



**Office of Clinical Research  
First Friday**

**The Training and Roles of  
Infectious Disease  
Pharmacists**

**Friday, May 6<sup>th</sup>, 2022**

**next  
lives  
here**



## **Learning Objectives:**

- 1) Outline the potential roles of an Infectious Disease (ID) Pharmacist**
- 2) Define outpatient parenteral antimicrobial therapy (OPAT) and healthcare system antimicrobial stewardship programs (ASPs)**
- 3) Describe the role of a pharmacist in clinical research**

## **Target Audience:**

**Clinical Research Professionals (CRPs) at UC/H and Cincinnati Children's Hospital Medical Center (CCHMC): including Principal Investigators (PIs), Research Nurses (RNs), Critical Care Unit Nurses (RNs), Pharmacy Technicians and Regulatory Specialists.**

**next  
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## **Planning Committee Members:**

- Maria Stivers, MS, CIP; Course Director – No Relevant Relationships
- Nathaniel L. Harris, BS, Course Coordinator – No Relevant Relationships
- Zachary Johnson, BS – No Relevant Relationships
- Heather Muskopf, CME Program Manager – No Relevant Relationships

## **Speaker:**

**Anna Poston-Blahnik, PharmD, BCIDP**

**Clinical Staff Pharmacist, Infectious Disease Research Clinic; UC Health**

**Vice President; Greater Cincinnati Society of Health-System Pharmacists (GCSHP)**

*No Relevant Relationships*

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# May 2022 Study of the Month #1

## Cincy BEARCAT Study

The Cincinnati Biorepository to Enhance the Acute Resuscitation of Cardiac Arrest Patients

### What

The purpose of this study is to understand why people have sudden cardiac arrest, which is an unexpected interruption of normal heart and lung function.

### Who

People of any age who experience a sudden cardiac arrest outside the hospital.

### Details

While treating this disease, 9-1-1 responders may draw a small amount of blood for study purposes. If you have any questions, contact study staff by calling 513-558-3301 or email [cincy-bearcat@uc.edu](mailto:cincy-bearcat@uc.edu).



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 **Health.**

01-22 IRB # 2021-0943

  
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# May 2022 Study of the Month #2

## Major Depression Study

### Non-Invasive Spinal Stimulation Study

#### What

The purpose of this study is to evaluate whether the use of a small electrical current applied through the skin is useful and safe in the treatment of adults diagnosed with major depression. Participation will last approximately 8 weeks and involve visits to the research center three times per week.

#### Who

Adults ages 18–55 who are currently moderately depressed for at least 1 month. Not currently on medication treatment for depression.

#### Pay

Eligible participants will be compensated up to \$250 for their time and travel.

#### Details

For more information, contact Brian or George at 513-536-0707 or visit [www.LCOH.info](http://www.LCOH.info) and fill out a pre-screen questionnaire. Located at the Lindner Center of HOPE in Mason, Ohio.



06-18 UC IRB # 2017-7424



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**UC / UC Health  
Clinical Research Orientation and Training  
(CRO&T)**

**Thursday, June 9<sup>th</sup>, 2022  
9:00 am - 3:00 pm  
Virtual presentation**

**Register [HERE](#)**

**The last day of registration is EOB  
Friday, June 3<sup>rd</sup>, 2022**

**next  
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Please reach out to Nate Harris,  
[nate.harris@uchealth.com](mailto:nate.harris@uchealth.com) for any questions

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# SOCRA CRP CERTIFICATION EXAMINATION

## Hosted by CCHMC

### Tuesday, August 9<sup>th</sup>, 2022

Please refer to the [SOCRA website](#) for more details.

CCHMC CRP will host open review sessions in July 2022 prior to the August 9<sup>th</sup>, 2022 exam date via Microsoft Teams (Dates and times TBD, link to be provided).

[Register for the examination Here](#)

For any questions or further information, please contact the CCHMC CRP Group at [CRP@cchmc.org](mailto:CRP@cchmc.org) or Nate Harris at [harrisnl@ucmail.uc.edu](mailto:harrisnl@ucmail.uc.edu)

**next  
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# EPIC UPGRADE, MAY 21<sup>st</sup>, 2022:

## A New Research Participant Banner Replaces the Beaker Icon in Storyboard for Research Patients

### Key Change for Research:

A new Research Participant banner (1) replaces the beaker notification icon in Storyboard to help identify whether a patient is associated with a research study. Additionally, if you have access to view or edit a patient's research study, you can now also see a summary (2) of their studies when you hover over the status line. FYI - Research enrollment and association workflows are not changing.

The screenshot shows the Epic patient dashboard for Ruth Arms. The left sidebar contains patient information, including a search bar, COVID-19 status (Vaccinated), and a new 'Research Participant' banner (1) with a beaker icon. The main content area shows the 'Research Snapshot' and 'Active Studies' section (2), which lists the 'FS RESEARCH STUDY - CHRONIC PAIN' with details like Principal Investigator, Status (Enrolled), Study Code (108), IRB # (108), and NCT # (132465798).

next  
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here

# Investigational Imaging Services (IIS)

## NEW: Radiology Research Needs Assessment Submission System

IIS has created a new Radiology Research Needs Assessment Online Submission System.

It is accessible through the DOR (Department of Radiology) website  
<https://med.uc.edu/depart/radiology/research/research-resources>

Or by accessing the redcap link directly.

<https://redcap.research.cchmc.org/surveys/?s=N84PR3WTF8>

**next  
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# Office of Clinical Research Lunch & Learn

**Thursday, May 19<sup>th</sup> , 2022, 12:00noon - 1:00pm  
Virtual Presentation**

## **Investigational Imaging Services (IIS)**

### **NEW: Radiology Research Needs Assessment Submission System**

In ongoing efforts to improve Clinical Research Workflows, Investigational Imaging Services (IIS) has implemented a new submission system for the assessment of your study's imaging needs. Join us for a walk through of the submission system and Q&A session over it's use.

**Abdulla Ahmed, Monene Kamm, Vivek Khandwala**

**UC COM Radiology Research Office  
UC Health Office of Clinical Research**

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Don't forget to visit The UC Office of Clinical Research site on Bearcats Landing!  
Visit Bearcats Landing by entering [my.uc.edu](https://my.uc.edu) into your web browser  
(UC login required).

**next  
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**Today's Presentation:**

# **The Training and Roles of Infectious Disease Pharmacists**

Infectious disease (ID) pharmacists are specialists in antimicrobial pharmacotherapy while often having substantial knowledge related to clinical microbiology and the management of infectious processes. The training path is unique for each pharmacist who specializes in infectious disease, and these pharmacists may use their training to work in a variety of settings such as in clinical health systems, ambulatory care, academia, or research. This presentation describes ID pharmacist training and typical practice roles from the perspective of a current ID pharmacist.

**Anna Poston-Blahnik, PharmD, BCIDP**

**Clinical Staff Pharmacist, Infectious Disease Research Clinic; UC Health**

**ResearchMatch Liaison**

**UC Office of Clinical Research**

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# The Training and Roles of Infectious Disease Pharmacists

Anna Poston-Blahnik, PharmD, BCIDP

Clinical Staff Pharmacist, Infectious Disease Research Clinic

University of Cincinnati Medical Center – UC Health

# Disclosure

No financial  
relationships to  
disclose

# Objectives

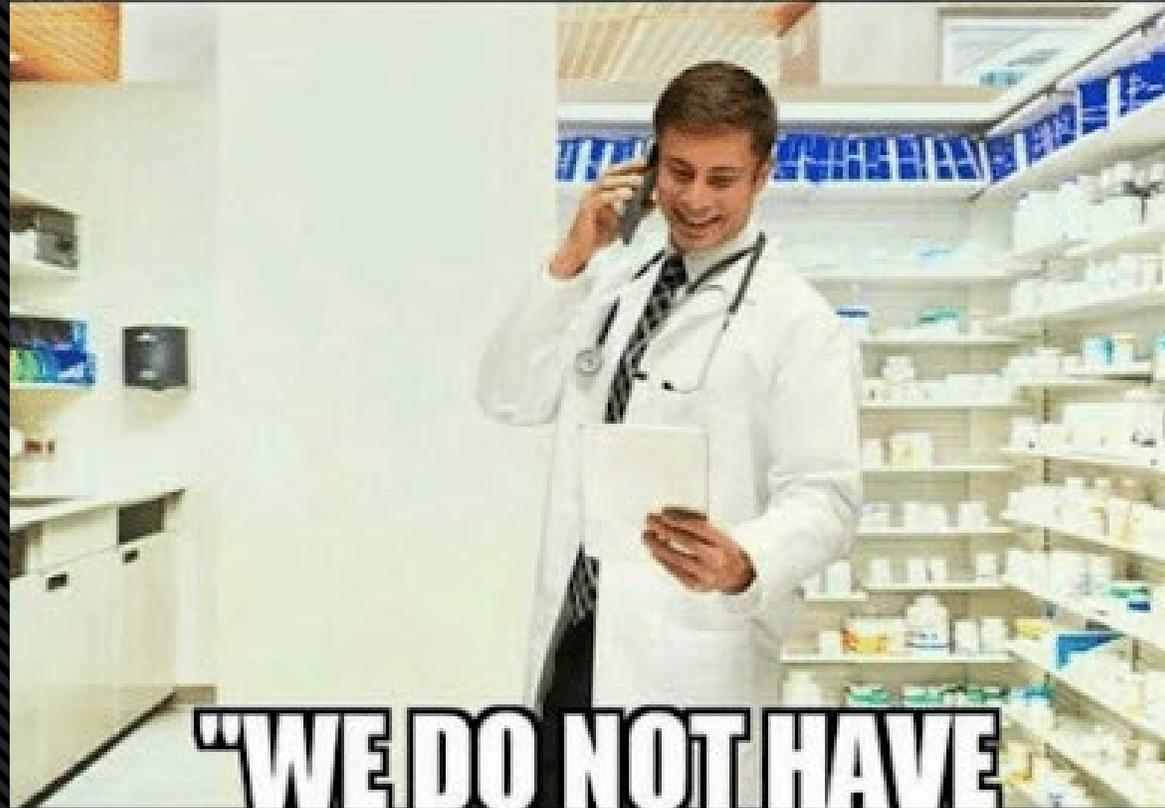
*Upon completion of this course, the participants should be able to:*

Outline the potential roles of an Infectious Disease Pharmacist

Define outpatient parenteral antimicrobial therapy (OPAT) and healthcare system antimicrobial stewardship programs (ASP)

Describe the role of a pharmacist in clinical research

**"HELLO DOCTOR"**



**"WE DO NOT HAVE  
SCRIBBLE IN STOCK"**

# Infectious Disease (ID) Pharmacist Overview

ID Pharmacists:  
Experts in antimicrobial pharmacotherapy

## Four Typical Areas of Practice

Inpatient Clinical Infectious Disease

Outpatient Clinical Infectious Disease

Antimicrobial Stewardship

Academic

# Infectious Disease (ID) Pharmacist Training

- Education: Doctor of Pharmacy, PharmD
- Optional training opportunities
  - Residency
  - Fellowships
  - Certifications



# Pharmacy Residency Programs

- Optional 12-month post-graduate clinical training as a **licensed pharmacist**

PGY1	General medicine training (usually)	<i>Examples: inpatient hospital, ambulatory care (outpatient clinics), community pharmacy, pharmacy administration</i>
PGY2	Specialty (usually)	<i>Examples: infectious disease, oncology, ambulatory care, internal medicine, emergency medicine, critical care, cardiology, pediatric</i>

- Structure standardized to the program; can be adjusted to participants' interests
  - Required and elective rotations
  - Choose own research topic

# Pharmacy Fellowships

- Directed, highly individualized, postgraduate program designed to prepare the participant to be an independent researcher
  - Careers in independent research, academia, and/or other related fields
- Programs: colleges of pharmacy, academic health centers, or specialized healthcare institutions
- Co-primary investigator on research during fellowship as a **licensed pharmacist**

Develop research questions

Design protocols

Manage and analyze data

Publish research findings

- May last 12 to 24 months

# ID Pharmacist Certification Opportunities

- Board Certified Infectious Disease Pharmacist (BCIDP)
- American Academy HIV Pharmacist (AAHIVP)
- Board Certified Pharmacotherapy Specialist (BCPS)
- Fellow of Infectious Diseases Society of America (FIDSA)
- Fellowship in Society of Infectious Disease Pharmacists (FIDP)

*All optional; many other possible certifications*

# Personal Professional Background

- **University of Kentucky (UK)**
  - Undergraduate, Pre-Pharmacy Courses, 2010-2013
  - Doctor of Pharmacy (PharmD), 2013-2017
- PGY1 Pharmacy Residency: **The Jewish Hospital – Mercy Health**, 2017-2018
- PGY2 Infectious Diseases Pharmacy Residency: **St. Louis VA Health Care**, 2018-2019
- Clinical Infectious Disease / Staff Pharmacist: **The Christ Hospital Health Network**, 2019-2022
- Clinical Staff Pharmacist: Infectious Disease Research Clinic, **University of Cincinnati Medical Center – UC Health**, 2022-Present



# Pharmacy School Experiences



**Walgreen's** Pharmacy Technician  
**Kroger** Pharmacy Intern

**Professional Development and Recruitment (PD&R) Co-Chair (UK COP)**



**Student National Pharmaceutical Association (SNPhA)**  
*Chapter Vice President*  
*Chapter Delegate*  
*National Recording Secretary*

**Ecuador Medical Mission Trip**

# Fourth Year Pharmacy Rotations

Rotation	Description	Location
<b>Nursing homes</b>	Patient chart reviews	Throughout Kentucky (KY)
<b>Trauma / surgery</b>	ICU and medical ward, clinical pharmacy	UK (Lexington, KY)
<b>Infectious disease</b>	Inpatient clinical pharmacy	UK (Lexington, KY)
<b>Pediatric oncology</b>	Outpatient chemotherapy infusion clinic	UK (Lexington, KY)
<b>Internal medicine Warfarin management</b>	Inpatient clinical pharmacy Outpatient clinic	Ephraim McDowell (Danville, KY)
<b>Community practice</b>	Outpatient, independent pharmacy	Cherokee Drug Shoppe (Independence, KY)
<b>Family medicine</b>	Inpatient clinical pharmacy	St. Elizabeth (Edgewood, KY)

# PGY1 Pharmacy Residency The Jewish Hospital – Mercy Health

July 2017-June 2018

# PGY1 Pharmacy Residency

## The Jewish Hospital – Mercy Health

- Cincinnati, OH (Kenwood)
- ~200 bed teaching hospital



- Monthly rotations, inpatient clinical and managerial
- Longitudinal outpatient medication management clinic
- Antimicrobial Stewardship Committee
- Research
- Teaching certificate
- Presentations

# PGY1 Pharmacy Residency Rotations

**Bolded** = required  
*Italicized* = elective

**Orientation**

**Critical Care**

**Internal Medicine I**

**Hospital Management**

**Hematology**

**Research**

*Bone Marrow Transplant*

*Emergency Medicine*

**Drug Policy Development (Mercy Health – Home Office, Norwood)**

*Surgery (Mercy Fairfield)*

*Infectious Diseases*

**Internal Medicine II**

# PGY1 Pharmacy Residency Off-Site Rotations

Mercy Health Home Office  
(Norwood, OH)



Mercy Fairfield  
(Fairfield, OH)



# PGY1 Pharmacy Residency:

# Longitudinal Rotations

## Medication Management Clinic

*Warfarin*

*Direct-Acting Oral Anticoagulants (DOACs)*

## Antimicrobial Stewardship Committee

## Research

# PGY1 Pharmacy Residency:

# Longitudinal Rotations

## Medication Management Clinic

Warfarin

Direct-Acting Oral Anticoagulants (DOACs)

## Antimicrobial Stewardship Committee

## Research

# Hospital Antimicrobial Stewardship Programs (ASPs)

- Improve clinical outcomes and minimize harms in antibiotic prescribing by reducing:
  - Treatment failures
  - *C. difficile* infection rates
  - Adverse effects
  - Antibiotic resistance
  - Hospital costs
  - Lengths of stay



# Antibiogram

University of Cincinnati Medical Center		2021 Antibiogram		01/01/2021 – 12/31/2021									
Gram Positive Organisms		Emergency & Inpatient		Percent Susceptible									
Gram Positive Organism (# of patient isolates)	Ampicillin	Cefotaxime	Ceftriaxone	Clindamycin	Doxycycline	Erythromycin	Levofloxacin	Linezolid	Oxacillin	Penicillin G	Tetracycline	Trimethoprim/ Sulfamethoxazole	Vancomycin
<i>Enterococcus faecalis</i> (218)	99				31	13	75	95			26		95
<i>Enterococcus faecium</i> (56)	15				26	3	13	98			15		25
<i>Staphylococcus aureus</i> (689)				74	98	40	75	100	51		94	95	100
<i>S. aureus</i> - MRSA (349)				71	97	15	58	100	0		93	92	100
<i>S. aureus</i> - MSSA (357)				78	99	63	92	100	100		95	98	100
<i>Staphylococcus epidermidis</i> (146)				44	89	24	52	100	28		85	44	100
<i>Staphylococcus lugdunensis</i> (27)				59	100	63	100	100	67		96	96	100
<i>Streptococcus pneumoniae</i> (60)				72		33	93	100			72	72	100
non-meningitis therapy interpretations (60)		92	95								93		
meningitis therapy interpretations (60)		68	63								35		

\**Streptococcus pneumoniae* MIC interpretations for Cefotaxime, Ceftriaxone, and Penicillin-G vary based on achievable drug levels in the CSF versus blood. Percentages were calculated by applying both sets of interpretations to all 60 isolates.

If the percentage of susceptible isolates increased by ≥ 10% compared to the previous year's data, the table cell has been shaded green; a decrease by ≥ 10% compared to the previous year's data has been shaded red.

University of Cincinnati Medical Center		2021 Antibiogram		01/01/2021– 12/31/2021								
Gram Negative Organisms		Emergency & Inpatient		Percent Susceptible								
Gram Negative Organism (# of patient isolates)	Ampicillin/ Sulbactam	Ampicillin	Cefazolin*	Cefepime	Ceftriaxone	Ciprofloxacin	Gentamicin	Levofloxacin	Meropenem	Piperacillin/ Tazobactam	Tobramycin	Trimethoprim/ Sulfamethoxazole
<i>Acinetobacter baumannii</i> (42)	66			61	13	50	71	53	55	53	76	58
<i>Citrobacter koseri/diversus</i> (34)			94	100	100	97	100	97	100	97	100	100
<i>Citrobacter freundii</i> (33)				97	71	97	97	94	97	81	97	94
<i>Enterobacter cloacae</i> complex (153)				81	70	89	90	88	97	73	88	85
<i>Escherichia coli</i> (916)	60	48	77	90	87	71	90	68	100	95	90	71
<i>Klebsiella aerogenes</i> (65)				97	85	91	97	88	100	84	97	97
<i>Klebsiella oxytoca</i> (70)	70		39	90	87	99	94	97	97	90	94	89
<i>Klebsiella pneumoniae</i> (344)	73		81	87	84	85	91	80	100	90	89	81
<i>Morganella morganii</i> (47)	13			96	83	70	96	70	100	98	98	89
<i>Proteus mirabilis</i> (170)	91	71	69	95	95	68	89	68	100	100	93	80
<i>Proteus vulgaris</i> (20)	55			85	85	100	100	100	100	100	100	100
<i>Providencia stuartii</i> (21)	14			100	100	24	0	19	100	100	0	91
<i>Stenotrophomonas maltophilia</i> (87)								86				84
<i>Pseudomonas aeruginosa</i> (360)				84		81	92	79	84	86	95	
<i>Serratia marcescens</i> (82)				100	95	99	99	99	100		93	99

\*Cefazolin values reflect the percentage of Non-Resistant isolates using an MIC breakpoint of ≤ 4 µg/mL  
If the percentage of susceptible isolates increased by ≥ 10% compared to the previous year's data, the table cell has been shaded green; a decrease by ≥ 10% compared to the previous year's data has been shaded red.

UCH Homepage → Corp Departments →  
Laboratory Services → Lab Documents (on  
left side) → Antibiograms

# Hospital Antimicrobial Stewardship Programs (ASPs)

 Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

## Antibiotic Prescribing and Use

CDC > Antibiotic Use > Core Elements of Antibiotic Stewardship

### Core Elements of Hospital Antibiotic Stewardship Programs



#### Hospital Leadership Commitment

Dedicate necessary human, financial, and information technology resources.



#### Accountability

Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.



#### Pharmacy Expertise (previously "Drug Expertise"):

Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.



#### Action

Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.



#### Tracking

Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.



#### Reporting

Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.



#### Education

Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.

# PGY1 Pharmacy Residency ASP Participation

Antimicrobial Stewardship Policy

Fluoroquinolone usage

Outpatient surgery pre-operative antibiotics

PGY1 Research Project

# PGY1 Pharmacy Residency:

# Longitudinal Rotations

## Medication Management Clinic

*Warfarin*

*Direct-Acting Oral Anticoagulants (DOACs)*

## Antimicrobial Stewardship Committee

## Research

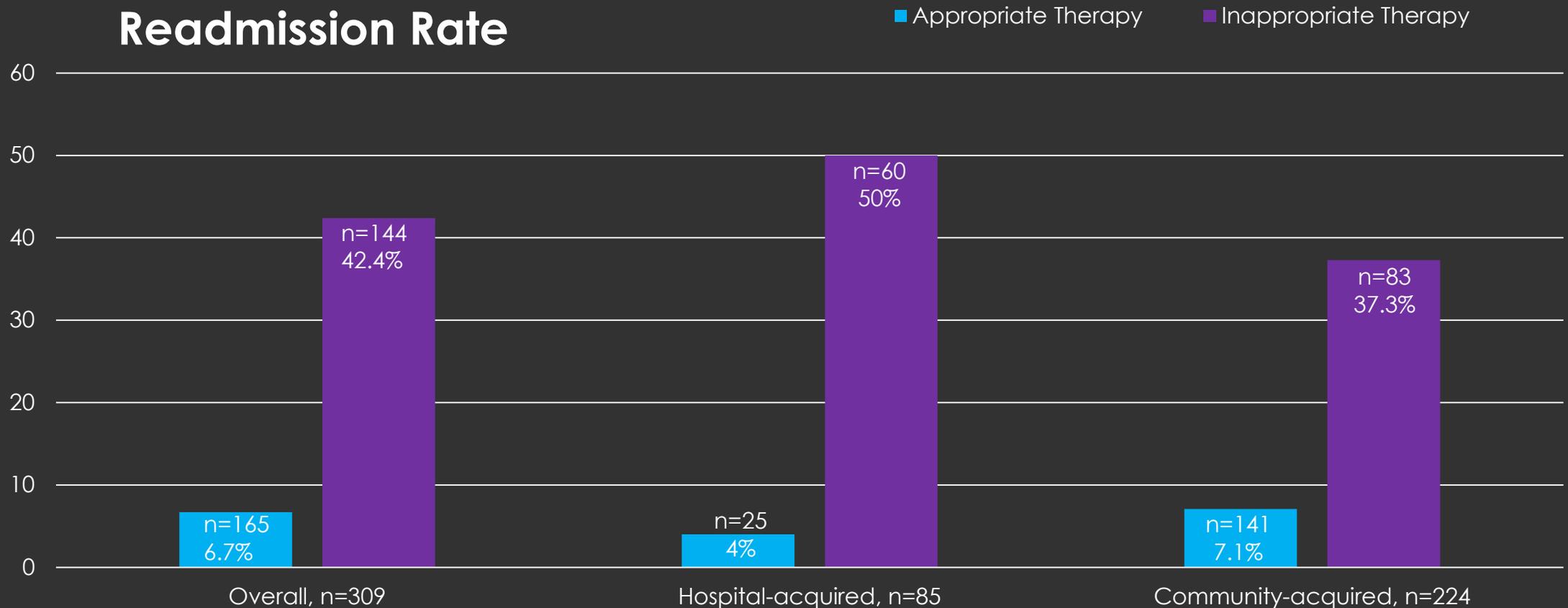
# PGY1 Pharmacy Residency Research Project Overview

National pneumonia readmission rate:  
1 in 5 patients within 30 days of discharge

- **Objective:** evaluated how appropriateness of pneumonia therapy affected readmission rates
  - Appropriateness = based on IDSA guidelines
  - Hospital- and community-acquired pneumonia
  - Retrospective chart review, September 1, 2015, through August 31, 2017
- **Primary outcome:** 30-day readmission rates
- **Secondary outcomes:** length of stay, readmission diagnosis

# PGY1 Pharmacy Residency Research Results

## Readmission Rate



# PGY1 Pharmacy Residency Research Results

## Reason for Designation as Inappropriate Therapy

	<b>Community-Acquired</b> n, total in study (% readmitted)	<b>Hospital-Acquired</b> n, total in study (% readmitted)
<b>Extended duration</b>	36 (30.6%)	26 (50%)
<b>Shortened duration</b>	6 (16.7%)	10 (70%)
<b>Inappropriate empiric regimen</b>	29 (34.5%)	5 (60%)
<b>Inappropriate de-escalation</b>	41 (41.5%)	48 (47.9%)

# PGY1 Pharmacy Residency Research Results

## Length of Stay

	<b>Controls</b> (appropriate therapy)	<b>Cases</b> (inappropriate therapy)
<b>Community-Acquired Pneumonia</b>	4.5 days	5.4 days
<b>Hospital-Acquired Pneumonia</b>	9.2 days	4.8 days

# PGY1 Pharmacy Residency Research Results

*Cases = inappropriate therapy  
Controls = appropriate therapy*

<b>Readmission diagnosis</b>	<b>CAP Controls (10)</b>	<b>CAP Cases (31)</b>	<b>HAP Controls (1)</b>	<b>HAP Cases (30)</b>
Pneumonia	3	13		9
Other infectious cause		3	1	4
CHF	1	3		2
COPD / Asthma exacerbation	1	1		3
Chest pain of unknown origin	1	1		
Fall		2		5
Surgical pain / repair		1		2
Newly diagnosed cancer		1		1
GI bleed		3		
NSTEMI				1
CVA	2			
Ventricular fibrillation				1
Hydronephrosis		1		
BPH	1			
Hypotension	1			
Dehydration		1		
Fatigue		1		1
Unknown				1

# PGY1 Pharmacy Residency Teaching Certificate



University of Cincinnati  
College of Pharmacy

## **Educated on how to teach**

- *Wrote a teaching Philosophy*

## **Participated in teaching activities**

- *Group leader, gout seminar*
- *Instructor, students' patient cases*
- *Instructor, patient lab classes*

# PGY1 Pharmacy Residency Presentations, Part 1

Title	Audience
Angiotensin II for the Treatment of Vasodilatory Shock	Pharmacists
Medical Management of Pancreatitis	Pharmacists
Dual Antithrombotic Therapy with Dabigatran after PCI in Atrial Fibrillation	Pharmacists (Journal Club)
Brugada Syndrome: Overview and Therapeutic Management	Pharmacists
Pneumonia Treatment Overview	Pharmacists
Management of Opioid-Induced Constipation	Medical Residents
Febrile Neutropenia	Oncology Nurses
Relationship Between Inpatient Antimicrobial Treatment for Pneumonia and 30-day Readmission Rates	Pharmacists and Students (ASHP Annual Meeting)
Letemovir: Prophylaxis for Cytomegalovirus in Hematopoietic Stem Cell Transplantation	Oncology Nurses

# PGY1 Pharmacy Residency Presentations, Part 2

Title	Audience
Relationship Between Inpatient Antimicrobial Treatment for Pneumonia and 30-Day Readmission Rates	Pharmacists (Ohio Pharmacist Residency Conference)
Tuberculosis Drug Induced Liver Injury	Physicians, Medical Residents, and Pharmacists
2017 ACC/AHA Hypertension Guidelines: Overview and Comparative Synopsis	Pharmacists
Treatment of Multiple Sclerosis	Pharmacists
The Incidence of Myocardial Injury after Loading Doses of Clopidogrel versus Prasugrel in the Candidates for PCI	Pharmacists (Journal Club)
Antimicrobial Stewardship: Management of Pneumonia, Urinary Tract Infections, and Penicillin Allergies	Physicians, Medical Residents, and Pharmacists

# PGY2 Infectious Diseases Residency St. Louis VA Health Care

July 2018-June 2019

# PGY2 Infectious Disease Residency

VA St. Louis Health Care



- Rotations (4 to 8 weeks), clinical and managerial
- Outpatient parenteral antimicrobial therapy (OPAT) monitoring
- Longitudinal outpatient infectious disease clinic
- Antimicrobial Stewardship Committee
- Presentations
- Instructor of Pharmacy Practice
- Research

# PGY2 Infectious Disease Residency Rotations

**Bolded** = required  
*Italicized* = elective

**Microbiology Lab**

**Infectious Disease I**

**Critical Care**

**Internal Medicine**

**Infectious Disease II**

**Management (VA St. Louis System)**

**Infectious Disease III**

*Infectious Disease Consult Service  
(Barnes-Jewish Hospital)*

*Antimicrobial Stewardship  
Management*

**Infectious Diseases IV**

# PGY2 Infectious Disease Residency

## Antimicrobial Stewardship Pager

- Daily antimicrobial report

Non-formulary	24-hour stop	<i>Examples: ceftolozane-tazobactam, amikacin, moxifloxacin, polymyxin, amphotericin B</i>
Restricted	72-hour stop	<i>Examples: meropenem, piperacillin-tazobactam, vancomycin, levofloxacin, gentamicin</i>

- Requires approval / re-ordering by pharmacist or Infectious Disease physician
- CANNOT be reordered unless approved
- Antimicrobial stewardship pager
  - Discuss pharmacist's or physician's decision to stop antibiotics
  - Teams page pharmacist with antimicrobial questions

# PGY2 Infectious Disease Residency Rotations

**Bolded** = required  
*Italicized* = elective

**Microbiology Lab**

**Infectious Disease I**

**Critical Care**

**Internal Medicine**

**Infectious Disease II**

**Management (VA St. Louis System)**

**Infectious Disease III**

*Infectious Disease Consult Service  
(Barnes-Jewish Hospital)*

*Antimicrobial Stewardship  
Management*

**Infectious Diseases IV**

# Barnes-Jewish Hospital



# PGY2 Infectious Disease Residency Rotations

**Bolded** = required  
*Italicized* = elective

**Microbiology Lab**

**Infectious Disease I**

**Critical Care**

**Internal Medicine**

**Infectious Disease II**

**Management (VA St. Louis System)**

**Infectious Disease III**

*Infectious Disease Consult Service  
(Barnes-Jewish Hospital)*

*Antimicrobial Stewardship  
Management*

**Infectious Diseases IV**

# ***PGY2 Infectious Disease Residency:***

# **Longitudinal Rotations**

- Outpatient Parenteral Antimicrobial Therapy (OPAT) Monitoring
- Infectious Diseases Clinic
- Antimicrobial Stewardship (AMS): AMS Committee, Quarterly Pharmacy Newsletter
- Residency Presentations
- Teaching: Instructor of Pharmacy Practice, St. Louis College of Pharmacy
- Research

# OPAT Definition

Administering IV antibiotics outside of an acute care hospital

- Long-term IV antibiotic therapy (weeks to months)
- Rates of healthcare associated infection lower than in hospitalized patients
- Common infection indications for OPAT:
  - Complicated skin and soft tissue infections (SSTIs)
  - Endocarditis
  - Bone / joint infections
- Administration: IV slow push, intermittent IV infusion, continuous IV infusion

# Challenges in OPAT

Patient compliance and comprehension

Line events: infections, thrombosis, mechanical and chemical phlebitis

Medication stability

Daily frequency of medication administration

Cost to patient and healthcare system

# PGY2 Infectious Disease Residency OPAT Program, VA St. Louis

1. If eligible for OPAT, patient discharged home or to skilled nursing facility (SNF)
2. Inpatient hospital pharmacy prepared and mailed medications to patient or SNF
3. Lab drawn by contracted company weekly or biweekly, depending on OPAT medication
4. Lab results faxed to pharmacy and ID physicians for review
5. Pharmacy recommends medication dosage adjustment or therapy change depending on labs and clinical improvement
6. Patient scheduled for multiple ID clinic visits throughout OPAT
7. Patient readmitted to hospital if OPAT fails

# OPAT Monitoring

Compliance,  
patient  
satisfaction

Patient's social  
situation remains  
appropriate

Clinical  
improvement

Safety

Therapeutic  
drug monitoring

No oral therapy  
options

# PGY2 Infectious Disease Residency

## ID Clinic

### HIV Primary Care

- Antiretroviral resistance evaluation
- Prevention of opportunistic infections
- Side effect management
- Other primary care medication questions

### Referrals from Non-ID Physicians

*Including:*

- Tuberculosis
- Skin and soft tissue infections
- Sexually transmitted infections

### OPAT monitoring

# ***PGY2 Infectious Disease Residency:***

# **Longitudinal Rotations**

- Outpatient Parenteral Antimicrobial Therapy (OPAT) Monitoring
- Infectious Diseases Clinic
- Antimicrobial Stewardship (AMS): AMS Committee, Quarterly Pharmacy Newsletter
- Residency Presentations
- Teaching: Instructor of Pharmacy Practice, St. Louis College of Pharmacy
- Research

# PGY2 Infectious Disease Residency

## Antimicrobial Stewardship

### Antimicrobial Stewardship Committee

- Developed Antimicrobial Renal Dose Adjustment Policy
- Review bacterial resistance trends
- Develop protocols and educational flyers
- Implement facility-specific treatment guidelines based on recent literature

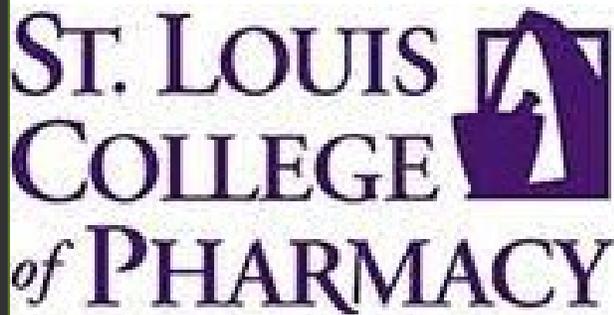
### Pharmacy Quarterly Newsletter

- Asymptomatic bacteriuria management
- Vancomycin dosing based on area under the curve (AUC)
- FDA reinforcement of fluoroquinolone-associated hyperglycemia and CNS dysfunction

# PGY2 Infectious Disease Residency Presentations

Title	Audience
Microbiology Lab Overview	Pharmacists and Medical Residents
PGY2 Pharmacy Resident Clinical Research Presentation	Clinical Pharmacists
Cefepime for the Treatment of AmpC-Producing <i>Enterobacteriaceae</i>	Pharmacists
Seven vs. Fourteen Days of Antibiotic Therapy for Uncomplicated Gram-Negative Bacteremia	Pharmacists (Formal Journal Club)
Adult Immunization Recommendations in Unique Populations	Pharmacists, Physicians, and Medical Residents
Presentation and Pharmaceutical Management of Complicated Endocarditis	Pharmacists

# PGY2 Infectious Diseases Residency Instructor of Pharmacy Practice



**University of Health Sciences and Pharmacy in St. Louis**  
*Formulary known as St. Louis College of Pharmacy*

- Lecturer
  - Ebola
  - Vector-borne diseases
- Pre- and post-presentation feedback for PGY1 lectures
- Graded papers / exams

# ***PGY2 Infectious Disease Residency:***

# **Longitudinal Rotations**

- Outpatient Parenteral Antimicrobial Therapy (OPAT) Monitoring
- Infectious Diseases Clinic
- Antimicrobial Stewardship (AMS): AMS Committee, Quarterly Pharmacy Newsletter
- Residency Presentations
- Teaching: Instructor of Pharmacy Practice, St. Louis College of Pharmacy
- Research

# PGY2 Infectious Disease Residency Research Project

## Association Between Vancomycin Area Under the Curve (AUC) and Nephrotoxicity: a single center, retrospective cohort study in a veteran population

- Evaluated rate of nephrotoxicity for vancomycin AUC  $\geq 550$  compared to AUC  $< 550$  mg\*hr/L
  - Nephrotoxicity: serum creatinine increase  $> 0.3$  mg/L or 50% from baseline in two or more consecutive measurements
- **Primary outcome:** occurrence of AKI
- **Secondary outcomes:** length of stay, readmission at 30 days, and mortality

# PGY2 Infectious Diseases Residency Research Project

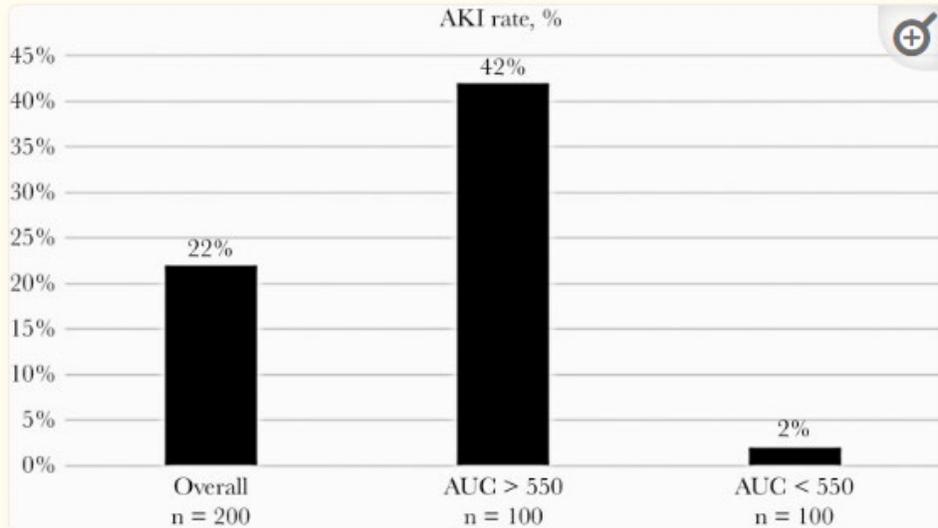


Figure 1.

Primary outcome, acute kidney injury rate.

## Secondary Outcomes

	AUC ≥550 (n = 100)	AUC <550 (n = 100)	P Value
Length of stay, mean ± SD	26.41 (35.10)	26.32 (37.21)	.673
d			
Mortality in 30 d, No. (%)	12 (12)	6 (6)	.138
Readmission in 30 d, No. (%)	30 (30)	22 (22)	.099

# PGY2 Infectious Diseases Residency Research Project

Multivariate Analysis to Define Independent Risk Factors for AKI

	OR (95% CI)	P Value
AUC >550	49.514 (10.117–242.334)	<.005
Age >70 y	2.427 (1.015–5.799)	.046
CrCl <50 mL/min	4.493 (1.061–19.031)	.041
Piperacillin-tazobactam	1.577 (0.646–3.851)	.318
Nephrotoxicity-related comorbidities	1.938 (0.73–5.143)	.184

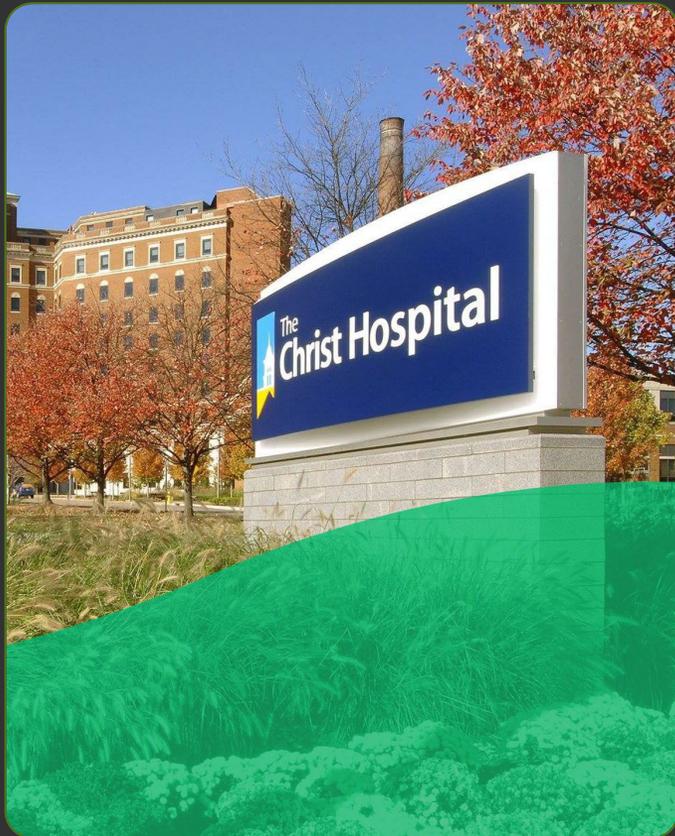
- **Conclusion:** Significantly higher rate of nephrotoxicity in patients when vancomycin AUC  $\geq$  550 mg\*hr/L
- **Other risk factors:** Age > 70, baseline CrCl < 50 ml/min

# Clinical ID / Staff Pharmacist The Christ Hospital Health Network

July 2019-January 2022

# The Christ Hospital Health Network

## Started July 2019: Inpatient Staff Pharmacist



- Verify orders placed by physicians
  - Recommend dose adjustments or medication changes if needed
- Answer nursing and physician questions
- Complete pharmacy consults
- Enforce formulary status
- Respond to emergency codes
- Prepare and check compounded (usually IV) medications
- Dispense oral medications

# WORKING IN A



What my mom thinks I do



What the nurses think I do



What my friends think I do



What the doctors think I do



What I think I do



What I really do

# HOSPITAL PHARMACY

# The Christ Hospital Health Network Transition to Dual Clinical / Staff Pharmacist

- Transitioned to infectious disease pharmacy resource
- Filled in for our Infectious Disease Pharmacist after a few months of training
  - Dosing antibiotics
  - Reviewing cultures / susceptibility
  - Answering ID-related questions
  - Teaching topic discussions to students
  - Responding to Vigilanz alerts



# The Christ Hospital Health Network Covid-19 Vaccine Clinic Manager

Researched preparation and administration of Moderna, Pfizer, and Johnson & Johnson vaccines

Monitored appropriate administration technique and documentation

Compounded vaccine into syringes

Counseled patients and answered vaccine questions



# The Christ Hospital Health Network

## COVID-19

Facilitated inpatient administration of vaccine

Reviewed medications being studied for potential clinical use

Trained pharmacists on monoclonal antibodies (mechanism, preparation, administration, storage)

Reviewed / approved patient referrals from providers requesting monoclonal antibody administration

# The Christ Hospital Health Network Inpatient ID / Antimicrobial Stewardship

Facilitated healthcare system transition to vancomycin AUC dosing

Taught students on ID rotations

Assisted pharmacy residents with ID-related grand rounds presentations

Prepared a staff pharmacist competency for vancomycin AUC dosing

Created an antimicrobial dosing recommendation sheet for dialysis patients

Participated in Antimicrobial Stewardship Committee

Published newsletter article:  
*Treatment of mild to moderate adult skin and soft tissue infections*

**Clinical Staff Pharmacist  
Infectious Disease Research Clinic  
UC Health**

January 2022-Present

# Infectious Disease Research Clinic

## UC Health

### *Primary functions:*

- Prepare pharmacy for new studies
- Teach members of research clinic about medications
- Counsel patients on investigational drugs
- Maintain / document records requested by study sponsor



# Infectious Disease Research Clinic

## UC Health

### **ID Pharmacist: Four Typical Areas of Practice**

Inpatient Clinical Infectious Disease

Outpatient Clinical Infectious Disease

Antimicrobial Stewardship

Academic

# Pharmacist, Clinical Trials

- **Maintain responsibility for clinical investigational drug trials**
- **Perform education responsibilities**
- **Provide accurate and efficient dispensing of medication**
- **Perform administrative and supervisor responsibilities**

# Pharmacist, Clinical Trials

## Maintain responsibility for clinical investigational drug trials

- Review protocols for drug trials
- Communicate with and train staff anticipated to participate in the drug trial
- Work with research clinic team to establish pharmacy's role and implement dispensing
- Maintain pharmacy binder with study summary, protocol, dispensing procedures, shipping documentation, required paperwork, and any other relevant material
- Maintain medication inventory

# Pharmacist, Clinical Trials

## **Perform education responsibilities**

- Orient staff to pharmacy's role in clinical trials
- Counsel patients about investigational product at study entry
- Participate as an active member on committees
- Attend and / or present at educational rounds

## **Provide accurate and efficient dispensing of medication**

- Monitor pharmacy activities each working day to ensure adherence to study protocols and dispensing procedures

# Pharmacist, Clinical Trials

## **Perform administrative and supervisor responsibilities**

- Attend and contribute to interdisciplinary team meetings related to clinical investigational trials
- Ensure investigational product in blinded studies is dispensed and / or administered such that all relevant personnel remain blinded
- Supervise and provide direction to technical support / staff
- Provide timely response to study monitor questions
- Monitor proper inventory record maintenance

The background of the slide is a complex 3D maze composed of numerous rectangular blocks in shades of yellow and green. The blocks are arranged in a way that creates a sense of depth and perspective, with some blocks appearing to be in the foreground and others receding into the distance. The lighting is soft, highlighting the edges of the blocks. In the lower right quadrant, there is a blue speech bubble with a white border and a small tail pointing downwards. Inside the bubble, the text "Future Directions?" is written in a bold, white, sans-serif font.

**Future Directions?**

# Summary

- ID Pharmacists are highly knowledgeable in antimicrobial pharmacotherapy
- There are post-graduate training options for pharmacists to specialize in infectious disease, including residency, fellowships, and certifications
- ID Pharmacists can work in a variety of settings, such as clinical pharmacy, antimicrobial stewardship, academia, and research
- Clinical research pharmacists ensure safety of patients in clinical trials through education and thorough drug accountability

# The Training and Roles of Infectious Disease Pharmacists

Anna Poston-Blahnik, PharmD, BCIDP

Clinical Staff Pharmacist, Infectious Disease Research Clinic

University of Cincinnati Medical Center – UC Health