

# CAITLIN WARD

2221 University Ave SE, Suite 200  
Minneapolis, MN 55414

Email: [ward-c@umn.edu](mailto:ward-c@umn.edu)  
Website: [ceward18.github.io](https://ceward18.github.io)  
ORCID: [0000-0002-0806-0222](https://orcid.org/0000-0002-0806-0222)

## EDUCATION

---

2018-2021	<b>University of Iowa</b> PhD, Biostatistics      Advisors: Dr. Jacob Oleson and Dr. Grant Brown Topic: Bayesian Methods for Spatio-Temporal Epidemic Models
2016-2018	<b>University of Iowa</b> MS, Biostatistics
2012-2016	<b>Iowa State University</b> BS, Statistics, <i>Summa Cum Laude</i> , Minors in Mathematics and Russian Studies

## RESEARCH INTERESTS

---

Bayesian statistics	Statistical computing	Infectious disease epidemiology
Network analysis	Spatio-temporal modeling	Multiplex imaging analysis

## EMPLOYMENT

---

2022-Present	<b>University of Minnesota</b> <i>Assistant Professor</i> , Division of Biostatistics & Health Data Science	Minneapolis, MN
2021-Present	<b>University of Iowa</b> <i>Adjunct Assistant Professor</i> , College of Nursing	Iowa City, IA
2021-2022	<b>University of Calgary</b> <i>CANSSI Distinguished Postdoctoral Fellow</i> Supervisors: Dr. Rob Deardon and Dr. Alexandra Schmidt	Calgary, AB
2016-2021	<b>University of Iowa</b> <i>Graduate Research Assistant</i> , Department of Biostatistics Biostatistics Consulting Center Center for Public Health Statistics Public Policy Center	Iowa City, IA

## HONORS AND AWARDS

---

2021	Milford E. Barnes Award, University of Iowa College of Public Health
2021	Ada Louise Ballard and Seashore Dissertation Fellowship, University of Iowa
2021	University of Iowa Dare to Discover Banner Campaign, Featured Researcher
2021	Recipient of Thank a Teacher note of appreciation through the Center for Teaching
2020	William R. Clarke Graduate Teaching Assistant Award, University of Iowa
2020	University of Iowa Council on Teaching Outstanding Teaching Assistant Award
2020	Recipient of Thank a Teacher note of appreciation through the Center for Teaching
2018	Leon F. Burmeister Memorial Scholarship Award, University of Iowa
2018	William R. Clarke Graduate Research Assistant Award, University of Iowa
2015	George W. Snedecor Undergraduate Award, Iowa State University

## PUBLICATIONS

---

### *Peer-Reviewed Journal Publications*

32. Shaw, C., Gordon, J., **Ward, C.**, Jackson, L., Shaw, N., Williams, K. (In press). The Iowa Coding Scheme for Elderspeak (ICodeE): Development and Validation. *The Gerontologist*.
31. Novotny, B., Moore, R., Langit, L., Maus, R. L., Jiang, J., **Ward, C.**, Guo, R., Winham, S. J., Goode, E. L., Markovic, S. N., Wang, C. (2025). SpaFlow: A Nextflow pipeline for QC and clustering of MxIF datasets. *Bioinformatics Advances*. 10.1093/bioadv/vbaf032
30. **Ward, C.**, Finical, W., Rounds, J. M., Smith, K., Klumb, C. A., Tarr, G. (2025). Ruminant-dense environments increase risk of Shiga toxin-producing *Escherichia coli* independently of direct ruminant contact. *Applied and Environmental Microbiology*. doi: 10.1128/aem.01864-24
29. Dei-Adomakoh, Y., Olayemi, E., Telke, S., Asamoah-Akuoko, L., Appiah, B., Segbefia, C., **Ward, C.**, Tancred, T., Yawson, A. E., Adu-Afarwuah, S., Akwasi-Kuma, A. B., Ofori-Acquah, S. F., Adongo, P. B., Acquah, M. E., Ametorwo, R., Bates, I., Agyei, F., Delaney, M., Reilly, C. (2024). Impact of iron supplementation among anemic voluntary first-time blood donors: Results from the BLOODSAFE pilot trial in Ghana *Transfusions*. doi: 10.1111/trf.18082
28. Suman, S., Nevala, W. K., Leontovich, A. A., **Ward, C.**, Jakub, J. W., Kim, Y., Geng, L., Stueven, N. A., Atherton, C. L., Moore, R. M., Schimke, J. M., Lucien-Matteoni, F., McLaughlin, S., Markovic, S. N. (2024) Melanoma-derived extracellular vesicles induce CD36-mediated pre-metastatic niche. *Biomolecules*. doi: 10.3390/biom14070837
27. Biesheuvel, M. M., **Ward, C.**, Penterman, P., van Engelen, E., van Schaik, G., Deardon, R., Barkema, H. W. (2023). Within-herd transmission of *Mycoplasma bovis* infections after initial detection in dairy cows. *Journal of Dairy Science*. doi: 10.3168/jds.2023-23407
26. **Ward, C.**, Deardon, R., Schmidt, A. (2023). Bayesian modeling of dynamic behavioral change during an epidemic. *Infectious Disease Modelling*. doi: 10.1016/j.idm.2023.08.002
25. Bathla, G., Soni, N., **Ward, C.**, Pillenahalli Maheshwarappa, R., Agarwal, A., Priya S. (2023). Clinical and Magnetic Resonance Imaging Radiomics-Based Survival Prediction in Glioblastoma Using Multiparametric Magnetic Resonance Imaging. *Journal of Computer Assisted Tomography*. doi: 10.1097/RCT.0000000000001493
24. Shaw, C., **Ward, C.**, Lee, K., Williams, A., Herr, K. (2023). The relationship between rejection of care behaviors and pain and delirium severity in hospital dementia care. *Innovation in Aging*. doi: 10.1093/geroni/igad076
23. **Ward, C.**, Brown, G., Oleson, J. (2022). Incorporating infectious duration-dependent transmission into Bayesian epidemic models. *Biometrical Journal*. doi: 10.1002/bimj.202100401
22. Heeren, T., **Ward, C.**, Ashida, S., Sewell, D. (2022). Applying network analysis to assess the development and sustainability of multi-sector coalitions. *PLoS ONE*. doi: 10.1371/journal.pone.0276114
21. Shaw, C., **Ward, C.**, Gordon, J., Williams, K. N., Herr, K. (2022). Elderspeak communication and pain severity as modifiable factors to rejection of care in hospital dementia care. *Journal of the American Geriatrics Society*. doi: 10.1111/jgs.17910

20. Walker, E. A., **Ward, C.**, Oleson, J., Sapp, C., McCreery, R. W., Tomblin, J. B., Moeller, M. P., (2022). Language growth in children with mild to severe hearing loss who received early intervention by 3 months or 6 months of age. *Journal of Early Hearing Detection and Intervention*. doi: 10.26077/e97b-7add
19. Shaw, C., **Ward, C.**, Gordon, J., Williams, K. N., Herr, K. (2022). Characteristics of elderspeak communication in hospital dementia care: findings from the Nurse Talk observational study. *International Journal of Nursing Studies*. doi: 10.1016/j.ijnurstu.2022.104259
18. Horak, S., **Ward, C.** (2022). Evaluating a state child care assistance program using administrative data. *Evaluation and Program Planning*. doi: 10.1016/j.evalprogplan.2022.102094
17. Eskandari, A., Narayanasamy, S., **Ward, C.**, Priya, S., Aggarwal, T., Elam, J., Nagpal, P. (2022). Prevalence and significance of incidental findings on computed tomography pulmonary angiograms: a retrospective cohort study. *The American Journal of Emergency Medicine*. doi: 10.1016/j.ajem.2022.01.064
16. **Ward, C.**, Brown, G., Oleson, J. (2021). An individual level infectious disease model in the presence of uncertainty from multiple, imperfect diagnostic tests. *Biometrics*. doi: 10.1111/biom.13579
15. Lence, T., Lockwood, G. M., Storm D. W., **Ward, C.**, Cooper, C. S. (2021). The utility of renal sonographic measurements in differentiating children with high grade congenital hydronephrosis. *Journal of Pediatric Urology*. doi: 10.1016/j.jpuro.2021.07.021
14. Priya, S., Aggarwal, T., **Ward, C.**, Bathla, G., Jacob, M., Gerke, A., Hoffman, E., Nagpal, P. (2021). Radiomics side experiments and DAFIT approach in identifying pulmonary hypertension using Cardiac MRI derived radiomics based machine learning models. *Scientific Reports*. doi: 10.1038/s41598-021-92155-6
13. Priya, S., Lui, Y., **Ward, C.**, Le, N., Neetu, S., Maheshwarappa, R., Monga, V., Zhang, H., Sonka, M., Bathla G. (2021). Radiomic based machine learning performance for a three class problem in neuro-oncology: time to test the waters? *Cancers*. doi: 10.3390/cancers13112568
12. Priya, S., Agarwal, A., **Ward, C.**, Locke, T., Monga, V., Bathla G. (2021) Survival prediction in glioblastoma on post-contrast magnetic resonance imaging using filtration based first-order texture analysis: comparison of multiple machine learning models. *The Neuroradiology Journal*. doi: 10.1177/1971400921990766
11. Priya, S., Lui, Y., **Ward, C.**, Le, N., Neetu, S., Maheshwarappa, R., Monga, V., Zhang, H., Sonka, M., Bathla G. (2021). Machine learning based differentiation of glioblastoma from brain metastasis using MRI derived radiomics. *Scientific Reports*. doi: 10.1038/s41598-021-90032-w
10. Priya, S., Aggarwal, T., **Ward, C.**, Bathla, G., Jacob, M., Gerke, A., Hoffman, E., Nagpal, P. (2021). Radiomics detection of pulmonary hypertension via texture-based assessments of cardiac MRI: a machine-learning model comparison. *Journal of Clinical Medicine*. doi: 10.3390/jcm10091921
9. Bathla G., Priya, S., Lui, Y., **Ward, C.**, Le, N., Neetu, S., Maheshwarappa, R., Monga, V., Zhang, H., Sonka, M. (2021). Radiomics-based differentiation between glioblastoma and primary central nervous system lymphoma: a comparison of diagnostic performance across different MRI sequences and machine learning techniques. *European Radiology*. doi: 10.1007/s00330-021-07845-6

8. Priya, S., **Ward, C.**, Locke, T., Neetu, S., Maheshwarappa, R., Monga, V., Bathla G. (2021). Glioblastoma and primary central nervous system lymphoma: differentiation using MRI derived first-order texture analysis - a machine learning study. *The Neuroradiology Journal*. doi: 10.1177/1971400921998979
7. **Ward, C.**, Oleson, J., Tomblin, B., Walker, E. (2020). Modeling population and subject-specific growth in a latent trait measured by multiple instruments over time using a hierarchical Bayesian framework. *Journal of Applied Statistics*. doi: 10.1080/02664763.2020.1817346
6. Kandemirli, S., Chopra, S., Priya, S., **Ward, C.**, Locke, T., Soni, N., Srivastava, S., Jones, K., Bathla, G. (2020). Presurgical detection of brain invasion status in meningiomas based on first-order histogram based texture analysis of contrast enhanced imaging. *Clinical Neurology and Neurosurgery*. doi: 10.1016/j.clineuro.2020.106205
5. Bathla, G., Ortega-Gutierrez, S., Klotz, E., Juergens, M., Zevallos, C. B., Ansari, S., **Ward, C.**, Policeni, B., Samaniego, E., Derdeyn, C. (2020). Comparing the outcomes of two independent computed tomography perfusion softwares and their impact on therapeutic decisions in acute ischemic stroke. *Journal of NeuroInterventional Surgery*. doi: 10.1136/neurintsurg-2020-015827
4. Bathla, G., Priya, S., Samaniego, E., Deo, S. K., Fain, N. H., Soni, N., **Ward, C.**, Derdeyn, C. P. (2020). Cerebral computed tomographic angiography using third-generation reconstruction algorithm provides improved image quality with lower contrast and radiation dose. *Neuroradiology*. doi: 10.1007/s00234-020-02406-y
3. Hartley, C. C., Renner, L. M., **Ward, C.** (2019). A new factor solution for the domestic violence-related financial issues scale (DV-FI). *Journal of Interpersonal Violence*. doi: 10.1177/0886260519860888
2. **Ward, C.**, Oleson, J., Jones, K., Charlton, M. (2018). Showcasing cancer incidence and mortality in rural ZCTAs using risk probabilities via spatio-temporal Bayesian disease mapping. *Applied Spatial Analysis and Policy*. doi: 10.1007/s12061-018-9276-4
1. Saletta, M., Goffman, L., **Ward, C.**, Oleson, J. (2018). Influence of language load on speech motor skill in children With specific language impairment. *Journal of Speech, Language, and Hearing Research*. doi: 10.1044/2017\_JSLHR-L-17-0066

#### *Journal Papers in Submission*

- **Ward, C.**, Deardon, R., Schmidt, A. (Submitted). Multivariable behavioral change modeling of epidemics in the presence of undetected infections.

#### *Textbooks*

- **Ward, C.**, Nolte, C. (2023). An Intuitive, Interactive, Introduction to Biostatistics. doi: 10.25820/work.006232

## TEACHING

---

Institution/Course	Role	Semester	Delivery Method	Class Size
<b>University of Minnesota</b>				
PUBH:8472 Spatial Biostatistics	Instructor	Spring 2025	In-person	16
PUBH:7402	Instructor	Spring 2023	In-person	14
Biostatistics Modeling and Methods	Instructor	Spring 2024	In-person	15
<b>University of Calgary</b>				
STAT:205 Introduction to Statistical Inquiry	Instructor	Winter 2022	Online/ Hybrid	180
<b>University of Iowa</b>				
BIOS:4120	Instructor	Summer 2019	In-person	7
Introduction to Biostatistics	Instructor	Fall 2019	Online	27
	Instructor	Spring 2020	Online	33
	Instructor	Summer 2020	Online	65
Iowa Summer Institute in Biostatistics	Guest Lecturer	Summer 2021	Online	15
Topic: Epidemic Modeling	Guest Lecturer	Summer 2022	Online	11
	Guest Lecturer	Summer 2024	Online	16
EPID:5540 Public Health Surveillance	Guest Lecturer	Fall 2020	Hybrid	16
Topic: COVID-19 Modeling				

## ADVISING

---

PhD Advisor	Tanvi Mehta	Biostatistics
	(Co-advised with Joe Koopmeiners)	
	Brent Strong	Biostatistics
PhD Committee Member	Jordan Aron	Biostatistics
	Ammar Yasir	Environmental Health Sciences
	Isabel Ricke	Epidemiology & Community Health

## FUNDING

---

### *Active*

**Title:** The BLOODSAFE Data Coordinating Center: A Data Center for More Safe Transfusions in Sub-Saharan Africa

**PI:** Dr. Cavan Reilly

**Source:** NIH/NHLBI U24HL151541-03

**Period:** Jul 2020 - Jun 2026

**Role:** Co-Investigator (10% salary support)

**Award:** \$768,916

**Title:** Midwest Disease Modeling and Analytics Preparedness Center (MDAP)  
**PIs:** Dr. Eva Enns, Dr. Kristin Sweet, Dr. Adams Dudley  
**Source:** CDC  
**Period:** Nov 2023 - Oct 2028  
**Role:** Co-Investigator (20% salary support)  
**Award:** \$17.5 million

**Title:** Quantitative Assessment of Pre-metastatic Immune Subversion as a Risk Factor for Melanoma Relapse  
**PI:** Dr. Svetomir Markovic  
**Source:** NIH/NCI  
**Period:** Jun 2023 - Aug 2025  
**Role:** Co-Investigator/Subcontract PI (5% salary support)  
**Award:** \$59,634

**Title:** Innovating the Evaluation of Rejection of Care in Hospital Dementia Care  
**PIs:** Dr. Clarissa Shaw (University of Iowa)  
**Source:** Alzheimer's Association  
**Period:** Sept 2024 - Aug 2027  
**Role:** Co-Investigator/Subcontract PI (10% salary support)  
**Award:** \$200,000

**Title:** Air Pollution and Mortality Risk in Veterans with Chronic Respiratory Disease: Assessing the Role of Individual and Place-Based Risk Factors  
**PI:** Dr. Jesse Berman  
**Source:** NIH/NIEHS R01ES036225  
**Period:** Aug 2024 - Jul 2029  
**Role:** Co-Investigator (6% salary support)  
**Award:** \$343,146

### *Completed*

**Title:** Generating Synthetic Data to Measure Subcounty Health Inequities  
**PI:** Dr. Harrison Quick  
**Source:** County Health Rankings & Roadmaps  
**Period:** Jan 2024 - Dec 2024  
**Role:** Co-Investigator (20% salary support)  
**Award:** \$97,536

**Title:** Simulation Based Inference in Introductory Statistics  
**Purpose:** Creation of an interactive OER with embedded Shiny applications using simulation-based approaches to illustrate statistical concepts  
**Source:** University of Iowa Libraries Open Educational Resources (OER) Grant  
**Period:** May 2020 - May 2021  
**Role:** Co-Principal Investigator  
**Award:** \$6,000

## PRESENTATIONS

---

### *Invited Talks*

Dec 2024	Estimating the Relative Importance of Multiple Data Sources Informing Behavioral Change in the Presence of Data Uncertainty During the COVID-19 Pandemic. <i>International Biometric Conference</i> . Atlanta, GA.
Mar 2024	Bayesian Modelling of Epidemics: From Population to Individual-level Models. <i>ENAR</i> . Short Course Co-Instructor. Baltimore, MD.
May 2023	Capturing Spatio-temporal Behavioral Change in Bayesian Epidemic Models. <i>Statistics in Medical Imaging</i> . Minneapolis, MN.
Oct 2022	Capturing Dynamic Behavioral Change in Bayesian Spatial Epidemic Models. <i>GEOMED 2022</i> . Virtual.
Jun 2022	Bayesian Modelling of Epidemics: From Population to Individual-level Models. <i>ISBA World Meeting</i> . Short Course Co-Instructor. Montréal, QC.
Jun 2022	Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity. <i>SSC Annual Meeting</i> . Virtual.
Apr 2022	Epidemic Modeling: Investigating Popular Approaches in the Context of COVID-19. University of Calgary O'Brien Institute for Public Health Seminar Series. Virtual.
Feb 2022	Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity University of Minnesota Division of Biostatistics. Virtual.
Jan 2022	Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity University of Iowa Department of Biostatistics. Virtual.
Dec 2021	Incorporating Infectious Duration-Dependent Transmission into Bayesian Epidemic Models. <i>Conference on Computational and Methodological Statistics</i> . Virtual.
Jul 2020	Introduction and Demonstration of an Interactive COVID-19 Forecasting Tool. University of Iowa College of Public Health Spotlight Series on COVID-19. Virtual.
Oct 2019	Accountable Communities of Health: Measuring Connectivity and Sustainability using Network Analysis. University of Iowa Public Policy Center. Iowa City, IA.

### *Contributed Talks*

Oct 2024	Fast Computation for Spatial Generalized Mixed Models for use in MxIF Imaging Analysis. <i>WSDS</i> . Reston, VA.
Jun 2022	Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity. <i>ISBA World Meeting</i> . Montréal, QC.
Jun 2022	Bayesian Modeling of Dynamic Behavioral Change During the COVID-19 Pandemic. <i>Bayesian Young Statisticians Meeting</i> . Poster Presentation. Montréal, QC.
Aug 2020	An Individual Level Infectious Disease Model in the Presence of Uncertainty from Multiple, Imperfect Diagnostic Tests. <i>JSM</i> . Virtual.
Oct 2019	A Spatio-Temporal Infectious Disease Model in the Presence of Uncertainty from Multiple, Imperfect Diagnostic Tests. <i>WSDS</i> . Speed poster. Seattle, WA.

Aug 2019 | Modeling Population and Subject-Specific Growth in a Latent Trait Measured by Multiple Instruments Over Time Using a Hierarchical Bayesian Framework.  
*JSM*. Poster presentation. Denver, CO.

## SERVICE

---

### Professional

- 2025 Joint Statistical Meetings (JSM) Associate Program Chair
- Member - 2024 ENAR Distinguished Student Paper Award Committee
- Refereed articles for the following journals

#### Statistical Methodology

Biostatistics (2)  
 Bayesian Analysis (1)  
 Statistics in Medicine (1)  
 Spatial and Spatio-temporal Epidemiology (2)  
 International Statistical Review (1)

#### Applications

Epidemiology and Infections (1)  
 Journal of the American Medical Association (1)  
 PLOS ONE (1)  
 BMC Public Health (1)  
 BMC Infectious Diseases (1)  
 JAMA Network Open (3)  
 Journal of Speech, Language, and  
 Hearing Research (1)  
 Scientific Reports (3)

### Division of Biostatistics & Health Data Science, University of Minnesota

- Diversity, Equity, and Inclusion Committee, 2023 - Present
- Exam Committee, 2022 - Present

### Department of Biostatistics, University of Iowa

- Biostatistics Student Organization
  - Mentorship Chair, 2020 - 2021
  - President, 2019 - 2020
  - Treasurer, 2018 - 2019
- Graduate Student Team Leader, COVID-19 Modeling Web Application, 2020
- Student Representative, Administrative Committee, 2019 - 2020
- Student Representative, Web-Based Instruction Resource Committee, 2019 - 2020

### University of Iowa

- Graduate & Professional Student Government Grant Reviewer, 2019 - 2020

## SOFTWARE

---

- BayesSEIR - An R Package designed to simulate and fit Bayesian SEIR models of infectious disease spread using various methods to describe the infectious period.  
<https://github.com/ceward18/BayesSEIR>



## PROFESSIONAL ACTIVITY

---

- Member, American Statistical Association (ASA)
- Member, International Biometrics Society, Eastern North American Region (IBS/ENAR)
- Center for the Integration of Research, Teaching and Learning (CIRTL) Practitioner Level  
Teaching as Research (TAR) project: Evaluating Student Attitudes and Engagement in a  
Project-Enhanced Online Introduction to Biostatistics Course
- Member, Phi Beta Kappa