duke Graduate Medical Education (GME) Innovation Grant 2015-2016: Virtual Rounding to Enhance Communication with Families in the Intensive Care Nursery. (PI: Izatt)

**Hornik, CD.** National Institute of Child Health and Human Development (NICHD) Pediatric Trials Network (HHSN 2752010000031). (PI: Benjamin)

Kahler S, **Kelm M**, Lay R, Meleis L, Rodriguez D, Wheeler T. Controlled Substance Diversion Detection Technologies and Applications: Environmental Scanning and Review. *Vizient AMC Pharmacy Network.* Posted May 28, 2016.

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**Kelm M**, Arrowood SA. Closing the IV administration loop. *Pharmacy Purchasing and Products Magazine.* 2015;12(11) 54.

Palazzolo N, **Kram B, Muzyk AJ**. Examination of QTc Values in Critically Ill Patients Diagnosed with Delirium and Prescribed Atypical Antipsychotics. *Curr Drug Saf*. 2016 Aug 15. Epub ahead of print.

Day SA, Cucci M, Droege ME, Holzhausen JM, **Kram B, Kram S**, Pajoumand M, Parker CR, Patel MK, Peitz GJ, Poore A, Turck CJ, Van Berkel MA, Wong A, Zomp A, Rech MA. Major publications in the critical care pharmacotherapy literature: January-December 2014. *Am J Health Syst Pharm*. 2015 Nov 15;72(22):1974-85.

Wong A, **Kram B, Kram S**, et.al. Major publications in the critical care pharmacotherapy literature: January-December 2015. *Am J Health Syst Pharm*. In press.

Rowe AS, Hamilton LA, Curtis RA, Davis CR, Smith LN, **Peek GK, Reynolds VW**. Risk factors for discharge on a new antipsychotic medication after admission to an intensive care unit, *J Crit Care*. 2015 Dec;30(6):1283-6.

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Wilczyński S, Koprowski R, **Wiernek BK**, Błońska-Fajfrowska B. Image-guided automatic triggering of a fractional CO2 laser in aesthetic procedures. *Comput Biol Med*. 2016 Sep 1;76:1-6. Epub 2016 Jun 11.



