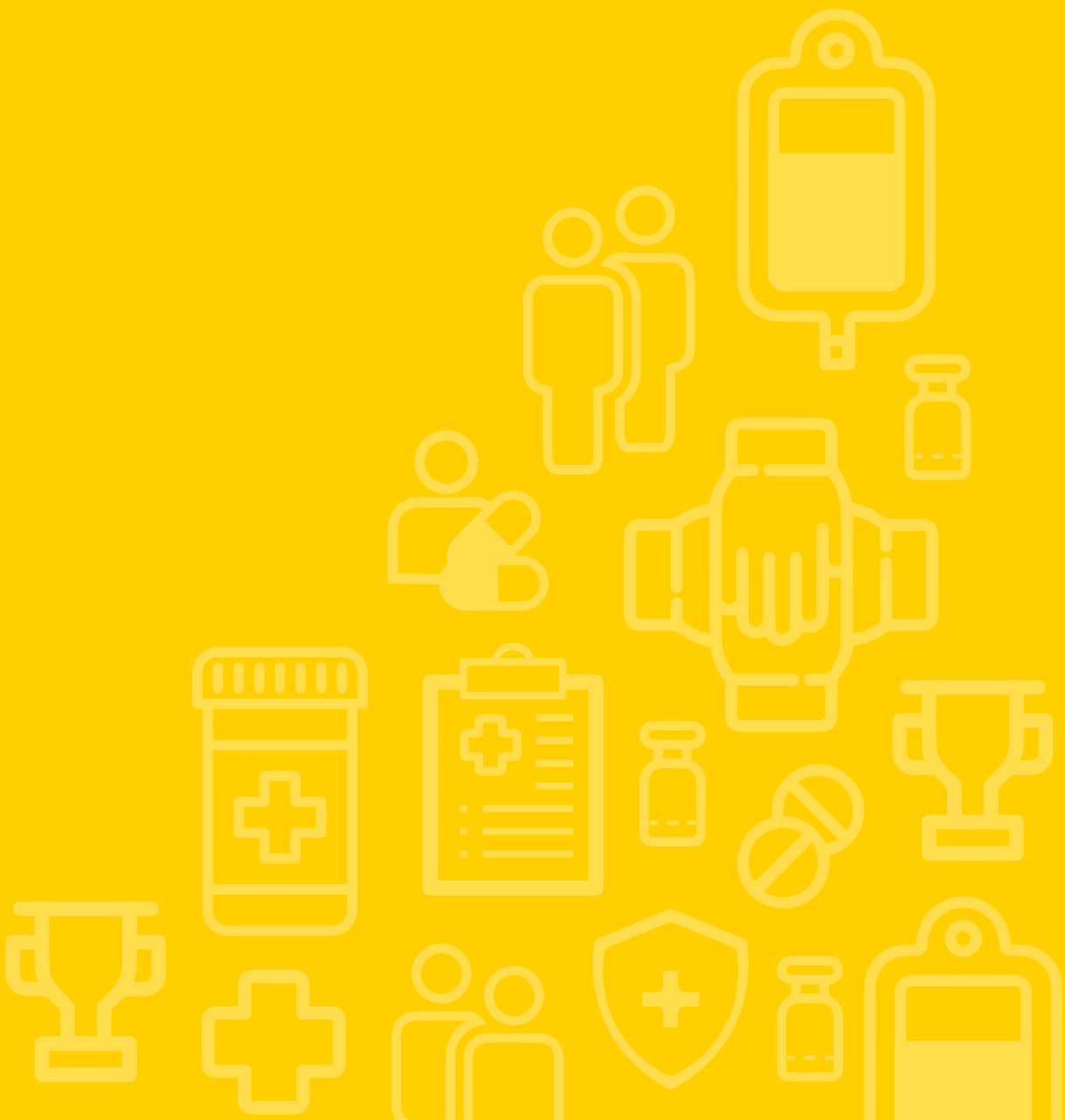
MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

Department of Pharmacy Services Annual Report

2020–2021



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Stan Kent, RPh, MS, FASHP

Our Approach

Patient Safety

Collaboration

Teamwork

Message from the Chief Pharmacy Officer

Welcome to the University of Michigan Health Department of Pharmacy Services annual report. This report serves two purposes — to recognize and record the major achievements of our department from the past year and to share those efforts with others — but it does not capture all our work. Know that our teams are doing remarkable things every day — for infants at Mott, for cancer patients in our infusion pharmacies, for the critically ill in the intensive care units. They're compounding thousands of sterile products in our clean rooms, helping patients navigate complex specialty medications, creating dashboards to manage drug shortages, teaching our students and residents, and the list goes on.

Last summer we thought we were over the hump of the COVID-19 pandemic, only to have two more surges over the winter. The pandemic has taught us a lot about teamwork and resilience. I hope we can take what we've all learned and use it to be even better. I want to specifically call out the work of Lindsey Clark, Janine Lee, Matt Tupps, and Emily Chen — and their teams — who managed the complex COVID-19 vaccine distribution. They were simply incredible.

A major change that took effect on July 1, 2021, is that the pharmacy department began reporting to the Office of the President of U-M Health. I am really looking forward to working with Dana Habers, MHA, who was named the interim chief operating officer for pharmacy and reports directly to President David Miller, MD, MPH. We plan to help our department accomplish great things for our pharmacy staff and patients.

My vision for our department continues to be that:

- All staff feel supported, respected, and look forward to working with their colleagues every day.
- Our staff are working at the top of their skill set and potential — and learning more every day.
- Our services and systems meet or exceed the needs and expectations of our customers.
- We are the highest performing and most innovative pharmacy department in the country.

I am very proud of the progress we've made over the years and look forward to the future with optimism and determination. Go Blue!

Stan Kent, RPh, MS, FASHP
Chief Pharmacy Officer

Department of Pharmacy Services FY 2021

600
Team Members

4M+
Orders Filled Annually

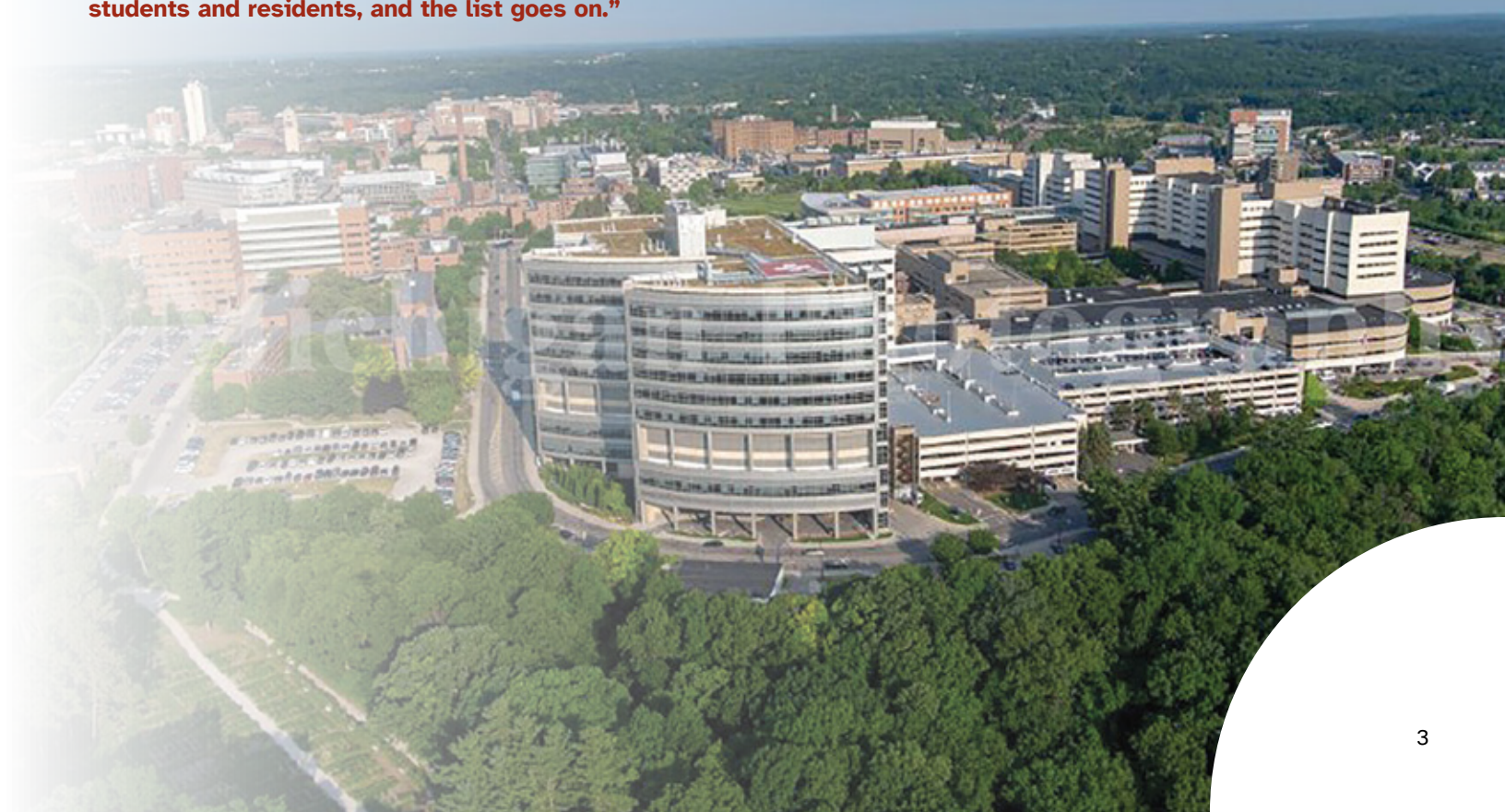
72K+
Infusions

138K+
Precriptions

14
Patient Care Services

90+
Research Publications

"Know that our teams are doing remarkable things every day — for infants at Mott, for cancer patients in our infusion pharmacies, for the critically ill in the intensive care units. They're compounding thousands of sterile products in our clean rooms, helping patients navigate complex specialty medications, creating dashboards to manage drug shortages, teaching our students and residents, and the list goes on."



University Hospital/Cardiovascular Center Acute Care Pharmacy Clinical Services

Serving the Patients of University Hospital and the Frankel Cardiovascular Center

Our department's acute care pharmacy clinical services in University Hospital and the Cardiovascular Center include the following inpatient teams and pharmacies:

- University Hospital Medicine Team
- University Hospital and Cardiovascular Center Cardiology and Surgery Team
- University Hospital and Cardiovascular Center Transplant Team
- University Hospital Central Pharmacy
- Adult Operating Room and Cardiovascular Center Pharmacies

During FY21, the work of these five groups included:

230
Technicians

235
Pharmacists

540K
Sterile compounds prepared

4M+
Orders Filled Annually

5.3M
Doses dispensed from Pharmacy and Pyxis

University Hospital Medicine Team

With 17 pharmacists, the medicine team is one of the largest inpatient pharmacist teams at University Hospital and is responsible for taking care of a wide range of patients on a daily basis, and typically covers the needs of up to half of all adult inpatients. Services covered by the team include a large spectrum of patient populations including but not limited to: medical and neuro ICUs, neurosurgery, inpatient psychiatry, GI/liver specialty services, inpatient rehab, inpatient family medicine, both medical observation units, along with up to 19 various general medicine teams. Many of our team members have cross-trained in numerous other areas of pharmacy, making them a valuable asset for the department. Our team also plays a significant role in the precepting and development of our students and residents.

Covers Up To
50%
of Adult Inpatients

FY21 Highlights:

- Played an integral role in caring for critically ill and floor status COVID-19 patients throughout the year; this included being involved in expansion COVID-19 critical care units, such as the Regional Infectious Containment Unit
- Participated in precepting or co-precepting 60 APPE and IPPE student rotations and 57 PGY-1 and PGY-2 residents' rotations over the past academic year
- Authored 25 manuscripts that have been published or submitted for publication over the past year

Photo: Abby Scott.

Clinical Pharmacist Dana Blanchard (middle left), along with APPE student Anastazia Capparelli (far left), shown making recommendations to the medical team while rounding with Medicine Newburgh, one of the many General Medicine teams that our medicine team covers.

University Hospital/Cardiovascular Center Acute Care Pharmacy Clinical Services

Awards & Recognition

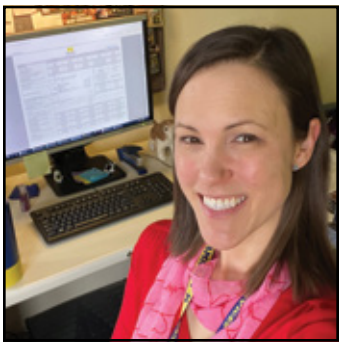
- **Michigan Chapter of SCCM Virtual Symposium Best Original Research Award**
- **President - Michigan Society of Parenteral and Enteral Nutrition**
- **Michigan Medicine Health System Pharmacy and Leadership Residency program Preceptor-of-the-Year**
- **48 Making a Difference Awards**

Top row: Simona Bulter, Angie Clark, YeeAnn Chen; 2nd row: Melissa Pleva, Sarah Nordbeck, Nick Farina; And others without camera on: Cards/Surg Team Meeting on Zoom

University Hospital and Cardiovascular Center Cardiology and Surgery Team

The cardiology and surgery team provides pharmacy services in both University Hospital and the Cardiovascular Center. The team is made up of a total of 17 clinical pharmacists. The team's main responsibilities not only include dispensing and preparing medications for patients but also working alongside our colleagues in medicine, nursing, and nutrition to make sure patients receive safe and effective medications. Core clinical services provided include therapeutic anticoagulation management, pharmacokinetic dosing, medication reconciliation, renal dosing, facilitating transitions of care, and IV to PO formulation conversions. Several of our team members serve on committees within the Department of Pharmacy, such as the Clinical Practice Committee, Residency Advisory Committee, METER as well as outside of our department on the Hyperglycemic Control Committee, Critical Care Steering Committee, and P&T Subcommittees, including Anticoagulation and VTE Subcommittees.

(Left to right) Michelle Schultz, Megan Lim, and Alyssa Divens outside of UH5 working as Cards/Surg Clinical Generalists!



Kristen Pogue wearing red for Women's Heart Health in February

FY21 Highlights:

- Precepted numerous PGY-1 and PGY-2 pharmacy residents as well as IPPE and APPE PharmD students throughout the year
- Developed guidelines (DM in adult non-critically ill patients and anticoagulation management in COVID-19), conducted MUEs (KCentra, Dexmedetomidine), managed critical drug shortages (Protamine), and attended several virtual conferences including SCCM and ACC
- Published clinical research and case series in various peer-reviewed journals, presented five posters for Quality Month, performed REMS audits and conducted a gap analysis on ICU pharmacy services

University Hospital and Cardiovascular Center Transplant Team

The transplant team's primary focus is to promote the safe and effective use of medications within the transplant programs. Transplant pharmacists are involved in all the phases of transplant. Prior to transplant, the pharmacists attend and participate in the selection meeting and address medication-related questions from the transplant evaluation team. During transplant admissions, the pharmacist rounds with the multidisciplinary team providing pharmacotherapy recommendations and patient education on transplant medications prior to discharge. In the outpatient clinic (abdominal programs), the pharmacist provides medication education to patients and family/caregivers, assesses for medication related adverse effects, and assists the rest of the transplant team regarding monitoring and managing transplant medications. They collaborate with providers to manage complications from transplant medications (ex. hyperglycemia, hypertension, renal dose adjustments, etc.).

Our team also provides pharmacy services in the transplant endocrine clinic and adult cystic fibrosis clinic. Transplant pharmacists are available to the staff and faculty to answer medication-related questions via MiChart in-basket during non-clinic days. The pharmacists also follow up with patients after medication adjustments and perform comprehensive medication reviews for patients on non-clinic days. In addition, the transplant pharmacists lead and support various QAPI initiatives (including protocol development and sustainment) throughout the Transplant Center and cystic fibrosis team. The transplant team also participates in training the PGY-2 Transplant resident, PGY-2 Ambulatory Care residents, PGY-1 pharmacy residents, and P4 students.

Left to Right: Jen Hagopian, Katie McMurry, Linda Fitzgerald, Sarah Tischer, Trung Ky, Abbie Leino, Jamie Park, and Laura Cotiguala celebrating the end of a residency year!

FY21 Highlights:

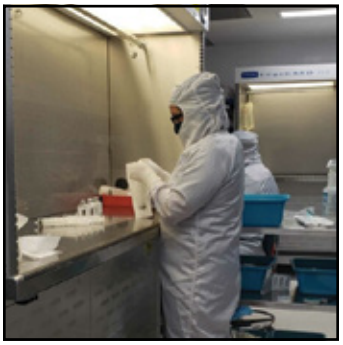
- Created or revised 15 Transplant Center or cystic fibrosis protocols
- Created or revised three workflow processes
- Precepted one PGY-2 transplant resident on transplant surgery, medicine pulmonary/lung transplant, liver transplant clinic, kidney transplant clinic
- Precepted five PGY-1 pharmacy residents on transplant surgery, liver transplant clinic, and medicine pulmonary/lung transplant
- Precepted eight PharmD students on a transplant surgery APPE, medicine pulmonary/lung transplant APPE, and health system IPPE rotations
- Precepted five PGY-1/PGY-2 pharmacy residents on writing (including case reports) or research projects
- Precepted three pharmacy PDI students
- Presented three webinars/ podcasts for professional organizations and two abstracts at the North American Cystic Fibrosis Conference in 2020

Revised
15
Protocols

University Hospital/Cardiovascular Center Acute Care Pharmacy Clinical Services

Paige Stratton

Kyle Fields and Tabita Ghiurau



Amanda Rivera

Thomas White

Dispensed 135K+ Doses of COVID-19 Vaccine

Anne Thompson and Sean Flynn

University Hospital Central Pharmacy

Pharmacists and technicians working in the University Hospital Central Pharmacy work in collaboration with team members to ensure timely preparation and delivery of medications. The central pharmacy provides services to all admitted patients in University Hospital as well as to other Michigan Medicine pharmacies and clinics. Medication distribution services offered by pharmacists and technicians include medication order review and verification, sterile and non-sterile medication preparation and delivery, drug information, code response, and other services as needed. The central pharmacy promptly prepares and delivers first dose, and STAT, hazardous and investigational medications. Additionally, the central pharmacy processes medication orders to supply pharmacy satellites, automated dispensing cabinets, emergency kits and boxes, and Michigan Medicine clinics.

FY21 Highlights:

- Implemented Dispense Prep technology in oral unit dose cartfill process
- Increased from once to twice daily Pyxis replenishment for controlled substances in ICUs
- Initiated movement of all bulk compounding from paper record storage to MiChart Compounding & Repackaging
- Implemented Daily Management System huddles into daily work
- Revised gabapentin liquid dispensing processes to improve controlled substance management and minimize diversion risk
- Revised CRRT process to ensure a more efficient and safer process for our patients
- Acquired pre-made calcium chloride bags to reduce workload
- Welcomed an evening shift technician supervisor to the central pharmacy leadership team
- Successfully completed review by the Joint Commission
- Implemented COVID-19 vaccine dispensing workflow for three COVID-19 vaccine manufacturers, dispensing more than 135,000 doses of COVID-19 vaccine
- Dispensed more than 1,000 doses of COVID-19 antibody therapy

Nancy Robare

Hannah Darmofal, Tyler Jaycox, Jessica Short

Josephine Frye, Hannah Robenault, Abby Scott

Courtney Inch

Adult Operating Room and Cardiovascular Center Team

Operating room (OR) and Cardiovascular Center (CVC) pharmacy team members provide services to support anesthesia, surgeons, OR nurses and nurses in the perioperative care units in the care of surgical patients. There are currently three adult OR pharmacy practice sites: University Hospital, Brighton Center for Specialty Care and East Ann Arbor Surgical Center (EAASC). The CVC pharmacy is our fourth practice site. In addition to supporting the CVC OR, our team members working in this location collaborate in the care of CVC inpatients and patients receiving cardiac procedures in the Cath and EP labs.

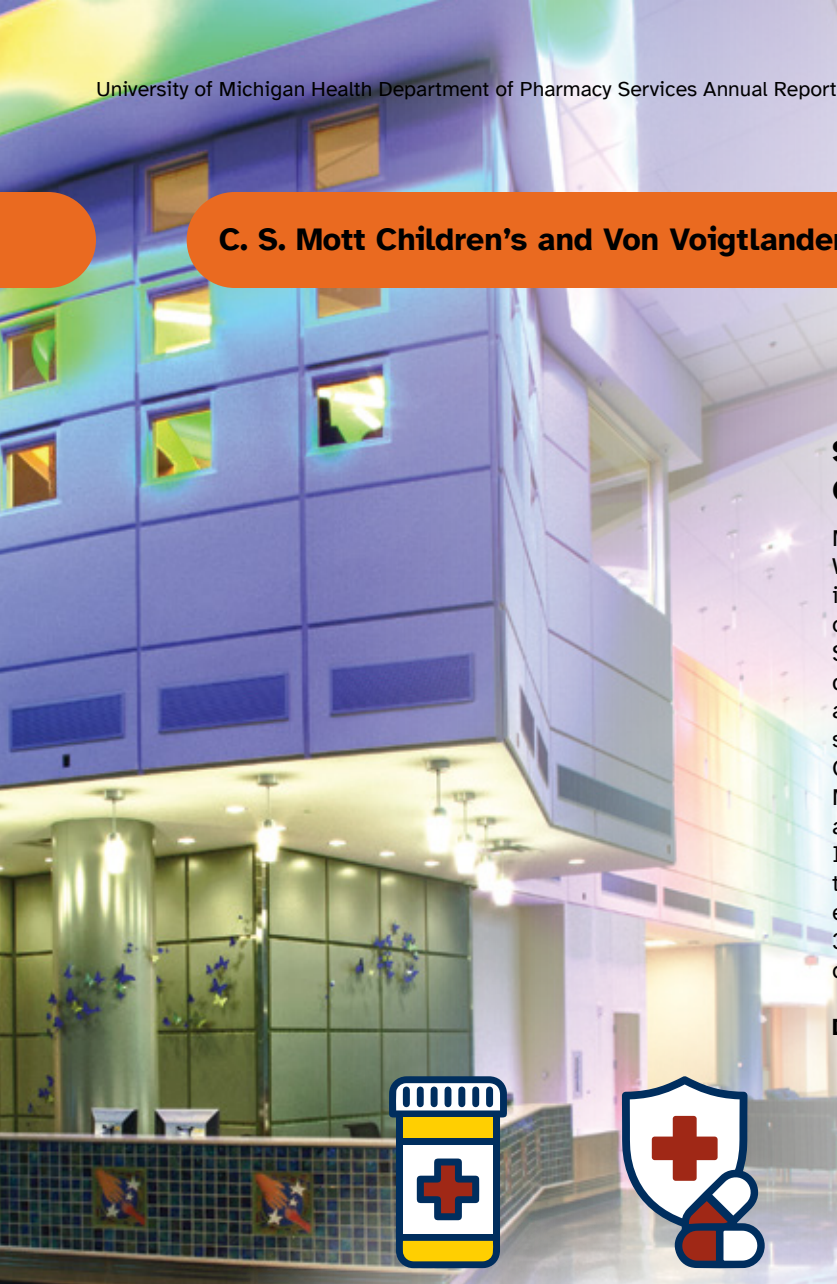
The core services offered by pharmacists and technicians include medication order review and verification, sterile and non-sterile medication preparation and delivery, drug information, cardiac arrest response, Pyxis stocking, and inventory management. The team also works closely with Anesthesia to dispense, reconcile, and monitor usage of controlled substance medications.

4
Pharmacy Practice Sites

FY21 Highlights:

- Implemented dispense tracking
- Revised CRRT process to ensure a more efficient and safer process for our patients
- Revised IV batch times for improved workflow
- Managed multiple national drug shortages affecting antimicrobials, pain medications, and anesthetic agents.
- Implemented waste reduction strategies for compounded intravenous medications
- Successfully completed review by the Joint Commission for Sterile Compounding
- Successfully completed DEA audit at EAASC
- Expanded CVC business hours to 24/7
- Expanded UH OR evening coverage
- Implemented process improvement for dispensing epidurals to anesthesia providers (change from syringe to cassette)
- Support approved to develop a segregated compounding pharmacy at EAASC
- Updated MiChart orders for improved dispensing and accuracy of antibiotic labels for radiology
- Expanded sterile compounding conducted in central cleanroom

C. S. Mott Children's and Von Voigtlander Women's Hospital Pharmacy



Serving Pediatric, Maternal, Women's Health, Oncology and Infusion Services

Michigan Medicine's C. S. Mott Children's and Von Voigtlander Women's Hospital, a 350-bed acute care academic medical center, is a top pediatric and women's hospital in the state of Michigan and one of the highest ranked pediatric medical centers in the United States. The Mott pharmacy provides services for a wide variety of diverse pediatric disease states as well as maternal fetal medicine and women's health, adult oncology, and adult and pediatric infusion services. Once again, *U.S. News & World Report* ranked C. S. Mott Children's Hospital in all 10 specialties for the 14th consecutive year. Mott is one of only 24 hospitals that are ranked in each category among over 200 children's hospitals in the United States. As a Level I trauma center, C. S. Mott Children's Hospital has been certified by the America College of Surgeons as providing the highest level of emergency and surgical care to pediatric patients 24 hours a day, 365 days a year. There are less than 40 pediatric Level I trauma centers in the entire nation, and only three in Michigan.

During FY21, the work of these groups included:

480K
Non-sterile doses from Pharmacy only — not Pyxis

350K
Sterile compounds prepared

1.5M
Orders verified

240
Average Census

76
Team Members

FY21 Highlights:

- Initiated PharmD education consult
- Launched bolus from pump
- Installed CW10 pharmacy phone tree
- Implemented Peds Standard concentrations
- Commenced dose rounding initiative
- Optimized dispense preparation & tracking
- Established technician training coach
- Created CW human resources congruency
- Formed CW Inpatient Operations Committee
- Reorganized reporting structure
- Launched CW10 Workload Reallocation Project
- Prepared BD IV Prep Go-Live
- Revamped RPh & CPhT onboarding and development
- Progressed layered learning model
- Developed pharmacist controller position

Ambulatory Pharmacy Services

Providing Patient-Centered Services Across the Care Continuum

Ambulatory pharmacy services team members provide high-quality, patient-centered services across the care continuum, including medication use and regulatory support to our ambulatory clinics. Our pharmacists, technicians, residents, and interns are involved in direct patient care, medication provision, and initiatives to improve cost, quality, and patient safety. Our staff collaborates with teams of health care providers to provide the best care to all. Ambulatory pharmacy services partners and provides care across five outpatient pharmacies, seven infusion pharmacies, specialty pharmacy services, and pharmacists embedded in clinics.

Community Pharmacy Services

Our community pharmacy locations include Taubman Center and the Rogel Cancer Center, which are on the main medical campus, East Ann Arbor, Kellogg Eye Center, and Brighton Center for Specialty Care.

FY21 Highlights:

- Filled 63,371 prescriptions at Taubman Pharmacy alone
- Continued growth of medication therapy management program to include medication synchronization for patients with complex care needs
- Expanded immunization services to include Tdap, and influenza vaccinations to patients of Mott Children's Hospital and caregivers/family
- Implemented insulin syringe/needle standing order, which allows pharmacists to dispense insulin syringes to patients who require them
- Expanded priority discharge program to include more than 50 multidisciplinary teams across the hospital
- Provided comprehensive medication reconciliations and education to patients discharging from the hospital, including pediatric counseling to patients less than 18 years of age
- Dispensed Deterra bags, a drug deactivation system for patients receiving opioid prescriptions
- Installed an opioid take-back receptacle in the neurology clinic at Taubman Center
- Continued integration of automation into the dispensing processes using both ScriptPro and RxSafe which helps to monitor controlled substance use
- Conducted controlled substance inventories quarterly in all five pharmacies
- Provided non-sterile compounding for patients who cannot swallow pills
- Dedicated and energetic team members delivering exceptional patient-centered care

The Ambulatory Care pharmacy staff in Taubman lobby

Erin Hennessey, technician and Jennifer Baldridge, pharmacist work through the filling and final check of a prescription in the Ambulatory Care pharmacy in the Taubman Medical Center

Katherine Bromm, pharmacy intern, counseling patients in the Ambulatory Care pharmacy in the Taubman Medical Center

Danielle Devlin, technician, processing prescriptions in the Cancer Center pharmacy

5
Outpatient Pharmacies

7
Infusion Pharmacies

63,371
Prescriptions filled at Taubman Pharmacy

Ambulatory Pharmacy Services

4
Pharmacy techs on discharge team

17
Pharmacy techs on clinic team

Transitions of Care Pharmacy Team

The transitions of care (TOC) pharmacy technician team strives to facilitate timely patient access to medications. TOC pharmacy team services include conducting copay checks to assess insurance coverage, facilitating prior authorizations, completing appeal letters, providing insurance formulary options, and coordinating the filling and bedside delivery of discharge medications.

The TOC discharge team consists of four pharmacy technicians and one pharmacy intern involved in the process of adult inpatient discharge to home and the discharge medication bedside delivery service, MiRxExpress. Pharmacy technicians currently assist patients discharging from University Hospital, Cardiovascular Center, Von Voightlander Women's Hospital Service, Adult Hematology/Oncology Service, Pediatric Endocrinology Service, and the Adult Emergency Services Department.

The TOC clinic team includes 17 pharmacy technicians who offer medication access assistance in the dermatology, hepatology, gastroenterology/infectious disease, pulmonary/nephrology, rheumatology, post-kidney transplant, metabolism, endocrinology, diabetes, pediatric multispecialty, cardiology, urology, and general medicine service lines within ambulatory care. Within these clinics, TOC pharmacy technicians are integral and highly valued members of the interdisciplinary health care team. They are frequently consulted by clinic nurses and providers for their services.

FY21 Highlights:

- A formal analysis of the MiRxExpress program concluded that the program reduces the median discharge prescription turnaround time, reduces the length of stay for patients, and increases the number of prescriptions filled at Taubman Pharmacy
- The MiRxExpress program was reactivated due to its positive impact, hired two new team members and plans for continued expansion using a phased implementation approach
- One new team member was hired for the discharge medication access team
- Hired six new clinic TOC pharmacy technicians, with the hiring of an additional four clinic TOC pharmacy technicians currently in progress
- Expanded to five new areas: Pediatric Neurology/ Pulmonary/Ventilator Clinics, Pediatric Cystic Fibrosis Clinic, Urology Clinic, Cardiovascular Center Clinics, and Brighton Health Center/ Canton Health Center General Medicine Clinics
- Expansion to the West Ann Arbor Pulmonary/Allergy Clinics and Pediatric GI Clinics is currently in progress
- A new TOC pharmacy technician, multiple clinics support position was hired

Specialty Pharmacy Services

The University of Michigan Health specialty pharmacy team had an extremely productive fiscal year despite the challenge presented by the coronavirus pandemic. The team maintained all aspects of specialty pharmacy services including medication coverage, financial assistance coordination, refill reminder calls, and shipping needs. We continued to collaborate with transplant, hepatitis, multiple sclerosis, pulmonary arterial hypertension, rheumatology, gastroenterology, orthopedics, pulmonary/Cystic Fibrosis, oral chemotherapy, and transitions of care colleagues to coordinate and refine our partnerships. An exciting foundation for focused specialty pharmacy expansion to meet patient and clinic partner needs was laid in the latter half of the fiscal year and we are excited to provide high-quality specialty services to new patients in the coming year.

Pictured: part of the specialty pharmacy team. From top row: Ashely Sabourin, Brandon Harkonen, Elyssa Henry, Wade Goodell, Emily Blouin, Sherrie Luttman, Nicholas Weller, Melanie Woods; Timothy Overstreet with Amanda Wu, Krystie Gagnon, Kelly Kasbohm, Lisa Nicholls-Slovinski; Tina Tarrant, Sara Baghdadi, Catherine Smith, Andrea Roman, Jessica Habbouche, Laura Jamnick, Heather Gillespie, and Vincent Miles.

FY21 Highlights:

- Served 5,800 patients and filled 135,000 prescriptions
- Specialty Pharmacy Call Center handled 145,000 patient calls (inbound & outbound)
- FY20 Patient satisfaction survey results indicated 93% of patients are extremely satisfied with our services and 99% would recommend our Specialty Pharmacy
- Three specialty pharmacy patient financial coordinators were nominated for a Michigan Medicine MVP award
- Welcomed a new pharmacy manager, a patient management program supervisor, two new clinical pharmacist generalists, one new patient financial coordinator, several new pharmacy technicians, and interns to the team
- Piloted an embedded specialty clinical pharmacist and patient financial coordinator in Taubman GI clinic which demonstrated an improved patient experience, enhanced clinic efficiency and real-time connection with patients both in person and virtually
- The specialty and oral oncology team implemented a paperless order processing workflow to reduce errors and minimize inefficiencies associated with paper communication
- The Quality Management Committee completed two active quality improvement projects and continues to evaluate quality metrics including health-related quality of life, improvement in patient comfort with self-injections and patient complaint turnaround time
- Welcomed a new partnership with biologic initiation/observation (BIO) clinic and expanded coverage for cardiovascular (CVC) clinic

135K
Prescriptions filled

5,800
Patients served

- Partnered with the U-M Prescription Drug Plan team to streamline prior authorization processes for calcitonin gene-related peptide (CGRP) inhibitors and select inflammatory disease agents (Humira, Stelara)
- Trained 19 pharmacy students (IPPE and APPE), nine interns and two residents in managed care, community, ambulatory care and administration

Ambulatory Pharmacy Services

58
Team Members

Carol Hare, Joel Graham, and Batoul Jaber caring for patients at Northville Health Center Infusion Pharmacy tion

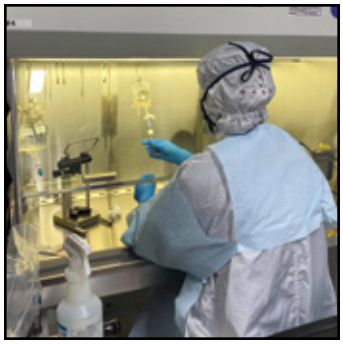
79K+
Patients served

Jon Haller, senior tech at the Rogel Cancer Center Infusion Pharmacy, prepares a non-hazardous medication in the NHD room

53K+
Orders verified

Anita Snow, Erika Knapp, Curtis Scheiderer, Hadise Kabil, and Kaitlyn Spears dispensing sterile preparations for patients receiving infusions at the Rogel Cancer Center

9,796
Products compounded



Pharmacy Intern Emily Nguyen compounds chemotherapy at the Rogel Cancer Center Infusion Pharmacy

Infusion Pharmacy Services

The infusion team is located in Ann Arbor and the surrounding suburbs and is composed of roughly 58 team members (pharmacists and pharmacy technicians).

There are three infusion centers with a dedicated pharmacy on the main medical campus:

- C. S. Mott Children's Hospital 7th Floor
- A. Alfred Taubman Health Care Center
- Rogel Cancer Center

The infusion centers located in the Ann Arbor suburbs with a dedicated pharmacy include:

- Brighton Center for Specialty Care
- East Ann Arbor Health Center
- Northville Health Center
- West Ann Arbor-Parkland Plaza

There are additional sites supported by the infusion team members for either infusion medications or intra-bladder BCG preparation.

- West Shore Urology — supported by West Ann Arbor-Parkland Plaza

FY21 Highlights:

- Initiated new APPE rotation: Ambulatory Care — Oncology
- Precepted three PharmD students in Ambulatory Care — Oncology APPE and several students on Health System/ Hospital IPPE rotations
- Assisted in the precepting of two PGY-2 residents in oncology
- Successfully onboarded and implemented dispense prep and BD pyxis IV prep across all infusion sites
- Managed the screening of COVID-19 positive patients and provided infusion treatments out of West Ann Arbor-Parkland Plaza Infusion
- Created biosimilar order conversion process and provided patient education as needed
- Collaborated on 2020 Quality Month Poster: Reduction in Rogel Cancer Center Infusion Patient Wait Times — Introduction of a Cleanroom Compounding Suite and Improvements in Infusion Pharmacy Workflows
- Improved our "Patient Own Medication" process to mitigate white bagging risks across all infusion sites
- Continued to provide excellent patient care during several infusion site construction projects at the Rogel Cancer Center and West Ann Arbor-Parkland Plaza
- Created an infusion pharmacy services webpage

Hematology/Oncology Pharmacy Services

Inpatient Oncology Pharmacists

The inpatient oncology clinical specialist team consists of seven pharmacists providing care to 10 inpatient oncology services in C. S. Mott Children's Hospital and University Hospital. These pharmacists provide care for up to 100 complex pediatric and adult patients per day in the areas of bone marrow transplant, cellular therapy, medical oncology, and hematology. This team continues to advance the role of the pharmacist as an integral member of the care team with treatment planning, collaborative research initiatives, policy and guideline creation, and oncology stewardship.

Ambulatory Oncology Pharmacists

The ambulatory oncology clinical specialist team includes seven pharmacists with two open positions who provide care in the Rogel Cancer Center, C. S. Mott Clinics, and the Brighton Center for Specialty Care. These pharmacists provide comprehensive oncology care as independent and collaborative care providers within the medical team. They provided pharmacist services for more than 7,000 patients this year which accounted for $141,000 in charges billed to patients' insurance.

Oral Medications for Cancer Therapy Program

The Oral Medications for Cancer Therapy Program was initiated in 2012 and follows all patients receiving oral anti-cancer medications. This team includes two pharmacists, two pharmacy interns, and four financial coordinators. The focus of this program is on streamlining and providing support for medication access, providing medication reconciliation, patient medication education, patient compliance/adherence information, drug-drug interaction review, and medical record documentation. They also work on creating and providing the health system with oral medication education to empower patients in self-management of adverse effects and when to contact their clinic providers. The team evaluates and cares for more than 3,000 patients a year. This year the program has contributed to high performance on many of the ASCO QOPI measures and URAC accreditation in our specialty pharmacy partnership.

Providing care to

Inpatient oncology services

7,000
Patients served

3,000+
Patients/year

Hematology/Oncology Pharmacy Services

1,200+
Commercial treatment or therapy plans

Clinical Orders Team

The University of Michigan continues to optimize workflows with the EPIC Beacon product for chemotherapy CPOE. This work is supported by a clinical orders team, which provides evidence-based reviews for treatment protocol requests and leads a standardized approach to the build for order templates. The team of 2.5 pharmacist FTEs maintains over 1,200 commercial treatment or therapy plans and helped manage over 330 research plans this year.

Medication Reconciliation Programs

The pharmacist-run medication reconciliation program for Rogel Cancer Center patients is an integral component of improving patient care and clinic efficiency. It is supported by pharmacy students through partnership with the University of Michigan College of Pharmacy and pharmacist interns with infusion clinical pharmacist preceptorship. The program provides complete medication reconciliation for patients prior to their first visit. In addition, pharmacist team members provide medication management services by request in which the pharmacist reviews medications, including herbal and dietary supplements and assesses for drug or disease interactions. Recommendations are communicated with the patient's primary oncology team.

Top row (Left to Right): Gianni Scappaticci, Bernie Marini, Victoria Nachar, Madeleine King
Middle row (Left to Right): Rachel McDevitt, Shawna Kraft, Martina Fraga, Andrea Roman
Bottom row (Left to Right): Catherine Christen, Lydia Benitez Colon, Anthony Perissinotti

FY21 Highlights:

- Served in a total of 46 committee and tumor board positions for Michigan Medicine & national, state, and local organizations
- Delivered 16 presentations and lectures to health care providers and managed care professionals
- Guest speaker on two episodes of "Plenary Session" national podcast discussion drugs in ALL and AML
- Completed 18 publications including one (authored exclusively by U-M hematology/oncology pharmacists) in NEJM
- Contributed to the Pediatric Infectious Prophylaxis Best Practice Guidelines
- Peer reviewed for the *Journal of Oncology Pharmacy Practice*
- Acted as a subject matter expert for the ISMP Reversal Agent and Antidote Task Force
- Awarded six Making a Difference Awards, Pharmacy Residency Preceptor of the Year Award, HOPA Basic Science and Clinical Research Literature Award, and a nomination for Oncology Preceptor of the Year
- Development of the Pediatric Hyperthermic Intraperitoneal Chemotherapy Program, and the Blinatumomab Infusion Workflow
- Outpatient migration of all second doses of rituximab and beyond outpatient for patients with ALL and first doses as medically possible; movement of pegasparaginase first dose outpatient as medically possible for patients with ALL saved the hospital bed days and drug expenses
- Preceptor for 64 oncology rotations for residents and pharmacy students
- Restructured the teaching certificate for pharmacy residents

Emergency Pharmacy Services

Addressing Emergencies 24/7

The emergency department (ED) pharmacy team consists of 10 core pharmacists and two core pharmacy technicians who provide 24/7 pharmacy services for two emergency departments — Adult Emergency Services (AES) and Children's Emergency Services (CES). The ED pharmacy team responds to all codes, traumas, and medical emergencies, assists with optimal drug and dose recommendations, compounds life-saving drips at the bedside, and recommends proper dose titrations to achieve desired patient outcomes.

The ED pharmacy team provides pharmacokinetic dosing services for vancomycin and aminoglycosides and works closely with providers to ensure antibiotic selection is appropriate and dosed correctly for each unique patient case.

Additional services provided by 24/7 pharmacist presence in AES and CES include participation in critical airway management, responding to drug information questions and toxicology consults, order verification, patient counseling, focused medication history reviews, and medication dispensing (some of which includes post-exposure prophylactic meds for occupational exposure, rabies vaccine, and immune globulin, investigational drugs, naloxone nasal spray to patients at high risk for opioid overdose and expedited partner therapy for the partners of patients diagnosed with gonorrhea or chlamydia in the ED).

Furthermore, the AES pharmacist also attends daily rounds for critical patients located in the Emergency Critical Care Center within AES. The ED pharmacy technicians play a critical role in medication dispensing, compounding for emergent use, conducting admission medication histories, managing the pharmacy satellite and Pyxis inventory, helping to ensure regulatory compliance, triaging phone calls, and other responsibilities that assist the pharmacist and promote optimal patient care in AES.

Emergency Pharmacy Services

Pharmacy Bedside Delivery Team. From Left to Right: Carrie Hammond, Jennifer Freel, Nicole Graczyk, and Esther Im

Optimized workflow for dispensing of new COVID-related therapies and ED research studies

Precepted 26 learners

FY21 Highlights:

- Further optimized AES/CES track board columns to better identify patients in need of a formal medication history
- Implemented order sets/ education to facilitate higher initial antiepileptic loading doses
- Optimized workflow for dispensing of new COVID-related therapies and ED research studies (remdesivir, convalescent plasma study, ED COVID vaccine administration)
- Participated in process-improvement initiatives for national stroke study
- Added volume cap to IM lidocaine products for procedures to ensure max doses are not exceeded
- Continued providing take-home naloxone at discharge for patients through the M-OPEN/MEDIC initiative, with more than 65 naloxone kits dispensed for FY21
- Updated STI treatment order sets and provided staff education to correlate with updated national guidelines
- Received P&T approval for new indication for sugammadex
- Facilitated process and protocol for continuation of home parenteral nutrition for pediatric patients
- Implemented workflow, order set and ED staff education for use of tranexamic acid for pediatric trauma patients with significant hemorrhage
- Increased pharmacist-led nursing and provider education via formal in-services and HAZMAT/HERT re-cert lectures to nurses, PAs, providers, and EM physician residents
- Continued involvement in adult and pediatric pharmacist code training classes
- Implemented quarterly AES Pharmacy Newsletter for providers, nurses, and other clinical staff
- Precepted 26 learners for 37 rotations throughout the year
- Completed ASHP accreditation survey and granted 8-year accreditation for PGY-2 EM Pharmacy Residency Program
- Successfully graduated second PGY-2 EM resident and matched third PGY-2 EM resident for the 2021–2022 year

Pain Management and Palliative Care

Managing pain safely and effectively

The pain management and palliative care team provides inpatient and ambulatory care clinical pharmacist specialist services for the palliative care services and clinics, inpatient adult acute pain service, opioid stewardship, and the addiction consult team. The team is made up of two clinical pharmacy specialists whose main responsibilities include providing clinical expertise to their respective consult services and clinics, addressing institutional change in the area of practice through active participation in more than 14 institutional and College of Pharmacy committees, precepting students and residents, multidisciplinary education, and participation in institution-wide initiatives in these specialty areas of practice.

From Left to Right: Robert Viviano, RN; Austin Sargent, MD; Jillian DiClemente, PharmD; Veronica del Calvo, MD; Mike Tobar, DO; Marcus Harris, MD; Doug Baughman, MD; Doug Anderson, MD

FY21 Highlights:

- Expanded to support the new addiction consult team and the symptom management clinic
- Achieved accreditation for the PGY-2 Pain Management and Palliative Care Residency Program
- Proposed and chaired the Pain and Opioid Stewardship Subcommittee with the aim of improving the safe and effective use of opioids and other analgesic medications
- Core member and metrics team lead for Rewrite the Script, an institutional initiative aimed at addressing pain management and opioid use disorder within the health system
- Developed the opioid stewardship clinical dashboard for the tracking, monitoring, and evaluating of patients experiencing pain across the health system
- Helped in the revision or optimization of several pain- and palliative-related policies and guidelines including the PCA therapy management guideline, low-dose lidocaine infusion guideline, methadone therapy guideline, and low-dose ketamine infusion for pain guideline
- Mentored and/or precepted 16 student and 33 resident experiences
- Had 13 publications, three scientific presentations, five CE presentations, one expert panel presentation, and more than $100,000 in grant funding
- Our PGY-2 resident achieved the SMSHP CE Excellence Award, the Pain/Palliative PRN of ACCP Travel Award and the James G. Stevenson Pharmacy Excellence Residency Award in addition to being chief resident
- Recruited the 3rd PGY-2 for the PPC residency program, started a new fellowship in pain research and started a non-traditional PGY-2 residency in pain management and palliative care

1,000+
Consults

570+
Epidurals

1,100+
Regional interventions

- Chair the Research Committee of SPPCP
- Member of the NCCN Adult Cancer Pain Guideline Panel
- Role Delineation Study panelist for the Board of Pharmacy Specialties to evaluate certification for pain management
- Team members on the Michigan Opioid Prescribing Engagement Network to address postoperative and acute care opioid prescribing across the State of Michigan

Pharmacy Analytics, Quality, Regulatory, & Safety

Jacob Holler, PharmD, MS, Director of Pharmacy Quality, Regulatory, Safety, and Analytics

Improving care, protecting patients

Pharmacy Analytics, Quality, Regulatory, & Safety (PQRS) represents four pillar concepts integrated within five teams in this distinct branch of the department. The following five teams provide services under these pillars to support Michigan Medicine and pharmacy services as detailed in the summaries below and pages that follow:

- Pharmacy Analytics
- Compounding Compliance
- Diversion Prevention
- Medication Quality & Safety
- Medication Use Policy

Pharmacy analytics is inclusive of the data, tools, and methods used to help us to better understand our work and its impact on patients. Primary tools include project management, business intelligence software, and data visualizations. Major analytics domains for the work include: workload and productivity assessment, drug costs and utilization tracking, clinical outcomes, diversion detection, and safety monitoring.

Quality improvement efforts help us continually improve the care we provide our patients and the services we provide for our customers. This is achieved via area-specific quality improvement projects, continual departmental metric and performance improvement monitoring, medication use evaluations, Pharmacy and Therapeutic Committee activities, and a commitment to becoming a high reliability organization.

Regulatory compliance is an integral part of quality. PQRS teams continually provide guidance to the department and organization regarding regulatory standards and best practices, education of staff about how to best meet these standards, devising detailed policies and standard operating procedures, and perform audits to continually assess our performance relative to standards and best practices to ensure a state of continual readiness and compliance.

Safety is achieved by working in an interdisciplinary manner to optimize the safe and effective use of medications in the health system. This work is spearheaded by our Medication Safety, Pediatric Medication Safety, and P&T committees. Our team has interest in working with other health care professionals to expand our presence in pediatrics and ambulatory care and in developing technologic solutions to prevent medication events using active surveillance, machine learning, and predictive analytics.

Pharmacy Analytics

The analytics team helps pharmacy and Michigan Medicine make decisions based on drug-related data and analytics. The team's primary focus is to extract pharmacy and drug-related data from MiChart and other sources to build an infrastructure in Pharmacy Datawarehouse and visualize the data via Tableau Dashboards to optimize drug use, waste, and Rx operations. We are committed to quality and excellence in data analytics and visualization for patient care, education, and research.

FY21 Highlights:

The analytics team completed nine high priority emergency projects to support Michigan Medicine including COVID-19 vaccine supply and distribution. The team completed or made significant progress in over 10 projects to build a robust and enhanced infrastructure for reporting and analytics. Most notable are:

- Built infrastructure and dashboard to visualize the COVID-19 vaccine capacity day by day for scheduled and predict additional appointments while ensuring supply of second doses for individuals
- Established the infrastructure for the calculation of drug usage for continuous infusions and provided pain and opioid stewardship morphine milligram equivalents calculations in MiChart
- Built a B2 Central Pharmacy Pyxis Logistics Protamine Inventory Tracker
- Developed a new hospital report for reporting monoclonal antibody treatment of COVID-19 patients to MDHHS
- Developed a pilot utilization of protamine in Centricity
- Built a CVCICU MPLAN dashboard showing fiscal years average monthly COST and current FY COST trend for five high-cost medications in CVICU MPLAN
- Undertook validation of the workload model by CHEPS
- Improve, enhance, and streamline all Clarity reports using informatica to build and populate the NEW Pharmacy Datawarehouse
- Built a BD Proxy Server for Logistics to capture all BD data to model drug flow in the hospital for the purpose of medication use, cost, and wastage
- Wrote and configured a EDI 810 file parser to transform invoice data feeds from ABC, and create an automated data pipeline to the NEW Pharmacy Datawarehouse
- Revised doses dispensed feed from Clarity to include label counts to improve workload calculations for technicians and pharmacists
- Built a new clean room dashboard for tracking patient-specific and non-specific doses

The current team through June 30, 2021 (from top Left to Right): Tom Mobley BI Analyst Sr., Seema Jetli Sr. Project Manager, Scott Ciarkowski Interim Manager, Todd Benner HITS and Karl Renius, Pharmacist Specialist Analytics

In March 2021, we bid goodbye to our leader Dr. Bruce Chaffee, who retired after over 30 years of service and was instrumental in forming the pharmacy analytics team

9
High priority emergency projects completed

Made significant progress in over

projects

Pharmacy Analytics, Quality, Regulatory, & Safety

Projects

The following projects had significant progress made in FY21 and are expected to be implemented in FY22:

- Led USP 800 implementation efforts, which were suspended in September 2020 due to COVID-19-related supply shortages and are anticipated to resume in late FY22
- Developed non-sterile compounder eLearning education
- Developed a biological safety hazard classification and safe handling policy
- Developed a radio pharmaceutical preparation policy compliant with USP 825

CCT Pharmacists (David Melton, Scott Blackburn, Jamie Tharp, and Carrie Penzien) gather after the TJC Compounding Recertification

CCT Technicians (Joey Jessing, Craig Rurka, Cheyanne Ward, and Shanna Kaczynski) gather during BD IV Prep Go-Live in the Training center

BD IV Prep equipment samples evaluated as part of the project planning process

COVID-19 sample transport media prepared by the CCT during the early months of the pandemic

Compounding Compliance

The compounding compliance team's (CCT) primary focus is to ensure regulatory compliance with compounding and hazardous drug safe handling standards. The CCT's primary mechanism to ensure ongoing regulatory readiness includes:

- Compounder education and competency assessment through New Employee Aseptic Technique (NEAT) training during department orientation and ongoing annual media fill assessments;
- Compounding facilities monitoring through routine and ad hoc viable air and surface sampling, certification of primary and secondary engineering controls, and evaluation of continuous systems monitoring trends;
- Developing and maintaining policies, procedures, and job aids;
- Monitoring compliance of policies and standards through monthly onsite audits of all compounding locations and review of cleaning logs and compounding records.

FY21 Highlights:

- Led TJC Medication Compounding Certification efforts that resulted in program recertification in May 2021 for 18 compounding locations across Michigan Medicine (MM)
- Integrated BD IV Prep IV workflow technology into CCT new employee orientation and assisted in the departmental technology hardware evaluation
- Supported compounding operations throughout the COVID-19 pandemic by evaluating and coordinating compounding and hazardous drug PPE, supply-related shortage planning, and including compounding of COVID-19 test transport media
- Revised sterile compounder education to convert 15 hours of CEU into four hours of focused learning
- Transitioned compounding audits from an informal Qualtrics survey to Verge Rounding, the MM quality assurance platform improving findings resolution tracking and reporting
- Supported and led the Compounding Compliance Oversight and Hazardous Drug Oversight Committees
- Precepted four PharmD Students on a Compounding Compliance Drug Information APPE and supported the Pharmacy Institutional and CVC Inpatient APPEs

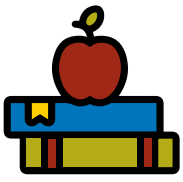
Diversion Prevention

The diversion prevention team (DPT) aims to prevent, detect, and respond to drug diversion. Prevention efforts are centered around education, audits, and regulatory compliance adherence. The DPT detects diversion using data analytics and internal reporting, including staff reporting and responds to all actual and suspected diversion, while also leading the interview and investigation. The DPT works daily to monitor data analytics and identify trends requiring follow up, assist with controlled substance (CS) reconciliation, and manage discrepancies for the departments of pharmacy, anesthesia, and nursing. The DPT is responsible for all Drug Enforcement Administration (DEA) required reporting and leads efforts of our multidisciplinary Controlled Substance Safety and Compliance Operations Team.

FY21 Highlights:

- Assisted with COVID-19-related changes to controlled substance management, notably resulting in significant process improvement in nursing CS reconciliation
- Revised and updated the Drug Free Workplace M-learning to include a new “Speak Up, Save A Life” video
- Completed 1,154 reviews of individuals’ practice and engaged in diversion algorithm testing that resulted in more reviews performed
- Completed a gap analysis and FMEA of the CW10 pharmacy and the B2 central pharmacy CS vault
- Developed a beta version of analytics to monitor for diversion in anesthesia staff
- Performed 53 education in-services and awareness events
- Filed 3 DEA form 106 reports — notices of theft or loss
- Developed several reports to help manage CS chain of custody tracking in pharmacy areas
- Precepted students in health system IPPE rotations
- Performed formal evaluation of commercial diversion detection systems against internally created analytics
- Shared program knowledge nationally

1,154
Reviews completed



53
Education in-services and awareness events

Pharmacy Analytics, Quality, Regulatory, & Safety

319
Inspections completed

Medication Management, Quality, & Safety

MEDICATION MANAGEMENT

The medication management team consists of Karrie Sokolowski and Matt Zedro. The team's main responsibilities include auditing ambulatory care clinics every six months and responsible for the Department of Pharmacy policies, regulatory readiness, education, and coordination with ambulatory care leaders and pharmacy. The team is also responsible for responding to all queries regarding medication management from the accreditation team, subject matter experts, and leaders across Michigan Medicine.

FY21 Highlights:

- Completed 319 inspections at 167 different ambulatory clinics
- Identified 372 findings in ambulatory care and 278 on inpatient units through inspections
- Identified and assisted with 46 departmental policy reviews to ensure regulatory compliance
- In-serviced new pharmacy staff on regulatory readiness and department policies
- Partnered with UMMG leadership to develop a workgroup and approval process for Ambulatory Care Nursing Protocols
- Completed proactive risk assessment for CMS compliance for new Hospital Care at Home Program
- Cross trained to increase medication safety outreach in Ambulatory Care
- Represented pharmacy on related committees such as Accreditation and Regulatory Readiness Committee (ARRC) and Inter-Professional Policy Committee (IPPC)
- In-serviced nursing leadership in Ambulatory Care on controlled substance handling and auditing expectations

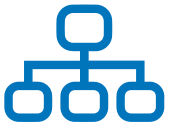
QUALITY

Scott Ciarkowski coordinates quality improvement projects across the department, leads the quality committee, and serves as the pharmacy representative on the Quality Council. Quality focus is on analyzing and improving outcomes, optimizing clinical processes and operations, supporting regulatory readiness, and supporting educational platforms for quality, PI, and safety.

FY21 Highlights:

- Implemented the Daily Management System (DMS) in UH B2 and CW10 pharmacies
- Pharmacy representation in Quality Month highlighted in the following posters:
  - Time saved: Reducing Ambulatory Infusion Patient Wait Times
  - Cost saved: Outmigration of R-EPOCH Chemotherapy, Impact of Aortic Dissection Management Protocol, and Outpatient Induction for Acute Leukemia
  - Decreased in number of steps: Bolus Administration of Comfort Medication in PICU
  - Revenue generated: Proactive Patient Outreach Initiatives during COVID-19
  - Costs avoided: Chemotherapy Remote Care Monitoring
  - Customer/staff satisfaction: UMMG Blood Pressure & A1C Drive-Through Chronic Disease Management during COVID
  - Increased preventive behaviors: Med Management in Ambulatory Clinics and Pressure Injury Prevention in the CVICU
  - Decreased incident & prevalence: C Diff stewardship and Reducing Postop AFib
- Organizational design improvements:
  - IV concentration standardization in C&W
  - Implementation of Dispense Prep in C&W
  - Implementation of Pharmacist Oncology Symptom Management
  - Implementation of Insulin Infusion Calculator
  - Implementation of CancelRx to Reduce Dispensing Discontinued High Risk Medication
  - Reduce tablet splitting by optimizing inventory in Pyxis
  - Antimicrobial Stewardship Team Review of Real-time alerts for Multi-drug Resistant Infections
  - Quality enhancement, services: ICU handbook and Dexmedetomidine protocol
  - Quality enhancement, systems: Improving Transition of Care
  - Quality metrics developed for the Economic Recovery Plan (ERP)

8
Quality Month posters



Implemented 7 organizational design improvements

Pharmacy Analytics, Quality, Regulatory, & Safety

MEDICATION SAFETY

The medication safety team consists of Christina Seeley, Jeff Hurren (MSO), and Scott Ciarkowski. The team's responsibilities include reviewing medication events, safety improvement initiatives, medication use system surveillance, common cause analysis, failure mode effects analysis, root cause analysis for significant medication events, and gap resolution identified through review of best practices and self-assessments.

FY21 Highlights:

- Conducted medication-use evaluations for DigiFab, epinephrine, phenylephrine, promethazine, hypersensitivity protocol, methadone
- Root cause analysis for alteplase, ketamine, enalapril, clopidogrel, levothyroxine, dexmedetomidine, sodium chloride
- Failure modes effects analysis for U-500 concentrated insulin, BD IV Prep
- Review of medication-related safety events (voluntarily reported)
  - Medication-related events are the #3 event type reported within Michigan Medicine
  - 5,285 voluntary reported medication-related events reported in 2020 (~14 per day)
  - 44% of reported incidents occurred prior to reaching the patient
  - Events with patient harm represent ~10% of reports
- Training staff for HRO tools & techniques: Near-universal completion
- Technology enhancements:
  - Implementation of Dispense Tracking in UH/CW
  - Dispense Prep implemented in CW
  - Pediatric Alaris bolus-from-pump implemented
  - BD IV Prep preparation & rollout began:
    - IV Compounding Workflow System
    - Incorporates camera, barcoding, gravimetrics to improve safety
- Medication Safety Rounds implemented
- ISMP Targeted Best Practices for 2020-2021
  - 16 focus areas recommended for action
  - Work to minimize/close gaps
- Assisted with education of 16 trainees (students & residents)

Medication Use Policy

The medication use policy (MUP) team's primary focus is to promote the safe and effective use of medications within the health system. The team's main responsibilities include supporting the Pharmacy and Therapeutics (P&T) Committee, optimizing medication use, and providing drug information services. Services include formulary management, medication use evaluations, development and revision of medication use policies/guidelines, and participation in P&T Subcommittees. The MUP team also serves as a primary experiential training site for P4 pharmacy students and PGY-1 pharmacy residents.

FY21 Highlights:

- Facilitated 12 P&T Meetings
- Supported 15 P&T Subcommittees
- Assisted with COVID-19 related EUA approvals, guidelines/protocols, and vaccine distribution plans
- Published 12 editions of the Pharmacy For U-M newsletter
- Completed nine drug class reviews
- $2.26 million in estimated net cost savings and cost avoidance through the Product Vendor and Selection Committee
- Created a streamlined biosimilar review process
- Implemented a review process for formulary additions that were FDA-approved through an accelerated pathway
- Performed REMS audit and gap analysis

From Left to Right: Julie Berman, Karin Durant, Noah Leja, Erin Helmkamp, Gundy Sweet, Kirsten Smith, Natalya Salganik (missing: Paul Walker)

- Completed review of all therapeutic interchange drug classes
- Precepted 16 PGY-1 pharmacy residents on a medication use policy rotation
- Precepted 15 PharmD candidates on a drug information APPE rotation

Research Pharmacy

240
New studies opened

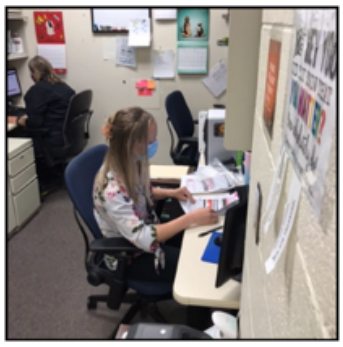
621
Studies maintained

19
Team members

A portion of the Research Pharmacy Team

Senior Intern Kimmy Bottenberg trains Junior Intern Sarah Leonard on dispensing oral prescriptions

Pharmacist Patty Wong and PGY-1 Resident Caitlyn Young review a prescription for verification



Junior Intern Sara Busam prepares a kit to be sent to the Cancer Center while Melissa Goetting-Saul manages inventory

Ensuring safe and efficient clinical trials

The research pharmacy's (RP) primary aim is to ensure that clinical trials with medication at Michigan Medicine are conducted safely, efficiently, and appropriately. RP will only manage protocols which have the approval of the Medical School Institutional Review Board (IRB). Because of this, the RP is actively involved with the IRB by reviewing protocols for approval and ongoing review of current protocols. Further, the RP is active in ensuring compliance with federal law, study sponsor protocols, the Joint Commission regulations, and Michigan Medicine institutional and Department of Pharmacy policies in all RP activities.

The RP is responsible for all pharmacy activities related to each research protocol that it oversees, including — but not limited to — procurement, storage, handling, labeling, dispensing, and disposal of investigational medications. Additionally, the RP's pharmacists develop protocol-specific dispensing guidelines that summarize these activities which ensure that all RP and satellite pharmacy staff are properly trained in proper dispensing and handling of each investigational medication in compliance with the study protocol and all regulations and policies. RP staff is responsible for maintaining proper documentation, inventory accountability, and oversight for all RP-managed protocols.

FY21 Highlights:

- Dispensed or supported dispensing of more than 11,500 investigational drug doses, with 750+ shipments of IP sent to patients
- Provided pharmacy reviews of 249 new clinical trials and nearly 1,400 amendments for Michigan Medicine IRB
- Expanded support for COVID-19 research through support for therapeutic and vaccine studies
- Received full ASHP accreditation for PGY-1/2 Investigational Drugs and Research Pharmacy Residency, graduating our PGY-2 resident
- Awarded an NCI Grant related to improving EHR implementation of cancer clinical trials

Antimicrobial Stewardship Program

Promoting Appropriate Treatments

Most patients admitted to Michigan Medicine receive an antibiotic, and the antimicrobial stewardship program (ASP) helps develop tools, guidelines, and education to promote appropriate therapy. The stewardship program participates and leads collaborations across the healthcare system to optimize patient outcomes. Efforts have helped optimize metrics and increase hospital revenue or reimbursement. Targeted initiatives have resulted in significant improvements in mortality, length of hospitalization, or readmission.

In 2020, significant time and resources were spent coordinating COVID-19 treatment and prevention efforts across the health care system. New quality improvement projects deferred for implementation in 2020 are planned for implementation in 2021 including penicillin skin testing, pneumonia initiative, and diagnostic stewardship practices.

Led QI work for the MiCOVID-19 collaborative

~40
Michigan Hospitals

FY21 Highlights:

Quality Improvement Initiatives

- Six infection-related metrics linked to hospital reimbursement, which the ASP helps optimize
- 19 committees and workgroups focused on QI, which require ASP collaboration
- Seven initiatives where ASP has directly reduced mortality, length of hospitalization, readmission or ADEs
- Two initiatives significantly reduced drug-drug interactions

19
Committees & workgroups focused on QI

Coordination of COVID-19 Treatment

- Developed inpatient and outpatient antiviral and anti-inflammatory treatment recommendations for COVID-19
- Coordinated involvement in randomized clinical trials
- Provided oversight and education to ensure compliance with COVID-19 guidelines
- Reduced empiric antibiotic use between first and second COVID-19 waves:
  - ICU and non-ICU: 45.1% vs. 32.8%
  - Non-ICU: 37.4% vs. 20.9%
- Led QI work for the MiCOVID-19 collaborative (~40 hospitals in Michigan) and reduced unnecessary early empiric antibiotic use from 53% to 33% in non-critically ill patients hospitalized with COVID-19
- Managed COVID-19 monoclonal antibody therapy
- Analyzed data to evaluate efficacy of antiviral and anti-inflammatory treatments

Pediatric ICU Handshake Stewardship

- Three days per week of multidisciplinary rounds with pharmacy, pediatric ID, and pediatric ICU teams to improve antibiotic prescribing

Ambulatory Urinary Tract Infection Initiative

- Reduced historical percentage of inappropriate prescribing for all UTIs in outpatient clinics from 23% to 7-9% after implementing prescriber-level Tableau dashboards, SmartSets and Expresslanes, and general education

Antimicrobial Stewardship Website

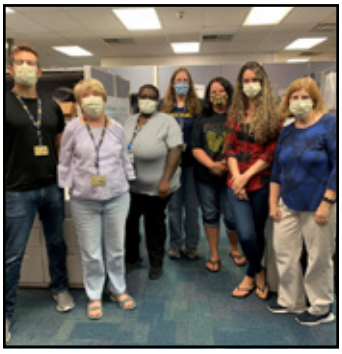
- 97,000+ views of guidelines and resources
- 145 countries accessed the website

HomeMed

94.7%
SHP patient satisfaction score

3,200+
Active patients per month

Foreground Katie Sandison, Middle Tina Glover (both pharmacists), Background Kyle Warnke (Pharmacy Technician) performing final checks on compounded patient orders



Pharmacists, Nurse, Technician Team Staff From Left to Right: Matt Gebarski (RPh), Anne Perez (RN), Krys Brandon (Technician), Pam Blevins (Reception), Tori McKinney (Technician), Danielle Kinkead (Technician), Sue Bickley (RPh)

Inventory Distribution Staff From Left to Right: Andre Brown (HCST), David Bogan (HCST), Andea Mino (Technician), Todd Arnold (Inventory Tech Specialist), Abel Gonzalez (HCST), Tom Kominek (HCST)

Home Infusion & Specialty Pharmacy

HomeMed Infusion & Specialty Pharmacy operates under the license and scope of a pharmacy in Michigan, Ohio, Indiana and Florida purposed with providing mission-driven clinical care to Michigan Medicine patients traversing the continuum of inpatient and outpatient U-M Health treatment locations. HomeMed is uniquely positioned to facilitate shortened inpatient stays and also prolong or extend outpatient stays while avoiding emergent and urgent care admissions, all the while maintaining Michigan Medicine care and revenue streams.

HomeMed is both Joint Commission and URAC-accredited and is regulated by the Center for Medicare and Medicaid Services for the provision of traditional/specialty pharmacy infusion and enteral nutrition services. The department provides clinical care management and oversight to all patients (more than 3,200 active patients per month) on its service and provides 24/7/365 support to patients and caregivers.

FY21 Highlights:

- July 2020 received Full URAC Specialty Accreditation
- Active membership in National Home Infusion Association and National Association of Specialty Pharmacy
- December 2020 Security Assessment completed
- TJC Sterile Compounding Certification with no findings upon survey
- TJC Best Practice Accolades for hand hygiene program and contract management
- Audit Compliance with Payer Supplier Requirements (no findings)
- Uninterrupted service provision throughout all months of the COVID-19 pandemic
- SHP Patient Satisfaction Score of 94.7%
- CLABSI rate below benchmark @ 0.181
- Adverse drug event rate below benchmark @ 0.45 (per 1,000 prescriptions filled)
- Medication error rate below benchmark @0.18 (per 1,000 prescriptions filled)
- Pharmacist productivity above benchmark
- Staff-authored department DEI mission statement
- Provided anti-racism and civility education for staff
- Onboarding of additional contracted nursing agencies to expand geographic reach of HomeMed-managed home infusion services in Michigan
- Reduced overtime by > 50% year over year
- Successfully exceeded financial margin target(s)

Medication Use Informatics and Technology

Facilitating safe, effective, and efficient medication use

Michigan Medicine's medication use informatics & technology (MUIT) teams are responsible for supporting enterprise informatics and health information technology, with the aim of facilitating the provision of safe, effective, and efficient medication use. The MUIT team resides within the HITS Clinical Revenue Cycle Division of Michigan Medicine.

In addition to implementation and support activities, these teams are actively involved in the education of pharmacy informatics professionals through the PGY-2 Pharmacy Informatics program and precepting of an informatics intern, pharmacy residents, and students on rotation from the U-M College of Pharmacy. The team provides pharmacy systems and MiChart support 24 hours per day, 7 days per week, 365 days a year.

FY21 Highlights:

- Completed over 4,800 requests
- Upgrade of Pyxis Logistics (PLX) to version 1.2.6
- Installation of SQL-always on configuration for PLX to give access to real-time data for pharmacy analytics
- Installation of BD Pyxis IV Prep at West Ann Arbor, Brighton, Northville, Cancer Center infusion sites, and the training center
- Hundreds of medication ERX revisions for IV prep
- Electronic Prescription of Controlled Substances grant/ revoke processes
- Fall 2020 and Spring 2021 MiChart upgrades
- Signing of BD Pyxis Limited Commercial Release agreement
- QS-1 quarterly upgrades
- Support for COVID vaccination workflows
- Identification of data integrity issue in Surescripts (SS) medication history data leading to changes that affected the entire SS network

Providing MiChart support

4,800+
Requests completed

Pharmacy Education & Professional Development

Our commitment to education

Education is a core part of the missions of Michigan Medicine and the University of Michigan, and the Department of Pharmacy Services has a strong commitment to education. Three key areas where we support education include our Pharmacy Residency Programs, pharmacy student experiential education, and Pharmacy Internship Program. Our team includes four dedicated professionals who are committed to providing the best possible experiences for our team members, new employees, and learners.

Education & Professional Development Team:

Kate Starosta, PharmD, BCPS
Pharmacy Residency Manager

Chadi Abbas, CPhT
Pharmacy Technician
Recruiter & Trainer

Kaitlin Baisden, PharmD
Education & Professional Development
Coordinator - Pediatric Practice

Carolyn Richards, PharmD
Education & Professional Development
Coordinator - Adult Practice

Pharmacy Residency Programs

Our Pharmacy Residency Programs strive to provide residents with excellent training and educational experiences to develop practice, teaching, and research skills, and to nurture the pursuit of professionalism, personal excellence, and leadership in the field of pharmacy. Postgraduate pharmacy training is a deep part of our department's history, in collaboration with the U-M College of Pharmacy. The University of Michigan Department of Pharmacy Services established the first pharmacy residency program in 1927 (at that time called a postgraduate internship) under the leadership of Harvey A.K. Whitney (one of the founders and the first president of the American Society of Health-System Pharmacists (ASHP). Our residency program was also among the first accredited pharmacy residency training programs in the nation.

Currently, we have 17 pharmacy residency programs plus a leadership fellowship, with 34 pharmacy residents and 1-2 fellows. All residency programs are accredited by ASHP.

Pharmacy Residency Class of 2021

FY21 Highlights:

- Received full eight-year accreditation for three new pharmacy residency programs: PGY-2 Emergency Medicine, PGY-2 Pain Management and Palliative Care, and PGY-1 Pharmacy/ PGY-2 Investigational Drugs and Research Pharmacy
- Several residents won national committee awards:
  - Dr. Megan Klatt (PGY-2 ID) won the SIDP Trainee Award
  - Dr. Autumn Walkerly (PGY-2 Psych) won the CPNP Research Award
  - Dr. Madison Irwin (PGY-2 Pain/Palliative) won the ACCP research travel award and SMSHP Exemplary Resident CE Award
  - Dr. Andrew Smith (PGY-2 IDRP) won the SMSHP Exemplary Resident CE Award
  - Dr. Jola Mehmeti (class of '20) was selected for Top Abstract at NORD Rare Diseases for her work on expanded access
- The PGY-1 Pharmacy Residency Program added two residents, bringing the total to 12 residents, with Dr. John Clark serving as residency program director (RPD)
- The Residency Advisory Committee (RAC) appointed two new RPDs: Dr. Karl Renius for PGY-2 Informatics and Dr. Bernie Marini for PGY-2 Oncology
- RAC completed a 100% virtual recruitment season hosting three Michigan virtual showcases for more than 300 candidates and over 150 virtual interviews
- RAC began a longitudinal Resident Wellness program aimed at building resiliency and providing dedicated time for wellness activities under the direction of faculty Dr. Amy VandenBerg

34
Pharmacy residents

340+
Resident rotations precepted

Pharmacy residency programs

- Our preceptors continue to shine as the number one reason residents want to train and stay here — they precepted over 340 resident rotations and 68 projects
- Residents published close to 30 articles this year under the direction of our preceptors

Pharmacy Education & Professional Development

350
APPE rotations

83
P-3 IPPE rotations

84
P-2 IPPE rotations

Pharmacy Student Experiential Education

Experiential education is an essential part of the doctor of pharmacy curriculum, and an important part of our department's support of the education mission. Our preceptors are dedicated professionals and educators who provide exceptional learning opportunities for pharmacy students. We offer a substantial number of both Advanced Pharmacy Practice Experiences (APPEs) for P-4 students, as well as Introductory Pharmacy Practice Experiences (IPPEs) for P-3 and P-2 students at the U-M College of Pharmacy. Our APPE and IPPE rotations include learning opportunities in the following categories/practice settings:

APPE Rotations

- Health system pharmacy practice
- Inpatient general medicine/general surgery (generalist) practice
- Inpatient specialty practice areas (e.g., critical care, infectious diseases, pediatrics, cardiology, etc.)
- Ambulatory care practice
- Community pharmacy practice
- Management/leadership practice
- Highly specialized practice areas (e.g., research pharmacy/ investigational drug service, pharmacy informatics, home infusion, etc.)

IPPE Rotations

- P-3 Students: Health-system pharmacy practice and direct patient care
- P-2 Students: Community pharmacy practice and ambulatory care practice

FY21 Highlights:

This past year, our team again provided a significant number of experiential rotations for pharmacy students across the entire health system, including both inpatient and ambulatory care practice sites:

APPE Rotations

- 350 individual rotations led by 114 preceptors
- Average of three student rotations per preceptor

IPPE Rotations

P-3 IPPE Rotations

- 83 individual rotations led by 24 preceptors
- 54 direct patient care rotations, 29 health system/hospital practice rotations
- Average of more than three student rotations per preceptor

P-2 IPPE Rotations

- 84 individual rotations led by 20 preceptors
- 76 ambulatory care rotations and eight community pharmacy practice rotations
- Average of more than four student rotations per preceptor

This contribution of APPE rotations represents approximately half of all of the APPE rotation spots for P-4 students at the U-M College of Pharmacy, and a significant number of the IPPE rotations as well. Our pharmacist preceptors make a substantial contribution to pharmacy student education and have a profound impact on their future careers through IPPE and APPE rotations, classroom instruction, and formal and informal mentorship.

Pharmacy Internship Program

The Michigan Medicine Pharmacy Internship Program has existed in many forms since at least the 1970s and has trained many prominent figures both within the Department of Pharmacy Services and across the nation at numerous prestigious institutions. The program was revised in 2006 with the hiring of three pharmacy interns. Initially working as pharmacy technicians in the adult inpatient setting, the Pharmacy Internship Program slowly expanded into a two-year program and began to encompass other areas of pharmacy practice, with partial support from the U-M College of Pharmacy. As of the 2020–2021 year, the pharmacy internship has expanded to 26 positions in a variety of pharmacy practice areas across U-M Health. Pharmacy interns are essential team members who make significant contributions to our patient care efforts. They work throughout U-M Health in areas that include inpatient adult and pediatric care, central pharmacy operations and medication use systems, medication use policy, ambulatory care, oral oncology, infusion pharmacy, research pharmacy, transitions of care, and specialty pharmacy. This past year we introduced a new pharmacy intern position with the compounding compliance team.

Pharmacy interns elect two chief pharmacy interns, one from each class, who have additional leadership opportunities and responsibilities, and they represent their respective classes of interns. This past year our senior chief intern was Kirsten Smith (Med Use Policy Team) and our junior chief intern was Alexander Kim (Infusion Pharmacy Team). This upcoming year, Alex will move into the senior position and Natalya Salganik (Med Use Policy Team) will serve as the junior chief intern.

In addition to the practice sites where interns cultivate their skills, the internship has a series of professional development meetings throughout the summer, including speakers and facilitators that discuss leadership, professional development, and other topics to foster success for the Interns throughout their careers. Furthermore, interns can participate in a formal Intern Mentoring Program as well as on-the-job shadowing opportunities.

During the second summer of the internship, senior interns complete a pharmacy-related project, typically in their core area of practice. Although the pandemic required us to suspend this temporarily, some interns completed projects on their own time.

In past years, senior interns have received support to attend the ASHP Midyear Clinical Meeting and present their projects as posters, and junior interns have received support to attend the Michigan Pharmacist Association Annual Convention and Exposition. For both events, interns attended educational sessions and prepared reports that were distributed to the rest of the pharmacy management team. After suspending this due to the pandemic, we intend to resume this benefit this year. Pharmacy interns can also become involved in a variety of outreach and advocacy events, including leading hospital tours for prospective College of Pharmacy students.

The pandemic required our entire team to make sacrifices and this impacted our pharmacy internship as well. We are optimistic that this year will be a return to more “normal” times and the ability to fully resume all Pharmacy Internship Program opportunities.

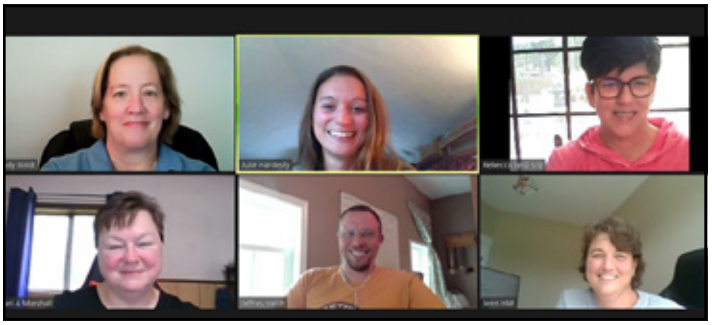
Senior Intern Projects

Previous projects have explored the following topics:

- Research Pharmacy Study Complexity
- Research Pharmacy Transition to Electronic Accountability
- Validation and Impact of an Oncology Risk Assessment Scoring Tool
- Evaluation of the Oncology Transitions of Care Pilot Program
- Outcomes of Pharmacist Interventions in Specialty Pharmacy Using Asembia1®
- Evaluation of Different Reassessment Time Frames for Specialty Medications
- Assessment of Opioid Weaning Practices in a Pediatric Cardiac ICU
- USP <797> Pharmaceutical Compounding: Sterile Preparations
- Impact of Medication Histories on Patients Admitted to the Medicine Coronary Service
- Evaluation of Cefazolin Use in Postoperative Pediatric Cardiac Patients During Drug Shortage
- MiChart (Epic®) Dispense Tracking
- Impact of Bedside Discharge Medication Counseling on Hospital Readmission Rates

Administration

$710M
Gross pharmacy supply expenses



Top Row Left to Right: Judy Boldt – Executive Assistant, Julie Hardesty – Financial Manager, Rebecca Sitz – Administrative Assistant Bottom Row: Cari Marshall – Administrative Specialist, Jeff Heldt – Financial Specialist, and Jenn Holtzhouse-Maynard – Financial Analyst

Top Row Left to Right: Gail Garrett, Janine Lee (Supervisor), Angela Mullins
Bottom row: Amber Barbee, Brian Armbrustmacher

Helping Pharmacy Run Smoothly

The Department of Pharmacy administration has four teams that act behind the scenes to help the folks that are on the frontlines take care of patients daily. Our teams include: finance and administration, purchasing, 340b, and billing. We take great pride in our work and the difference it makes for not only our department, but also for Michigan Medicine. Below is a summary of each team's contributions from the past year:

Finance & Administration

The pharmacy finance and administration team runs the day-to-day operations related to the financial oversight and reporting, human resources transactions, and reporting and administrative functions for the Department of Pharmacy Services. This past FY21 was a year of change for the team. Most moved to working in a fully remote environment, while a few members are using a hybrid work model, where they work from home most of the week and go into the office when needed. This has allowed flexibility and efficiency in the work that is performed. The team also welcomed one additional finance staff member.

FY21 Highlights:

- Vouchered expense totals: $710M gross pharmacy supply expense
- Added an additional finance staff member
- Successfully transitioned the team to working remotely

B2 Purchasing Team

The B2 pharmacy buyers are responsible for procuring all medications that are administered within our health system, including inpatient areas, infusion centers, operating rooms, and clinics. The team orders as many as 500 different line items per day from 50 different distributors up to six days per week. They also assist with management of the B2 pharmacy inventory database, optimization of the B2 pharmacy inventory, investigation and mitigation of 200+ active drug shortages at a time, and return of damaged or unusable medications to manufacturers for credits totaling more than $100,000 annually. FY21 was an exceptionally challenging year for the purchasing team, who had to ensure that we had enough medications on hand to cover anticipated COVID-19 surges and manage the inventory and ordering of many new therapies and vaccines, all while continuing with normal daily functions. Thanks to the team's perseverance, the hospital never ran out of essential medications during the pandemic!

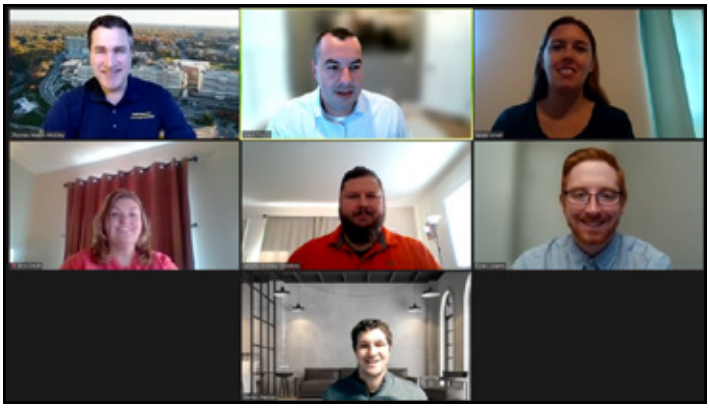
The 340b Team

The 340b drug team ensures Michigan Medicine maintains 340b program regulatory compliance and integrity, while optimizing medication discount capture and margin enhancement through contract pharmacies. The 340b program enables health care organizations to stretch scarce federal resources as far as possible, reaching more eligible patients and providing more comprehensive services.

For FY22, the team plans to improve the 340b program through a comprehensive review of the overall system logic, increased targeted sampling of our self-audit program, purchasing efficiency, and collaboration with external/internal partners on projects to enhance overall program compliance and medication savings.

FY21 Highlights:

- Successful completion of FY20 Mock HRSA Audit
- 340b qualification process improvements led to a 30% reduction in manual reviews
- Enhanced 340b qualification logic to meet HRSA requirements
- Doubled monthly audit selections and expanded review methodology to ensure 340b program compliance
- Assisted Metro Health with 340b optimization
- Our preceptors continue to shine as the number one reason residents want to train and stay here — they precepted over 340 resident rotations and 68 projects
- Residents published close to 30 articles this year under the direction of our preceptors



Top to bottom, Left to Right: Tom Mobley, Mark Thorn, Sarah Ismail, Erin Smith, Jeremy Dornbos Dylan Adam, Steven Warner

576
Contract pharmacy locations

269K
Retail pharmacies evaluated

2.4M+
Outpatient Administrations evaluated

Monitor 12 work queues

Audit responses

Billing

The pharmacy billing team is responsible for maintaining compliance with all insurance and state/federal prescription billing requirements. We are also responsible for ensuring charges are entered accurately in EPIC. We do this in several ways: by entering charges sent from outpatient pharmacies that need to be billed to the medical insurance, by reviewing certain charges for accuracy, and by reviewing claims that do not have the proper charge attached. We monitor 12 work queues, clearing an average $2.3 million per day. We coordinate our efforts with team members from other pharmacy departments, compliance, revenue cycle, and clinical areas throughout Michigan Medicine to maximize revenue capture.

FY21 Highlights:

- Responded to 237 audits from pharmacy benefit managers, with claims totaling $12.4 million
- Audited claims for compliance with state of Michigan and Michigan Medicine polices
- Updated workflows with internal partners to enhance revenue capture and create efficiencies

Publications

2020

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