
BIOGRAPHICAL SKETCH

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NAME: Carnahan, Ryan M.

eRA COMMONS USER NAME (credential, e.g., agency login): RCARNAHAN

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

| INSTITUTION AND LOCATION | DEGREE <i>(if applicable)</i> | Completion Date MM/YY | FIELD OF STUDY |
|-----------------------------------|----------------------------------|-----------------------------|--------------------|
| University of Iowa, Iowa City, IA | Pharm.D. | 2001 | Pharmacy |
| University of Iowa, Iowa City, IA | M.S. | 2004 | Epidemiology |
| University of Iowa, Iowa City, IA | Fellowship | 2001-2004 | Psychopharmacology |

Positions and Honors

Positions and Employment

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| 2001-2004 | Fellow in Clinical Psychopharmacology, University of Iowa College of Pharmacy |
| 2004-2008 | Assistant Professor, University of Oklahoma College of Pharmacy |
| 2004-2008 | Pharmacy Consultant, OU-IMPACT, assertive community treatment team OU-Tulsa College of Medicine, Department of Psychiatry |
| 2006-2008 | Director of PACT Research, OU-Tulsa College of Medicine, Department of Psychiatry |
| 2008-2013 | Assistant Professor (Clinical) University of Iowa College of Public Health, Department of Epidemiology |
| 2008-present | Associate Director, University of Iowa Health Effectiveness Research Center |
| 2008-2012 | Assistant Director and Educational Consortium Representative University of Iowa Older Adult Center for Education and Research on Therapeutics |
| 2013-2014 | Associate Professor (Clinical) University of Iowa College of Public Health, Department of Epidemiology |
| 2014-2020 | Associate Professor University of Iowa College of Public Health, Department of Epidemiology |
| 2016-2018 | Co-Director of Education and Outreach University of Iowa Center on Aging |
| 2017-current | Director of Graduate Studies University of Iowa College of Public Health, Department of Epidemiology |
| 2018-2019 | Co-Director The University of Iowa Aging Mind and Brain Initiative |
| 2020-current | Professor University of Iowa College of Public Health, Department of Epidemiology |

Other Professional Activities

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|-----------|---|
| 1998-1999 | Member of the Iowa Pharmacy Association House of Delegates |
| 1998-2000 | Co-Chairperson of the Operation Immunization Committee, Academy of Students of Pharmacy |
| 1999 | Member, Iowa Pharmacy Association Professional Affairs Policy Committee |
| 1999 | Member, Academy of Students of Pharmacy—American Pharmaceutical Association National House of Delegates |
| 1999-2000 | Internship with Pharmacy Care Associates/Omni Care, long-term care pharmacy |
| 1999-2004 | Member, Iowa Pharmacy Association Political Action Network |
| 2004 | Board Certification in Psychiatric Pharmacy from the Board of Pharmaceutical Specialties |
| 2005-2006 | University of Oklahoma Health Sciences Center Faculty Leadership Fellow |
| 2006-2014 | Member, the College of Psychiatric and Neurologic Pharmacists Research Committee |

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| 2008-2012 | Member, Veterans Affairs VISN 23 Mental Health Pharmacoepidemiology Consulting Board |
| 2009-2011 | Member, CHAIN Editorial Board, CERTs national education website |
| 2010-2012 | Vice Chair, the College of Psychiatric and Neurologic Pharmacists Research Committee |
| 2010-2014 | Member, Protocol Core, FDA Mini-Sentinel surveillance program |
| 2010-2014 | Co-Director, Iowa Geriatric Education Center |
| 2011 | Expert Panel Member, Treatment of Neuropsychiatric Symptoms in Dementia, University of Michigan Program for Positive Aging |
| 2012-2013 | Ad Hoc Member, NIA-S review panel |
| 2012-2014 | Chair, the College of Psychiatric and Neurologic Pharmacists Research Committee |
| 2014 | Committee Member, National Quality Forum, Prioritizing Measure Gaps Project, Alzheimer's Disease and Related Dementias |
| 2014-2015 | Co-Lead, the College of Psychiatric and Neurologic Pharmacists Research Community |
| 2014-present | Leadership Team Member, Iowa Geriatric Education Center |
| 2014-2020 | Co-Lead, Applied Surveillance Core, FDA Sentinel System |

Awards and Honors

| | |
|-----------|---|
| 1999 | Inducted into Rho Chi—Delta Chapter, National Pharmacy Honor Society |
| 2001 | Department of Psychiatry Award for excellence in psychiatric pharmacy practice and research |
| 2001 | Bristol Meyers Squibb Patient Care Award, University of Iowa |
| 2002 | American College of Clinical Pharmacists Wyeth Psychopharmacology Research Fellowship |
| 2003-2005 | NIH Clinical Researcher Loan Repayment Program award |
| 2004 | Inducted into the Delta Omega—Alpha Phi Chapter, Honorary Society in Public Health |
| 2007 | The College of Psychiatric and Neurologic Pharmacists New Investigator Award |
| 2008 | University of Iowa College of Public Health/College of Medicine New Investigator Award |
| 2013 | Edna Stilwell Writing Award, Slack Incorporated, Publisher of the Journal of Gerontological Nursing |
| 2019 | Faculty Teaching Award, The University of Iowa College of Public Health |

C. Publications (2017-present, in chronological order)

1. Bali V, Chatterjee S, Carnahan R, Chen H, Johnson M, Aparasu RR (2017). Risk of mortality in elderly nursing home patients with depression using paroxetine. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*, 37(3):287-296. PMID: 28079266
2. Carnahan RM, Brown GD, Letuchy EM, Rubenstein LM, Gryzlak BM, Smith M, Reist JC, Kelly MW, Schultz SK, Weckmann MT, Chrischilles EA (2017). Impact of programs to reduce antipsychotic and anticholinergic use in nursing homes. *Alzheimer's & Dementia: Clinical and Translational Sciences*, 3(4):553-561. PMC: PMC5671632, PMID: 29124114
3. Al-Jumaili AA, Al-Rekabi MD, Alsawad OS, Allela OQB, Carnahan R, Saeed H, Naqishbandi A, Kadhim DJ, Sorofman B (2017). Exploring Electronic Communication Modes Between Iraqi Faculty and Students of Pharmacy Schools Using the Technology Acceptance Model. *American Journal of Pharmaceutical Education*, 81(5):89. PMC: PMC5508088, PMID: 28720917
4. Jorgensen SM, Carnahan RM, Weckmann MT (2017). Validity of the Delirium Observation Screening Scale in Identifying Delirium in Home Hospice Patients. *The American journal of hospice & palliative care*, 34(8):744-747. PMC: PMC5236003, PMID: 27413013
5. Zhou M, Wang SV, Leonard CE, Gagne JJ, Fuller C, Hampp C, Archdeacon P, Toh S, Iyer A, Woodworth TS, Cavagnaro E, Panozzo CA, Axtman S, Carnahan RM, Chrischilles EA, Hennessy S (2017). Sentinel Modular Program for Propensity Score-Matched Cohort Analyses: Application to Glyburide, Glipizide, and Serious Hypoglycemia. *Epidemiology (Cambridge, Mass.)*, 28(6):838-846. PMC: PMC6554646, PMID: 28682851

6. Ammann EM, Leira EC, Winiecki SK, Nagaraja N, Dandapat S, Carnahan RM, Schweizer ML, Torner JC, Fuller CC, Leonard CE, Garcia C, Pimentel M, Chrischilles EA (2017). Chart validation of inpatient ICD-9-CM administrative diagnosis codes for ischemic stroke among IGIV users in the Sentinel Distributed Database. *Medicine*, 96(52):e9440. PMID: 29384925
7. Eum S, Hill SK, Rubin LH, Carnahan RM, Reilly JL, Ivleva EI, Keedy SK, Tamminga CA, Pearlson GD, Clementz BA, Gershon ES, Keshavan MS, Keefe RSE, Sweeney JA, Bishop JR (2017). Cognitive burden of anticholinergic medications in psychotic disorders. *Schizophrenia research*, 190:129-135. PMC: PMC5628100, PMID: 28390849
8. Carnahan RM, Letuchy EM (2018). Bipolar Disorder in Nursing Homes: Impact on Antipsychotic Use, Diagnosis Patterns, and New Diagnoses in People with Dementia. *The American Journal of Geriatric Psychiatry*, 26(1):2-10. PMID: 29031571
9. Ammann EM, Cuker A, Carnahan RM, Perepu US, Winiecki SK, Schweizer ML, Leonard CE, Fuller CC, Garcia C, Haskins C, Chrischilles EA (2018). Chart validation of inpatient International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) administrative diagnosis codes for venous thromboembolism (VTE) among intravenous immune globulin (IGIV) users in the Sentinel Distributed Database. *Medicine*, 97(8):e9960. PMC: PMC5841980, PMID: 29465588
10. Chrischilles EA, Gagne JJ, Fireman B, Nelson J, Toh S, Shoabi A, Reichman ME, Wang S, Nguyen M, Zhang R, Izem R, Goulding MR, Southworth MR, Graham DJ, Fuller C, Katcoff H, Woodworth T, Rogers C, Saliga R, Lin ND, McMahonill-Walraven CN, Nair VP, Haynes K, Carnahan RM (2018). Prospective surveillance pilot of rivaroxaban safety within the US Food and Drug Administration Sentinel System. *Pharmacoepidemiology and drug safety*, 27(3):263-271. PMID: 29318683
11. Ammann EM, Schweizer ML, Robinson JG, Eschol JO, Kafa R, Girotra S, Winiecki SK, Fuller CC, Carnahan RM, Leonard CE, Haskins C, Garcia C, Chrischilles EA (2018). Chart validation of inpatient ICD-9-CM administrative diagnosis codes for acute myocardial infarction (AMI) among intravenous immune globulin (IGIV) users in the Sentinel Distributed Database. *Pharmacoepidemiology and Drug Safety*, 27(4):398-404. PMID: 29446185
12. Carnahan RM, Kuntz JL, Wang SV, Fuller C, Gagne JJ, Leonard CE, Hennessy S, Meyer T, Archdeacon P, Chen CY, Panozzo CA, Toh S, Katcoff H, Woodworth T, Iyer A, Axtman S, Chrischilles EA (2018). Evaluation of the US Food and Drug Administration sentinel analysis tools in confirming previously observed drug-outcome associations: The case of clindamycin and Clostridium difficile infection. *Pharmacoepidemiology and Drug Safety*, 27(7):731-739. PMID: 29532543
13. Zhang Y, Letuchy EM, Carnahan RM (2018). Where Are Antipsychotics Prescribed in Nursing Homes Initiated? *Journal of the American Geriatrics Society*, 66(6):1082-1088. PMID: 29355891
14. Mendy A, Forno E, Niyonsenga T, Carnahan R, Gasana J (2018). Prevalence and features of asthma-COPD overlap in the United States 2007-2012. *The Clinical Respiratory Journal*, 12(8):2369-2377. PMC: PMC6287748, PMID: 29873189
15. Carnahan RM, Gagne JJ, Hampp C, Leonard CE, Toh S, Fuller C, Hennessy S, Hou L, Cocoros NM, Panucci G, Woodworth T, Cosgrove A, Iyer A, Chrischilles EA (2019). Evaluation of the US Food and Drug Administration Sentinel Analysis Tools Using a Comparator with a Different Indication: Comparing the Rates of Gastrointestinal Bleeding in Warfarin and Statin Users. *Pharmaceutical Medicine*, 33(1):29-43.
16. Carnahan RM, Daly JM, Minion S, Gryzlak B, Weckmann MT, Levy BT, Bay CP (2019). A Needs Assessment of Family Physicians to Inform Development of Educational Resources on Antipsychotic Use in Dementia. *Journal of primary care & community health*, 10:2150132719840113. PMC:

PMC6477762, PMID: 31006318

17. Ranapurwala SI, Carnahan RM, Brown G, Hinman J, Casteel C (2019). Impact of Iowa's Prescription Monitoring Program on Opioid Pain Reliever Prescribing Patterns: An Interrupted Time Series Study 2003-2014. *Pain medicine (Malden, Mass.)*, 20(2):290-300. PMID: 29509935
18. Haskins CB, McDowell BD, Carnahan RM, Fiedorowicz JG, Wallace RB, Smith BJ, Chrischilles EA (2019). Impact of preexisting mental illness on breast cancer endocrine therapy adherence. *Breast cancer research and treatment*, 174(1):197-208. PMC: PMC6426454, PMID: 30465157
19. Stewart M, Norden AD, Dreyer N, Henk HJ, Abernethy AP, Chrischilles E, Kushi L, Mansfield AS, Khozin S, Sharon E, Arunajadai S, Carnahan R, Christian JB, Miksad RA, Sakoda LC, Torres AZ, Valice E, Allen J (2019). An Exploratory Analysis of Real-World End Points for Assessing Outcomes Among Immunotherapy-Treated Patients With Advanced Non-Small-Cell Lung Cancer. *JCO clinical cancer informatics*, 3:1-15. PMID: 31335166
20. Voruganti DC, Shantha G, Dugyala S, Pothineni NVK, Mallick DC, Deshmukh A, Mohsen A, Colello SS, Saeed M, Latchamsetty R, Jongnarangsin K, Pelosi F, Carnahan RM, Giudici M (2019). Temporal trends and factors associated with increased mortality among atrial fibrillation weekend hospitalizations: an insight from National Inpatient Sample 2005-2014. *BMC research notes*, 12(1):398. PMID: 31300069
21. Lee S, Gottlieb M, Mulhausen P, Wilbur J, Reisinger HS, Han JH, Carnahan R (2020). Recognition, prevention, and treatment of delirium in emergency department: An evidence-based narrative review. *The American journal of emergency medicine*, 38(2):349-357. PMID: 31759779
22. Singh N, Nair R, Goto M, Carvour ML, Carnahan R, Field EH, Lenert P, Vaughan-Sarrazin M, Schweizer ML, Perencevich EN (2019). Risk of Recurrent *Staphylococcus aureus* Prosthetic Joint Infection in Rheumatoid Arthritis Patients-A Nationwide Cohort Study. *Open forum infectious diseases*, 6(11):ofz451. PMC: PMC6847211, PMID: 31737738
23. Lee S, Harland K, Mohr NM, Matthews G, Hess EP, Bellolio MF, Han JH, Weckmann M, Carnahan R (2019). Evaluation of emergency department derived delirium prediction models using a hospital-wide cohort. *Journal of psychosomatic research*, 127:109850. PMID: 31678811
24. Dougherty MC, Woodroffe RW, Wilson S, Gillies GT, Howard, 3rd MA, Carnahan RM (2020). Predictors of Reduced Opioid Use With Spinal Cord Stimulation in Patients With Chronic Opioid Use. *Neuromodulation: journal of the International Neuromodulation Society*, 23(1):126-132. PMID: 31602750
25. Weeks KS, Lynch CF, West M, McDonald M, Carnahan R, Stewart SL, Charlton M (2020). Impact of Rurality on Stage IV Ovarian Cancer at Diagnosis: A Midwest Cancer Registry Cohort Study. *The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association*, 36(4):468-475. PMC: PMC7852624, PMID: 32077162
26. Chatterjee S, Bali V, Carnahan RM, Chen H, Johnson ML, Aparasu RR (2020). Anticholinergic burden and risk of cognitive impairment in elderly nursing home residents with depression. *Research in social & administrative pharmacy: RSAP*, 16(3):329-335. PMID: 31182419
27. Nidey N, Carnahan R, Carter KD, Strathearn L, Bao W, Greiner A, Jelliffe-Pawłowski L, Tabb KM, Ryckman K (2020). Association of Mood and Anxiety Disorders and Opioid Prescription Patterns Among Postpartum Women. *The American journal on addictions*, 29(6):463-470. PMID: 32249527
28. Haskins CB, Neuner JM, McDowell BD, Carnahan RM, Fiedorowicz JG, Wallace RB, Smith BJ, Chrischilles EA (2020). Effects of Previous Medication Regimen Factors and Bipolar and Psychotic

Disorders on Breast Cancer Endocrine Therapy Adherence. *Clinical breast cancer*, 20(3):e261-e280. PMC: PMC7103521, PMID: 32139273

29. Chapman CG, Hudspeth J, Floyd SB, Carnahan R, Thigpen CA, Kissenberth MJ (2020). Increased opioid use following rotator cuff repair associated with prior opioid use and surgeon prescription patterns. *Journal of shoulder and elbow surgery*, 29(7S):S115-S125. PMID: 32646593
30. Carnahan RM, Waitman LR, Charlton ME, Schroeder MC, Bossler AD, Campbell WS, Campbell JR, McDowell BD, Smith NC, Gryzlak BM, Chrischilles EA (2020). Exploration of PCORnet Data Resources for Assessing Use of Molecular-Guided Cancer Treatment. *JCO clinical cancer informatics*, 4:724-735. PMID: 32795185
31. Fuller CC, Hua W, Leonard CE, Mosholder A, Carnahan R, Dutcher S, King K, Petrone AB, Rosofsky R, Shockro LA, Young J, Min JY, Binswanger I, Boudreau D, Griffin MR, Adgent MA, Kuntz J, McMahill-Walraven C, Pawloski PA, Ball R, Toh S (2020). Developing a Standardized and Reusable Method to Link Distributed Health Plan Databases to the National Death Index: Methods Development Study Protocol. *JMIR research protocols*, 9(11):e21811. PMC: PMC7669437, PMID: 33136063
32. Haskins CB, McDowell BD, Carnahan RM, Fiedorowicz JG, Wallace RB, Smith BJ, Chrischilles EA (2021). Breast cancer endocrine therapy adherence in health professional shortage areas: Unique effects on patients with mental illness. *Journal of psychosomatic research*, 140:110294. PMID: 33232903
33. Weeks K, Lynch CF, West M, Carnahan R, O'Rourke M, Oleson J, McDonald M, Stewart SL, Charlton M (2021). Rural disparities in surgical care from gynecologic oncologists among Midwestern ovarian cancer patients. *Gynecologic oncology*, 160(2):477-484. PMC: PMC7869694, PMID: 33218682
34. Rege S, Carnahan RM, Johnson ML, Chen H, Holmes HM, Aparasu RR (2021). Antipsychotic Initiation Among Older Dementia Patients Using Cholinesterase Inhibitors: A National Retrospective Cohort Study. *Drugs & aging*, 38(6):493-502. PMID: 33763822
35. Vakkalanka P, Lund BC, Arndt S, Field W, Charlton M, Ward MM, Carnahan RM (2021). Association Between Buprenorphine for Opioid Use Disorder and Mortality Risk. *American journal of preventive medicine*. PMID: 34023160
36. Vakkalanka JP, Lund BC, Ward MM, Arndt S, Field RW, Charlton M, Carnahan RM (2021). Telehealth Utilization Is Associated with Lower Risk of Discontinuation of Buprenorphine: a Retrospective Cohort Study of US Veterans. *Journal of general internal medicine*. PMID: 34159547
37. Dougherty MC, Woodroffe RW, Wilson S, Gillies GT, Howard, 3rd MA, Carnahan RM (2021). Risk Factors and Survival Analysis of Spinal Cord Stimulator Explantation. *Neuromodulation : journal of the International Neuromodulation Society*, 24(1):61-67. PMID: 32491256
38. Weeks KS, Lynch CF, West MM, Carnahan RM, O'Rourke MA, Oleson JJ, McDonald ME, Charlton ME (2021). Impact of Surgeon Type and Rurality on Treatment and Survival of Ovarian Cancer Patients. *American journal of clinical oncology*. PMID: 34342289