Caitlin Ward

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Education

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

Research Interests

Bayesian statistics
Infectious disease epidemiology
Statistical Computing
Spatio-temporal modeling

Employment

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

Publications

Peer-Reviewed Journal Publications

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.jpurol.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). Bayesian modeling of dynamic behavioral change during an epidemic. Pre-print: arXiv:2211.00122

- Shaw, C., **Ward, C.**, Lee, K., Williams, A., Herr, K. (Submitted). The relationship between rejection of care behaviors and pain and delirium severity in hospital dementia care.

- Sewell, D. K., Li, H., **Ward, C.**, Pham, H., Wilcox, K., Diekema, D. K., Perencevich, E. (Submitted). Evaluating the effect of quarantining in the context of regular universal testing: A validated agent-based modeling approach to assessing interventions in academic settings.

Teaching

Institution/Course	Role	Semester	Delivery Method	Class Size
University of Calgary				
STAT:205 Introduction to Statistical Inquiry	Instructor	Winter 2022	Online/ Hybrid	180
University of Iowa				
BIOS:4120 Introduction to Biostatistics	Instructor	Summer 2019	In-person	7
	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
EPID:5540 Public Health Surveillance Topic: COVID-19 Modeling	Guest Lecturer	Fall 2020	Hybrid	16

Honors and Awards

- Milford E. Barnes Award, University of Iowa College of Public Health 2021
- Ada Louise Ballard and Seashore Dissertation Fellowship, University of Iowa Spring 2021
- University of Iowa Dare to Discover Banner Campaign, Featured Researcher 2021
- 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 2020, 2021
- Leon F. Burmeister Memorial Scholarship Award, University of Iowa 2018
- William R. Clarke Graduate Research Assistant Award, University of Iowa 2018
- George W. Snedecor Undergraduate Award, Iowa State University 2015

Presentations

Invited Talks

- Capturing Dynamic Behavioral Change in Bayesian Spatial Epidemic Models. *GEOMED 2022.* Virtual presentation. October 2022.
- Bayesian Modelling of Epidemics: From Population to Individual-level Models. *International Society for Bayesian Analysis World Meeting.* Short Course Co-Instructor. Montréal, QC. June 2022.
- Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity. *Statistical Society of Canada Annual Meeting.* Virtual presentation. June 2022.

- Epidemic Modeling: Investigating Popular Approaches in the Context of COVID-19. University of Calgary O'Brien Institute for Public Health Seminar Series. Calgary, AB. April 2022.
- Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity. University of Minnesota. Virtual presentation. February 2022.
- Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity. University of Iowa. Virtual presentation. January 2022.
- Incorporating Infectious Duration-Dependent Transmission into Bayesian Epidemic Models. *Conference on Computational and Methodological Statistics.* Virtual presentation. December 2021.
- Introduction and Demonstration of an Interactive COVID-19 Forecasting Tool. University of Iowa College of Public Health Spotlight Series on COVID-19. Virtual presentation. July 2020.
- Accountable Communities of Health: Measuring Connectivity and Sustainability using Network Analysis. University of Iowa Public Policy Center. Iowa City, IA. October 2019.

Contributed Talks

- Sound the Alarm: Modeling Behavioral Changes in Response to Epidemic Intensity. *International Society for Bayesian Analysis World Meeting.* Contributed Talk. Montréal, QC. June 2022.
- Bayesian Modeling of Dynamic Behavioral Change During the COVID-19 Pandemic. *Bayesian Young Statisticians Meeting.* Poster Presentation. Montréal, QC. June 2022.
- An Individual Level Infectious Disease Model in the Presence of Uncertainty from Multiple, Imperfect Diagnostic Tests. *Joint Statistical Meetings.* Virtual presentation. August 2020.
- A Spatio-Temporal Infectious Disease Model in the Presence of Uncertainty from Multiple, Imperfect Diagnostic Tests. *Women in Statistics and Data Science Conference.* Speed poster presentation. Seattle, WA. October 2019.
- Modeling Population and Subject-Specific Growth in a Latent Trait Measured by Multiple Instruments Over Time Using a Hierarchical Bayesian Framework. *Joint Statistical Meetings.* Poster presentation. Denver, CO. August 2019.

Funding

University of Iowa Libraries Open Educational Resources (OER) Grant 2020

- "Simulation Based Inference in Introductory Statistics." Co-Principal Investigator. Total award amount: $6,000
  - Creation of an interactive OER using Shiny applications to illustrate statistical concepts

Service

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

Professional

- Refereed articles for the following journals
  - Biostatistics (1)
  - Statistics in Medicine (1)
  - Spatial and Spatio-temporal Epidemiology (1)
  - Journal of the American Medical Association (1)
  - JAMA Network Open (3)
  - PLOS ONE (1)
  - BMC Public Health (1)
  - BMC Infectious Diseases (1)
  - Journal of Speech, Language, and Hearing Research (1)

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 Society for Bayesian Analysis (ISBA)
- 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