



Different Pathways of Pharmacy

Amy Leung and Michael Ley
Student Ambassadors
Office of Admissions and Outreach
November 2020

When you think of a pharmacist, what comes to mind?



UC San Diego

SKAGGS SCHOOL OF PHARMACY
AND PHARMACEUTICAL SCIENCES

Knowledge Check!

Which of the following is a pharmacist in California NOT allowed to do?

- a. Administer immunizations
- b. Conduct research
- c. Dispense medications
- d. Educate patients about management of chronic health conditions
- e. Order and interpret lab tests
- f. Perform a comprehensive review of all of a patient's medications
- g. Prescribe medications
- h. Take a patient's blood pressure
- i. None of the above (a pharmacist can do all of these things)

Knowledge Check!

Which of the following is a pharmacist in California NOT allowed to do?

- a. Administer immunizations
- b. Conduct research
- c. Dispense medications
- d. Educate patients about management of chronic health conditions
- e. Order and interpret lab tests
- f. Perform a comprehensive review of all of a patient's medications
- g. Prescribe medications
- h. Take a patient's blood pressure
- i. **None of the above (a pharmacist can do all of these things)**

What is a Pharmacist?

General definition: A healthcare provider whose expertise focuses on the safe and effective use of medications



What is the Goal of Medication Therapy?

- Cure disease
- Eliminate or reduce symptoms
- Stop or slow a disease
- Prevent a disease
- Consider benefits and risks of treatment
- Overall to help patients live better lives



What Does a Pharmacist Do?

Overall role is to **ensure safe and effective use of medications**, which may include:

- Determining whether a medication order (prescription) is safe and appropriate for a given patient
- Educating a patient about their medications or general health
- Guiding or leading selection of medication and dose for a given patient
- Guiding or leading medication monitoring
- Ensuring medications are prepared appropriately, such as compounded medications or intravenous medications

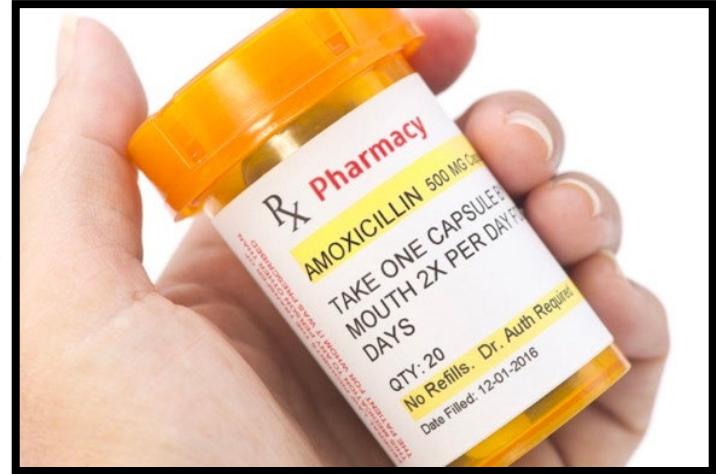
Traditionally...

Dr. John Smith, MD
United Family Medicine Clinic
1234 Broadway Street, San Diego, CA 92182
(858) 555-1234

Name Jane Doe

Rx Amoxicillin 500 mg capsules
1 capsule PO BID x 10 days
Quantity #20 No refills

John Smith
Dispense as written May substitute

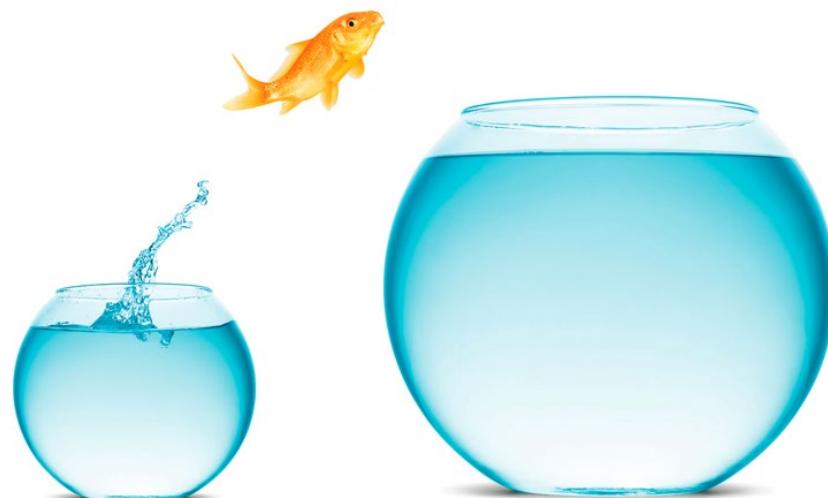


Dispense prescription and counsel (educate) patient after ensuring that prescription is safe and appropriate for patient, including:

- Is the patient allergic to this medication?
- Does the patient have any health conditions that make the medication unsafe?
- Are there any potential drug-drug interactions?
- Is the medication appropriate for the condition being treated?
- Is the dose and length of therapy appropriate?

The Pharmacist's Role is Constantly Expanding

- Pharmacists play an integral role on the healthcare team and are continuously able to do much more than “traditional” pharmacist roles
- Certain states, including California, allow for more advanced practice of pharmacists
 - Includes ability for pharmacists to prescribe medications under collaborative agreements with physicians



What Else Can Pharmacists in California Do?

- Independently furnish certain medications
 - Hormonal contraception
 - Nicotine replacement therapy (smoking cessation)
 - Naloxone
 - Travel medications
- Independently initiate and administer all immunizations to patients 3 years or older
- Administer medications to patients
- Order and interpret lab tests
- Become Advanced Practice Pharmacists



Advanced Practice Pharmacists

In California, Advanced Practice Pharmacists can also:

- Perform patient assessments
- Order and interpret all drug therapy-related tests
- Refer patients to other healthcare providers
- Participate in the evaluation and management of diseases and health conditions in collaboration with other healthcare providers

advanced
practice
pharmacist



Pharmacists Work in Many Settings

- Academia
- Ambulatory Care (Clinic)
- Community/Retail
- Government Agencies
- Hospital/Inpatient
- Hospital/Outpatient
- Home Care
- Industry
- Long-term Care
- Managed Care



Pharmacists Can Specialize in Many Areas

- Administration
- Ambulatory care
- Cardiology
- Critical care
- Geriatrics
- Hepatology
- Infectious disease
- HIV/AIDS
- Nephrology
- Nutrition support
- Nuclear pharmacy
- Oncology
- Pediatrics
- Pharmacoconomics
- Pharmacokinetics
- Psychiatry
- Rheumatology
- Surgery
- Veterinary pharmacy
- Women's health





A Glimpse into Pharmacy...

UC San Diego
SKAGGS SCHOOL OF PHARMACY
AND PHARMACEUTICAL SCIENCES

Academia



- Work at a school of pharmacy and/or medicine
- Teach pharmacy and other health professional students and trainees
- Conduct research in their area of expertise
- Serve on local, regional, and national committees
- Balance academic and clinical responsibilities
 - Many pharmacists in academia also continue to work in clinical, ambulatory and/or retail settings!

Academia

“Being a pharmacist faculty allows you to work in various different capacities. As faculty, I have a clinical practice where I serve patients who have pain and symptoms related to their cancer. Additionally I lead and participate in research, serve on committees both regionally and nationally, and serve in administrative roles including dean of admissions and outreach. And finally my favorite role is that I have the pleasure of teaching and mentoring future pharmacists. I love being faculty because it feels like being a kid in a candy store.”

- Dr. Rabia Atayee, Pharm.D., BCPS, APh



UC San Diego
SKAGGS SCHOOL OF PHARMACY
AND PHARMACEUTICAL SCIENCES

Ambulatory Care

- Work in outpatient clinics
- Collaborate with physicians and other healthcare professionals to optimize patient care
 - May prescribe medications under partnership with physician
- Work with patients to optimize medication regimen
- Provide patient counseling and education
- Often help manage chronic diseases, including, but not limited to:
 - Diabetes
 - HIV
 - Cancer
 - Chronic Kidney Disease

Ambulatory Care - Diabetes

"Nothing is more rewarding for me than when I see hope in my patients' eyes when their disease becomes manageable and they feel empowered. As an Amcare clinical pharmacist and certified diabetes care and education specialist, I assist physicians with their patients' diabetes management and educate patients on their disease state so that they take better care of themselves. I'm also the coordinator for our diabetes clinic program. Hence, wearing an administrative hat by making sure all of our rules and regulations are in place to keep our clinic functioning."



- Professor Pawny Kelly, R.Ph, BCACP, APh, CDE

Ambulatory Care - Diabetes

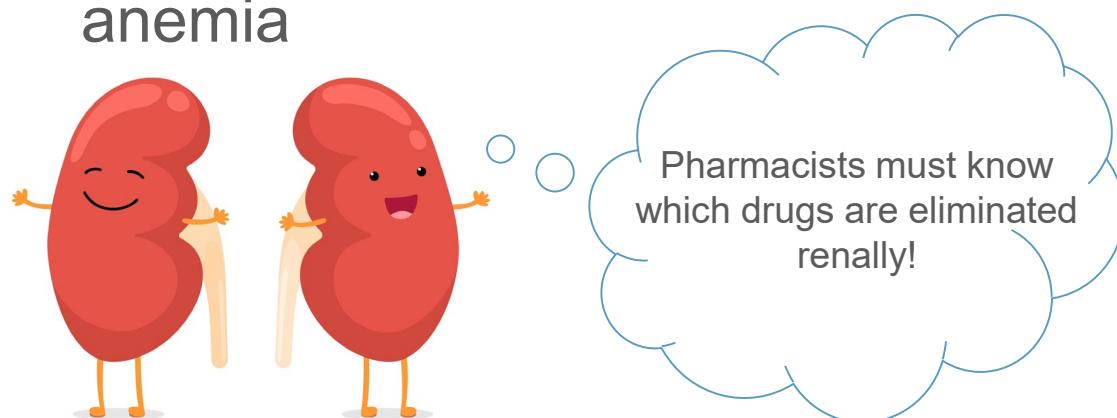


“As a Certified Diabetes Care and Education Specialist and Clinical Pharmacist, I use my expertise to educate and empower my patients to improve their self-care skills in my weekly Diabetes Self-Management Clinic. This may include helping them improve their lifestyle habits, how to use and interpret their glucose meter, and/or provide recommendations to their referring provider on which may be the most effective diabetes medication for a particular person. I also advocate for all my patients to ensure they receive the most appropriate treatment for their diabetes that they can tolerate and afford. It is incredibly rewarding to be able to see the beneficial effects on patient health after assisting a patient with improving their blood glucose levels.”

- Dr. Renu Singh, Pharm.D., BCACP, APh, CDE

Ambulatory Care - Chronic Kidney Disease

- Educate on the importance of medication management and adherence
- Analyze patient lab values to assess medication effectiveness and toxicity
- Manage risk of cardiovascular issues, hypertension and anemia



Ambulatory Care - Oncology

- Care for patients through all stages of cancer treatment
- Manage chemotherapy and drugs to reduce side effects

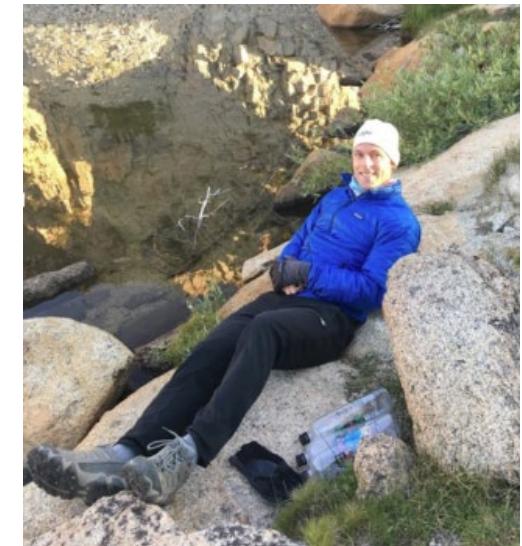


“Oncology pharmacy is an incredibly rewarding and intellectually challenging field, which are some of the reasons I love it! It is a true honor to take care of cancer patients as a member of an interdisciplinary team. I am constantly challenged by complex clinical scenarios and questions and what seems like a new drug approval every week.”

-Dr. Ila Saunders, Pharm.D., BCOP

Hospital/Inpatient

- Verify medication orders
- Work as part of interdisciplinary teams to optimize care
- Staff various hospital units (e.g., intensive care unit [ICU], emergency department, cardiovascular ICU, neonatal ICU, etc.)
- Verify sterile intravenous preparations



"Orders aren't for drugs, they are for solutions to patients' problems. You can object to any order you like - as long as you have a better solution to offer."

- Dr. Timothy Bassell, Pharm.D. (Emergency Department Pharmacist)

Hospital/Inpatient - Infectious Disease



- Focus on antimicrobial pharmacotherapy
 - antibacterial, antiviral, antifungal, and antiparasitic drugs
- Select and optimize antimicrobial drug use on interprofessional team
- Ensure appropriate use of antimicrobials system-wide

“With COVID-19, the world now recognizes the importance of infectious diseases and the role of pharmacists in fighting infections since we are the most equipped to understand and apply pharmacokinetics to optimize drug dosing.”
- Dr. Jennifer Le, PharmD, MAS, BCPS-ID, FIDSA, FCCP, FCSHP

Hospital/Inpatient - Pediatrics



- Manage wide ranges of dosing
 - Exponential difference between neonate and 17 year old
 - Many dilutions
- Most medications are oral solutions
- Many sub-specialties in pediatrics!
 - Hematology
 - Oncology
 - Psychiatric
 - Intensive Care

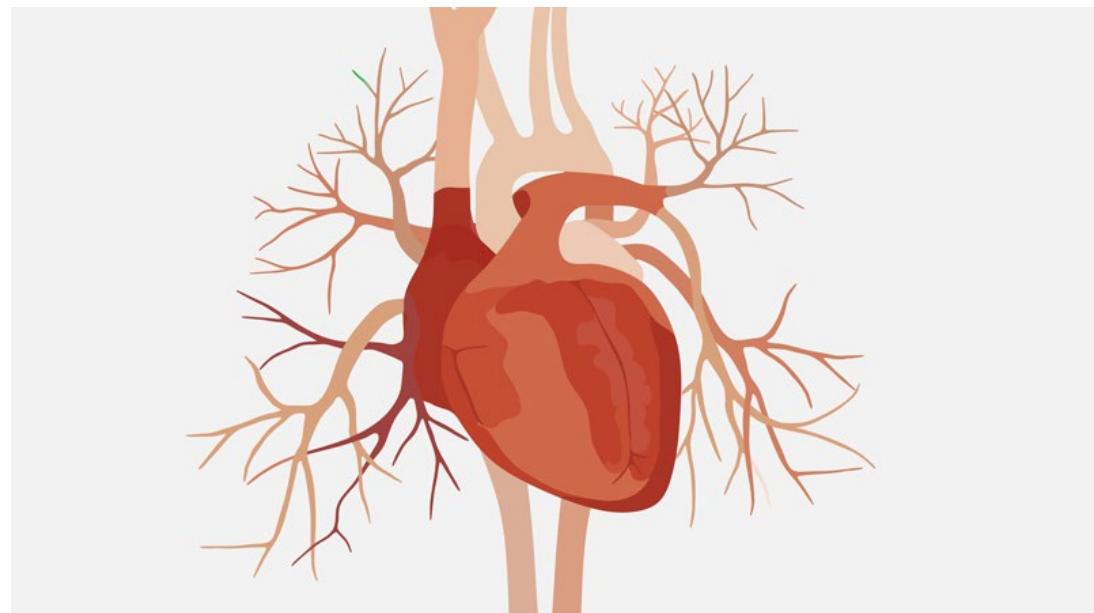
“We are the captains of the pediatric central pharmacy train ride. We work together as a team to make every day happen!”

-Dr. Hoa Nguyen, Pharm.D. and Dr. Gloria Kim, Pharm.D.



Cardiology

- Monitor patients with cardiovascular disease
 - Myocardial infarction
 - Stent
 - Cardiothoracic surgery
 - Heart failure
- Manage cardiovascular medications
 - Blood Pressure
 - Anticoagulation
 - Warfarin
 - Anti-arrhythmic
 - Statins



Cardiology



“Patients with heart disease are often on many medications that require frequent adjustment and monitoring. I am able to help these patients live longer by promoting healthy lifestyle changes and improving medication use.”

- Dr. Felix Yam, Pharm.D., M.A.S., BCPS, BCCP

Psychiatry

- Manage patients on psychiatric medication
- Provide education regarding mental illness



“I am passionate about serving the needs of our most vulnerable patients with severe mental illness. Psychiatric pharmacists have the opportunity to ensure that these patients have access to care, receive appropriate medications and have minimal toxicity from their medications.”

-Dr. Kelly Lee, Pharm.D., M.A.S.,
BCPP

UC San Diego
KAGGS SCHOOL OF PHARMACY
ND PHARMACEUTICAL SCIENCES

Transplant

- Mix of Inpatient and Outpatient/Ambulatory Care
- Work on a multidisciplinary team
 - rounds and clinics
- Monitor immunosuppressant therapy, including:
 - Tacrolimus, sirolimus, cyclosporine, mycophenolate
- Transitions of care
 - Hospital admission
 - Pre-operative
 - Post-operative immunosuppression
 - Medication reconciliation and discharge
 - Long term immunosuppression



Community

- Work in a retail, independent, or outpatient pharmacy:
 - Chain pharmacies (e.g., CVS, Walgreens, Rite-Aid)
 - Independent pharmacies
 - Hospital Outpatient Pharmacy
- Verify and dispense prescriptions
- Counsel patients and recommend over-the-counter products
- Resolve insurance issues
- Pharmacy Manager opportunities



Community - Retail

“As a community pharmacist, the most rewarding part of my job is interacting with patients. Everyone always talks about how pharmacists are the most accessible healthcare personnel and boy is that the truth in the community setting. In a typical day, I will administer between 20-50 vaccines, furnish about 3 birth control prescriptions, consult on at least 30 pain management cases, recommend 50 potential therapy changes, and educate every patient about their concerns with this pandemic. It’s a busy setting, but the fast pace keeps me on my toes and I go home every day content that I could be an asset to so many patients and their care teams.”

- Dr. Kaylene De Vries, PharmD (UCSD SSPPS Alum 2019)



Geriatrics

- Specialize in medication therapy for older adults
- Ensure medications are appropriate based on many factors, including age and kidney function
- Reduce use of potentially inappropriate medications
- Work as part of interprofessional team to optimize medication use and health outcomes
- Provide education to older adults, as well as family and caregivers

Geriatrics

“As a geriatric pharmacist, I work to optimize medication use in older adults. Despite medications being a vital healthcare intervention for the older adult population, there are unique risks of medication use in this population given a myriad of factors, such as changes in the body with aging that affect how medications are processed. Risks must be carefully weighed against benefits, and each patient requires an individualized approach. Medication management for older adults is often very complex and can be overwhelming for a patient, and I enjoy being able to help simplify this aspect of healthcare for my patients. An aspect of geriatric pharmacy that I love the most, especially working in the clinic setting, is the ability to form strong relationships with patients and their families. It is a privilege to connect with my patients on a human level and hear their incredible stories.”

- Dr. Laura Hart, Pharm.D., M.S., BCPS, BCGP



UC San Diego
SKAGGS SCHOOL OF PHARMACY
AND PHARMACEUTICAL SCIENCES

Government Agencies



- Work for regulatory bodies, such as the Food and Drug Administration (FDA) or the state Board of Pharmacy
- Understand the laws and regulations in the profession of pharmacy
- Enforce policies to optimize patient care and safety

Government Agencies



“Having dual degrees and licenses to practice gave me a position and perspective valuable to future employers. It led me to speak in hearings before Congressional health committees, state legislative bodies and before national and state regulators and policy makers concerning pharmacy. It also made my eight year service to the California State Board of Pharmacy far more impactful since my primary focus was to promote strong health policy benefiting the consumer. Understanding how laws and regulations are made and applied to the profession of pharmacy has been useful in every practice setting where I have worked. Today I serve on multiple non-profit boards concerning quality in health care and affordability of health benefits as well as the education of pharmacy students. A sound knowledge of the law improves that service for the organizations I continue to work with.”

-Dr. John Jones, RPh, J.D.

Pharmacoconomics

- Perform evaluations focused on costs and benefits of medication therapy, such as cost-effectiveness evaluations
- Use data to make informed decisions on pharmacy spending and investment



Pharmacoconomics



“Pharmacoconomics allow us to make informed decisions on limited healthcare resources that seek to maximize health benefits. Without this approach, health care would not be sustainable.”

-Dr. Mark Bounthavong, Pharm.D., Ph.D.

“Pharmacoconomics is a discipline that mixes financial and social issues with health care. We learn how to estimate the financial and societal impact of new and old drugs, and how that influences who can afford them.”

-Dr. Charles Daniels, BS Pharm, Ph.D.



Industry

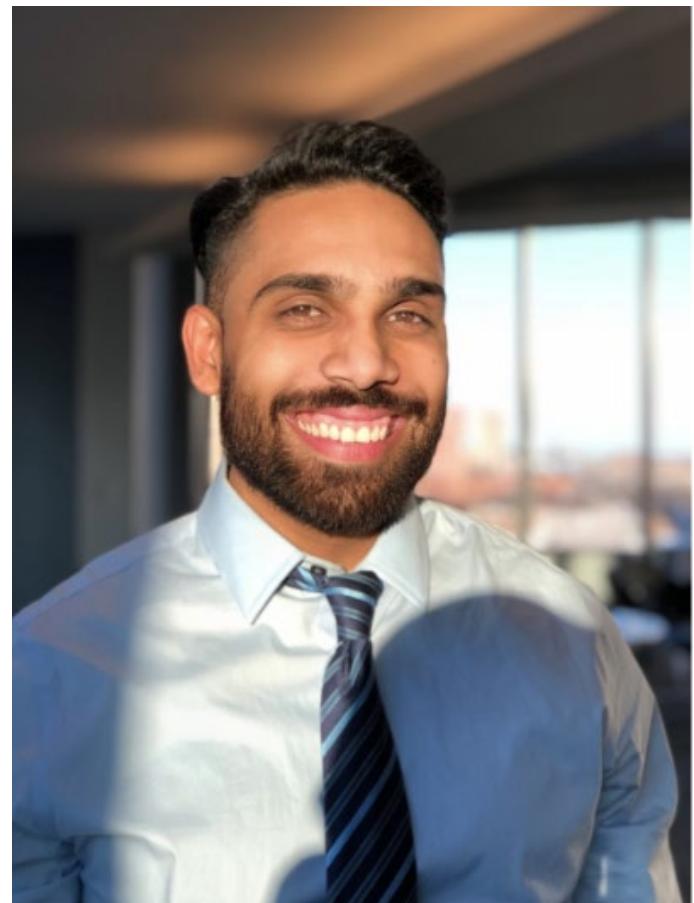
- Work on a pharmacovigilance team to assess and prevent adverse effects
- Participate in research and medication development
- Conduct quality assurance and safety/efficacy trials
- Oversee medication production



Industry

“My objective in the pharmaceutical industry is to make a global impact on patient populations and ensure that medications are effective but, most importantly, safe. With GW, our focus in the epilepsy community is an undertaking that is very delicate as the patients we care for must be sure to take a medicine that will reduce the impact on their quality of life and ensure that it is safe. My job in the safety evaluation team with GW is just that. Ensuring our medicines are safe for our vulnerable epilepsy patient populations around the world.”

-Dr. Syed Zafar, Pharm.D.



Informatics

- Streamline pharmaceutical processes with technology
- Encode health-care related programs
- Troubleshoot technological issues in the pharmacy
- Train other staff on pharmacy programs



Informatics

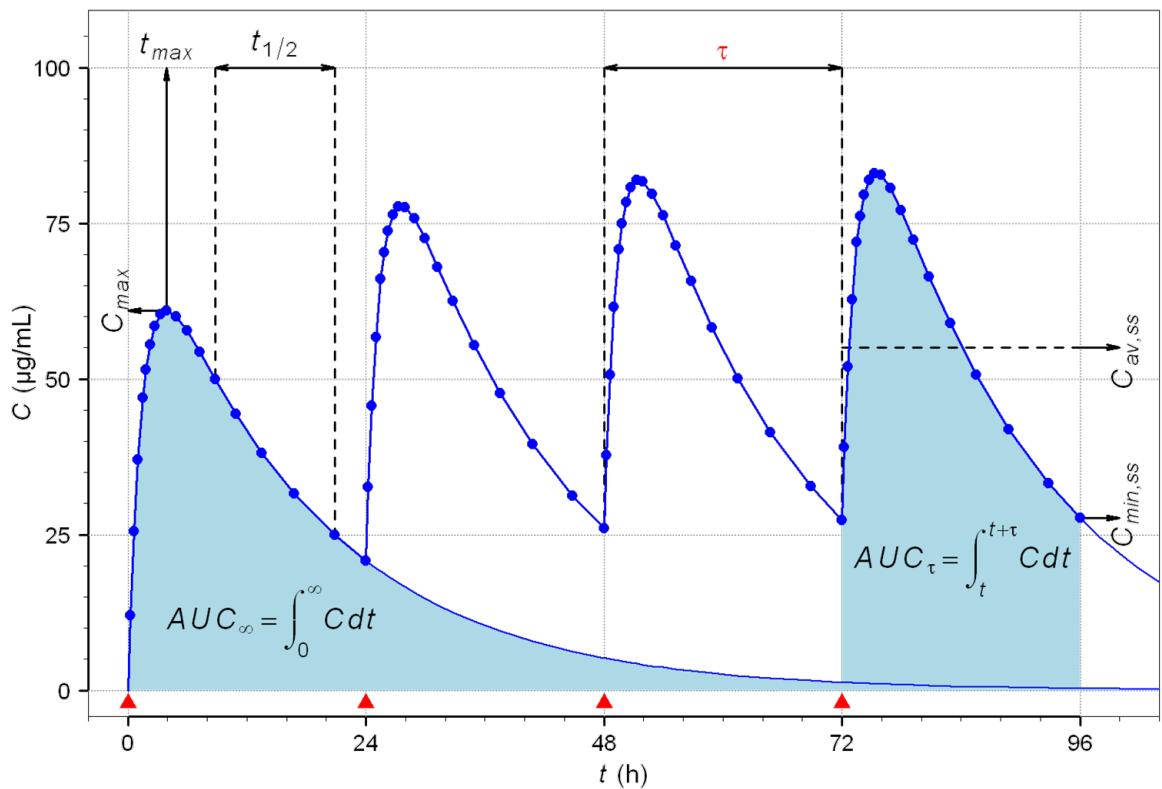
“I solve problems in EPIC and make sure our daily software operations in the pharmacy go smoothly”

- Dr. Roy Joseph, Pharm.D.



Pharmacokinetics

- Study pharmacokinetic parameters of drugs
 - Half-life
 - Bioavailability
 - Distribution
 - Metabolism
 - Toxicity
 - Clearance
 - renal
 - hepatic



Pharmacokinetics

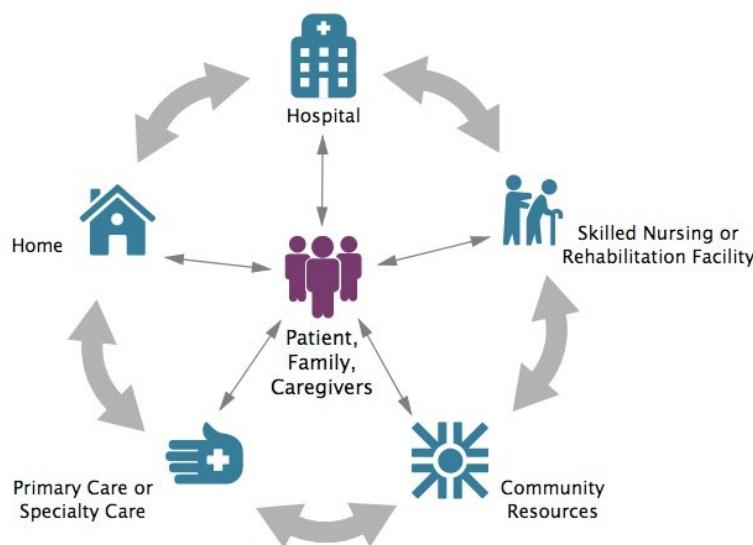
“My research focuses on the application of quantitative pharmacology approaches to optimize the development and clinical use of drugs. I enjoy working in pharmacokinetics and pharmacodynamics because it offers the potential to impact large groups of patients. I also like being able to collaborate on research projects with talented scientists across multiple disciplines.”

-Dr. Jeremiah Momper, Pharm.D., Ph.D.



Transitions of Care

- Coordination and continuity of health care during a movement from one healthcare setting to either another or to home
- Optimize medication therapy to reduce readmissions to hospitals



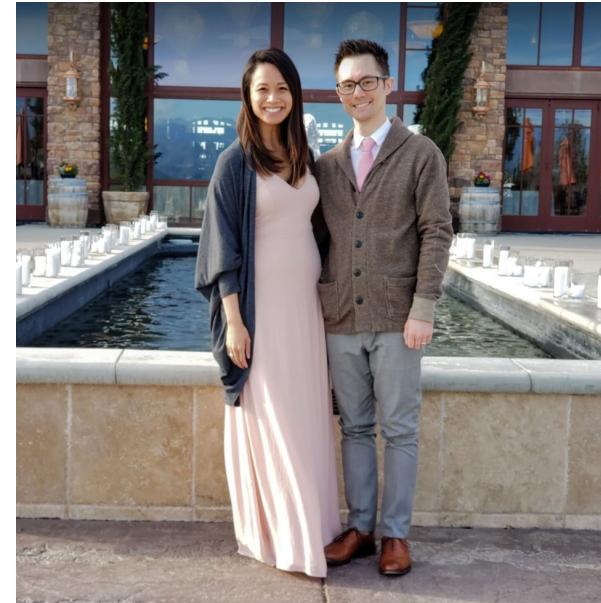
PharmD/PhD Program at UC San Diego SSPPS

- Offers students the opportunity to earn their PharmD and PhD consecutively
- General Description
 - Student will complete 2 or 3 years of pharmacy curriculum
 - Student will then take a break to complete PhD (3-5 years)
 - Student returns to complete 3rd and/or 4th year of pharmacy curriculum
- Great option for students with career interests in
 - Academia
 - Faculty at a pharmacy/medical school
 - Drug discovery/development
 - Industry
 - Government

PharmD/PhD Program at UC San Diego SSPPS

“Reasons for doing a PhD should be centered on the concept of learning how to generate novel and interesting questions and less about the day-to-day work involved with the training. My work during the PhD focused on cardiomyocyte cellular signaling and often involved experimentation with mice. My ultimate goal was not to be the best basic cardiovascular scientist, but rather learn how to critically think and ask questions that push the boundaries of what is known. I definitely attained those skills, and I can see that those past efforts have paid off in my post-Pharm/PhD training in the form of multiple publications, a grant, and regional recognition for my clinical research. That is what the PharmD/PhD has to offer.”

-Dr. Andrew Willeford, Pharm.D., Ph.D. (UCSD SSPPS Alum 2019)

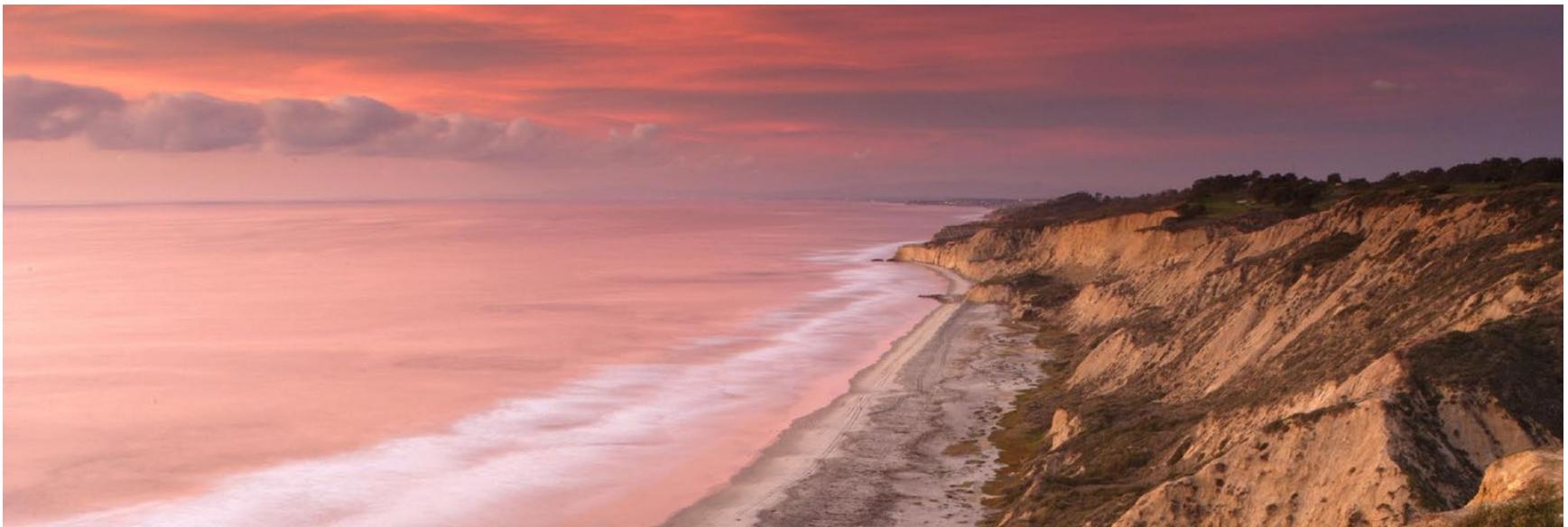


There Are Many Pathways in Pharmacy!

Pharmacists work beyond community or retail settings!
There are many different areas in health care where pharmacists play integral roles.

The role of pharmacists in our health care system continues to expand.





Questions?

Contact: