

Madison N. Irwin
Adult Palliative Care Program
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CURRENT APPOINTMENTS

Clinical Assistant Professor Department of Clinical Pharmacy University of Michigan College of Pharmacy	Ann Arbor, Michigan February 2024-present
Clinical Pharmacist Specialist in Pain and Palliative Care (Inpatient – 20% effort) Department of Pharmacy Services University of Michigan Health	Ann Arbor, Michigan February 2024-present
Clinical Pharmacist Specialist in Pain and Palliative Care (Ambulatory Care – 50% effort) Pharmacy Innovations and Partnerships of University of Michigan University of Michigan Health	Ann Arbor, MI February 2024-present

EDUCATION AND TRAINING

University of Michigan College of Pharmacy Clinical and Translational Sciences Postdoctoral Fellowship	Ann Arbor, Michigan July 2021-June 2023
Michigan Medicine, Department of Pharmacy Services PGY2 Pain Management and Palliative Care Pharmacy Residency	Ann Arbor, Michigan July 2020-June 2021
Michigan Medicine, Department of Pharmacy Services PGY1 Pharmacy Practice Residency	Ann Arbor, Michigan July 2019-June 2020
The Ohio State University College of Pharmacy Doctor of Pharmacy, <i>summa cum laude</i>	Columbus, Ohio August 2015-May 2019
University of Dayton Bachelor of Science, <i>summa cum laude</i> Major in Biology, Minors in Chemistry and Psychology	Dayton, Ohio August 2011-May 2015

PAST ACADEMIC AND CLINICAL APPOINTMENTS

Clinical Pharmacist Specialist in Pain Management University of Michigan Health, Department of Pharmacy Services	Ann Arbor, Michigan August 2023-February 2024
Ambulatory Palliative Care Clinical Pharmacist (40% effort) Pharmacy Innovations and Partnerships of University of Michigan	Ann Arbor, Michigan July 2021-June 2023

Clinical Adjunct Instructor University of Michigan College of Pharmacy	Ann Arbor, Michigan July 2019-January 2024
Pharmacist Michigan Medicine, Department of Pharmacy	Ann Arbor, Michigan July 2019-December 2022
Pharmacy Intern Mount Carmel West Hospital Preceptor: Katrina Reynolds, PharmD	Columbus, Ohio August 2015-April 2019
Pharmacy Intern Kroger Pharmacy Preceptor: Marci Conway, PharmD	Columbus, Ohio June 2016-August 2017

CERTIFICATIONS AND LICENSURE

Board Certified Pharmacotherapy Specialist Board of Pharmacy Specialties Credential Number 3166700	July 1, 2022-present
Pharmacy Resident Teaching Certificate Michigan Medicine and University of Michigan College of Pharmacy	July 2020
Pharmacist Licensure in Michigan License Number 5302411639	July 2019-present
Controlled Substance Licensure in Michigan License Number 5315211968	July 2019-present
APhA Pharmacy-Based Immunization Delivery Certification APhA Certificate Training Program	August 2016
Human Subjects Research Protection Training Collaborative IRB Training Initiative	August 2016

PUBLICATIONS

16. **Irwin MN**, Cooke DA, Berland DW, Marshall VA, Smith MA. Efficacy and safety of low dose naltrexone for chronic pain. *J Pain Pall Care Pharmacotherapy*. 2024. Published online February 1, 2024. doi: 10.1080/15360288.2024.2302550
15. Pasternak A, Ward K, **Irwin M**, Okerberg C, Hayes D, Fritsche L, Zoellner S, Virzi J, Choe HM, Ellingrod V. Identifying the prevalence of clinically actionable drug-gene interactions in a health system biorepository to guide pharmacogenetics implementation services. *Clin Transl Sci*. 2023;16:292-304. doi: 10.1111/cts.13449
14. **Irwin MN** & Smith MA. Validation of ICD-9 codes for identification of chronic overlapping pain conditions. *J Pain Pall Care Pharmacotherapy*. 2022;36(3):166-77. doi: 10.1080/15360288.2022.2089437

13. **Irwin MN**, Walkerly A. Role of the pharmacist in acute care interventions for opioid use disorder: A scoping review. *JACCP*. 2022;5(2):193-202. doi: 10.1002/jac5.1547
12. **Irwin MN**, Ellingrod V, Smith MA. Pharmacogenetics of methadone for pain management in palliative care. *J Pain Symptom Management*.2022;63(1):e142-5. doi: 10.1016/j.jpainsymman.2021.08.007
11. **Irwin MN**, Adie S, Sandison K, Alsomairy S, Brancaccio A. Warfarin dose requirements in adults hospitalized with COVID-19 infection: A retrospective case series. *J Pharmacy Prac*. 2022;35(4):654-60. doi: 10.1177/08971900211000705
10. **Irwin MN**, Gunther W, Keefer P, Saul D, Singh SA, Wright J, Smith, MA. Buprenorphine for chronic pain in a pediatric patient with sickle-cell disease. *J Pain Symptom Management*.2021;62(5):1086-91. doi: 10.1016/j.jpainsymman.2021.04.007
9. Wright J, Louttit E, Pasternak E, **Irwin MN**, Spruit JL. Pain Management in Pediatrics. *Adv Fam Pract Nursing*. 2021;3:195-214. doi: 10.1016/j.yfnpn.2021.02.002
8. **Irwin MN** & VandenBerg A. Retracing our steps to understand ketamine in depression: A focused review of hypothesized mechanisms of action. *Mental Health Clinician*. 2021;11(3):200-10. doi: 10.9740/mhc.2021.05.200
7. **Irwin MN**, Quirk K, Banner A, Hosseini K, Smith MA. Strategies for rotation between gabapentinoids in the inpatient setting. *J Pain Pall Care Pharmacotherapy*.2021;35(1):13-22. doi:10.1080/15360288.2020.1852358
6. **Irwin MN**, Petersen KS, Smith MA. Rapid buprenorphine induction for cancer pain in pregnancy. *J Palliat Med*. 2021;24(8):1257-62. doi:10.1089/jpm.2020.0524
5. **Irwin M**, Tare M, Singh A, Puli O, Riccetti M, Deshpande P, et al. A positive feedback loop of Hippo- and c-Jun-Amino-Terminal kinase signaling pathways regulates amyloid-beta-mediated neurodegeneration. *Front Cell Dev Biol*. 2020;8:117. doi: 10.3389/fcell.2020.00117
4. Thompson, M; **Irwin, M**; Murphy, C. 969: Phenobarbital monotherapy for acute alcohol withdrawal syndrome in the surgical ICU. *Crit Care Med*: 2019;47(1suppl):463. doi: 10.1097/01.ccm.0000551717.93052.50
3. Sarkar A, **Irwin M**, Singh A, Riccetti M, & Singh A. Alzheimer's disease: The silver tsunami of the 21st century. *Neural Regen Res*. 2016;11(5):693-697. doi: 10.4103/1673-5374.182680
2. **Irwin M** & Singh A. The Role of the Hippo-Signaling Pathway and the JNK-Signaling Pathway in Amyloid-Beta 42 (A β 42) Mediated Cell Death in the *Drosophila* Eye. (Undergraduate thesis). 2015.
1. **Irwin M** & Singh A. Review: The roles of Hippo signaling and JNK signaling in Alzheimer's Disease in *Drosophila melanogaster*. *2013 Berry Summer Thesis Institute Proceedings*. 2013.

BOOK CHAPTERS

1. **Irwin MN** & Smith MA. Ch. 35, Acute Pain Management. In: Matthias KR, Katz MD eds. *Pharmacotherapy Principles and Practice Study Guide: A Case Based Care Plan Approach*, 6th ed. New York: McGraw Hill Medical; 2023. ISBN 978-1-264-27891-6

GRANT FUNDING

4. Pharmacist interventions for insomnia in palliative care: Key stakeholder perspectives , January 1, 2022-June 30, 2024 Society of Pain and Palliative Care Pharmacists Seed Fund Role: PI	0% effort \$5,000 (direct costs)
3. Intersection of insomnia and centralized pain in older adults: Effects on medication use , July 1, 2022-June 30, 2023 Claude D. Pepper OAIC and University of Michigan Geriatrics Center Role: Postdoctoral fellow (PI: Smith)	25% effort \$19,868 (direct costs)
2. Patterns of opioid use for centralized pain in older adults , April 1, 2022-March 31, 2023 University of Michigan College of Pharmacy, Duellman Award Role: PI	0% effort \$20,000 (direct costs)
1. Quality of life and potentially inappropriate medications in older adult cancer survivors , March 1, 2022-February 28, 2023 Pilot and Exploratory Projects in Palliative Care Role: Postdoctoral fellow (PI: Smith)	10% effort \$19,990 (direct costs)

INVITED PRESENTATIONS

10. Oh, the places you'll go – In pharmacy! Keynote Presentation; Great Lakes Pharmacy Conference, University of Michigan, Ann Arbor, MI.	May 23, 2024
9. Pain Management Michigan Medicine Hematology/Oncology Nursing Core Course, Ann Arbor, MI.	May 7, 2024
8. Optimizing medication management in chronic pain: Pain management in the hospitalized patient ANCC Accredited Continuing Education; University of Michigan Health APRN Professional Development Series, Ann Arbor, MI.	November 7, 2023
7. Virtual ambulatory palliative care: Pharmacist's perspective in palliative transitions of care ACCME, ANCC, and NASW Accredited Continuing Education; Veterans Affairs Ann Arbor GRECC and UM Division of Geriatric and Palliative Medicine Virtual Palliative and Hospice Care: Lessons Learned and Future Directions.	April 21, 2022
6. Scoping review of pharmacist acute care interventions for opioid use ACCP Journals Podcast, https://apple.co/38UdlS6 .	February 14, 2022
5. The painful truth of opioid allergies and our itch to find out ACPE Accredited Continuing Pharmacy Education Presentation; Michigan Pharmacists Association Annual Convention.	February 2021

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| <p>4. The painful truth of opioid allergies and our itch to find out
 ACPE Accredited Continuing Pharmacy Education Presentation;
 Southeastern Michigan Society of Health-System Pharmacists Exemplary
 Resident CE Lecture.</p> | <p>January 2021</p> |
| <p>3. Deprescribing: Tips and tricks
 Northstar Palliative Care Nurse Practitioner Conference, Ann Arbor, MI.</p> | <p>November 2020</p> |
| <p>2. Antipsychotics 101
 Northstar Palliative Care Nurse Practitioner Conference, Ann Arbor, MI.</p> | <p>October 2020</p> |
| <p>1. Pain and symptom management in end-of-life care for adults with COVID-19
 ACCME and ANCC Accredited Continuing Medical and Nursing Education;
 2020 The Power of Palliative Care: Lessons Learned During COVID-19
 Webinar, Ann Arbor, MI.</p> | <p>September 2020</p> |

SCIENTIFIC PLATFORM PRESENTATIONS

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| <p>5. Buprenorphine in two acts: Treating acute pain and dispelling myths for the management of chronic pain
 ACPE Accredited Continuing Pharmacy Education Presentation, 1.00 contact hours; SPPCP 2021 Virtual Conference on Pain and Palliative Care. Co-presenters: Jessica Emshoff, PharmD, BCPS, BCGP; Kyle Quirk, PharmD</p> | <p>May 2021</p> |
| <p>4. The painful truth of opioid allergies and our itch to find out
 ACPE Accredited Continuing Pharmacy Education Presentation, 1.00 contact hours, Ann Arbor, MI.</p> | <p>October 2020</p> |
| <p>3. Low-dose naltrexone for chronic pain: Research proposal and protocol
 2020 ACCP Pain and Palliative PRN Annual Meeting.</p> | <p>October 2020</p> |
| <p>2. Glutamate modulation in depression: How does ketamine actually work?
 ACPE Accredited Continuing Pharmacy Education Presentation, 1.00 contact hours, Ann Arbor, MI.</p> | <p>February 2020</p> |
| <p>1. Gabapentin and pregabalin conversions: Best approaches Michigan Medicine Pharmacy Residency Protocol Presentation, Ann Arbor, MI.</p> | <p>September 2019</p> |

SCIENTIFIC POSTER PRESENTATIONS

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| <p>7. Low dose naltrexone for chronic pain in adults (Poster Presentation)
 2022 ACCP Global Conference on Clinical Pharmacy, San Francisco, CA.</p> | <p>September 2022</p> |
| <p>6. Buprenorphine induction for sickle-cell pain in a pediatric patient (Virtual Poster Presentation) 2021 American Academy of Hospice and Palliative Medicine Annual Assembly.</p> | <p>February 2021</p> |

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| 5. Strategies for rotation between gabapentinoids in the inpatient setting (Virtual Poster Presentation) 2020 ACCP Annual Meeting. | October 2020 |
| 4. Medication utilization evaluation of intravenous copper therapy within a large, academic medical center (Poster Presentation) ASHP Midyear Clinical Meeting and Exhibition, Anaheim, CA. | December 2018 |
| 3. Phenobarbital for acute alcohol withdrawal syndrome in the surgical ICU (Poster Presentation) ASHP Midyear Clinical Meeting and Exhibition, Orlando, FL. | December 2017 |
| 2. <i>Drosophila</i> eye model to understand role of signaling pathways in Aβ42 mediated neurodegeneration (Poster Presentation) Genetics Society of America 56 th Annual <i>Drosophila</i> Research Conference, Chicago, IL. | March 2015 |
| 1. Hippo signaling pathway and JNK signaling pathway in Amyloid-Beta 42 (Aβ42) mediated cell death (Poster Presentation) OMV-SfN Neuroscience Day at The University of Cincinnati Medical School, Cincinnati, OH. | July 2013 |

TEACHING

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| University of Michigan School of Nursing, Interprofessional Case Discussion on Opioid Use Disorder
Facilitator
Director: Gina Dahlem, PhD, FNP-C, FAANP | Ann Arbor, Michigan
April 7, 2023 |
| University of Michigan College of Pharmacy, P547 Fundamentals of Pain Management (PharmD), 1-credit hour course
Course Coordinator
Course Director: Michael Smith, PharmD, BCPS | Ann Arbor, Michigan
January 2023-June 2023 |
| University of Michigan College of Pharmacy, P117 Fundamentals of Pain Management, 1-credit hour course
Course Coordinator
Lecturer (Introduction and Pain Epidemiology; Neuroanatomy, Physiology, and Pathophysiology of Pain; SNRIs/TCAs Pharmacology; Gabapentinoids Pharmacology)
Course Director: Michael Smith, PharmD, BCPS | Ann Arbor, Michigan
January 2022-December 2023 |
| University of Michigan College of Pharmacy, P516 Pharmacy and the US Health System, 2-credit hour course
Graduate Student Instructor
Course Director: Steven Erickson, PharmD | Ann Arbor, Michigan
January 2022-May 2022 |
| University of Michigan School of Nursing, HS 301 Exploring Palliative Care, 2-credit hour course
Lecturer (Pharmacologic Symptom Management)
Course Director: Heidi Mason, DNP, RN, ACNP-BC | Ann Arbor, Michigan
February 4, 2021 |

University of Michigan College of Pharmacy, P733 Pharmacy Practice Skills IV, 2-credit hour course
Ann Arbor, Michigan
July 2020-June 2023
Course Coordinator
Course Director: Michael Smith, PharmD, BCPS

University of Michigan College of Pharmacy, P621 Pharmacotherapeutics II for Doctor of Nursing Students, 4-credit hour course
Ann Arbor, Michigan
February 20, 2020
Lecturer (Pharmacology of Antiepileptic Agents and Pharmacotherapy of Seizures)
Course Coordinator: Paul C. Walker, PharmD, FASHP, FMPA

University of Michigan College of Pharmacy, P733 Pharmacy Practice Skills IV, 2-credit hour course
Ann Arbor, Michigan
January-May 2020
Instructor
Course Coordinator: Michael Smith, PharmD, BCPS

The Ohio State University College of Pharmacy
Columbus, Ohio
October 24 and 26, 2018
Interprofessional Simulation Peer Facilitator/Preceptor
Supervisor: Julie Legg, PharmD

The Ohio State University College of Pharmacy
Columbus, Ohio
September 2017-June 2018
Peer Tutor
Supervisor: Katherine Kelley, PhD

POST-GRADUATE TRAINEE INVOLVEMENT

University of Michigan Health, Ann Arbor, Michigan
Required Rotation – Adult Ambulatory Palliative Care
2023-24 PGY2 Pharmacy Resident – Isabelle Zerfas April-June 2024
2022-23 PGY2 Pharmacy Resident – Abbey Schwery August-November 2022
2021-23 PGY2 Non-Traditional Pharmacy Resident – Rania Bazzi April-September 2022
2021-22 PGY2 Pharmacy Resident – Aradhna Mayalall September-December 2021

Required Rotation – Adult Inpatient Palliative Care
2023-24 PGY2 Pharmacy Resident – Isabelle Zerfas May 2024

Required Rotation – Longitudinal Research
2022-2023 PGY1 Health System Pharmacy Resident – Meagan Dean September 2022-June 2023

Elective Rotation – Adult Ambulatory Palliative Care
2022-23 PGY2 Ambulatory Care Pharmacy Resident – Fatima Waheedi January -March 2023
2022-23 PGY2 Ambulatory Care Pharmacy Resident – Kelsey Ernst August-November 2022
2021-22 PGY2 Ambulatory Care Pharmacy Resident – Henry Huang January-March 2022

PROFESSIONAL SERVICE

Professional Organizations

American College of Clinical Pharmacy	July 2020-present
National Resident Advisory Committee, Member at Large (July 2022-June 2023)	
Pain and Palliative Care Practice and Research Network (July 2020-present)	
Membership Committee, Chair Elect (October 2021-2022)	
Membership Committee, Chair (November 2022-December 2023)	
Society of Pain and Palliative Care Pharmacists	July 2020-present
Southeastern Michigan Society of Health System Pharmacists	August 2019-present
Rho Chi Honors Society Upsilon Chapter	February 2017-present
Secretary for the Class of 2019 (September 2017-May 2018)	
American Society of Health System Pharmacists	October 2015-2023
Section of Inpatient Practitioners	
Section of Clinical Specialists and Scientists	
Student Society of Health System Pharmacy	May 2015-May 2019
Programming Co-Coordinator, Executive Board Member (May 2016-May 2017)	

Reviewing and Editorial Activities

Journal of Pain and Symptom Management, Reviewer	2024-present
Mental Health Clinician, Reviewer	2021-present

ACADEMIC SERVICE

University of Michigan Health , Ann Arbor, Michigan	
Ambulatory Care Controlled Substances Quality Improvement Committee, Member	February 2024-present
Pain Committee, Member	February 2024-present
Residency Advisory Committee, Member	July 2020-June 2021
Michigan Medicine Pharmacy Residency Program, 2020-2021 PGY2 Chief Resident	July 2020-June 2021
University of Michigan College of Pharmacy , Ann Arbor, Michigan	
Clinical Skills Committee, Member	February 2024-present

COMMUNITY SERVICE

Pharmacist Preceptor UM COP Community Screening Event	Ann Arbor, Michigan October 27, 2021
Pharmacist Volunteer Student Run Free Clinic	Pinckney, Michigan October 16, 2019
Naloxone Clinic Student Volunteer Southeast Incorporated Healthcare Services	Columbus, Ohio January 2017-May 2017
Pharmacy Volunteer Helping Hands Free Clinic	Columbus, Ohio February 2016-May 2018

HONORS AND AWARDS

2022 ACCP Resident/Fellow Travel Award	September 2022
2022-2023 Rho Chi Society Clinical Research Scholarship	January 2022
2021 SMSHP Resident of the Year	October 2021
2021 James G. Stevenson Excellence in Pharmacy Practice Award	June 2021
2020 SMSHP Exemplary Resident CE Award	November 2020
2020 ACCP Pain and Palliative Care PRN Resident Conference Award	September 2020
The College of Pharmacy Alumni Society Scholarship Fund	June 2018
The William and Anne Altschule Professional Student Scholarship and Endowed Fund in Pharmacy	June 2017
The Plough Pharmacy Student Scholarship Fund	June 2016
The Ohio State University Pharmacy Merit Scholarship	June 2016, 2017
2014 University of Dayton Goldwater Scholar Nominee	2014
2014 Daniel P. Arnold Memorial Scholarship	June 2014
Sigma Xi 2 nd Place Undergraduate Poster Award	April 2013, 2014
Frank G. Brooks Award for Excellence in Student Research	March 2013

REFERENCES

Available upon request