Department of Biostatistics and Medical Informatics Seminar



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Friday, October 30, 2026
12:00-1:00 pm – Morgridge Hall Seminar Room 7560

Zoom Meeting: 966 3372 9112
https://uwmadison.zoom.us/j/96633729112?pwd=tHFc9i1dAAgmXe05uWtw8wXBIQZxGB.1 **Passcode: 621125**

Learning from Clinical Data: Distributional Balancing and Multimodal AI

Abstract: Clinical data offer rich opportunities to study treatment effects and support clinical assessment, but treatment selection can confound comparisons, and relevant information is spread across heterogeneous modalities. This talk presents methodological approaches to both challenges and examines how causal inference can assess the usefulness of AI for intervention decisions.

I first present distributional balancing as a principle for deconfounding. For binary treatments, the goal is to make covariate distributions comparable across treatment groups. For continuous treatments, this becomes a goal of treatment–covariate independence in a weighted population. The Independence Weights approach uses distance covariance optimal weighting to target both independence and preservation of the original covariate and treatment distributions. I illustrate its role in dose–response estimation and discuss newer sliced Lp balancing methods that address computational challenges and provide inference results.

I next introduce MoMA, a modular framework for multimodal clinical prediction. Its central idea is middle fusion in language space: specialized models translate nontext inputs into descriptions that are integrated with clinical notes before task-specific prediction. This common interface supports reuse of pretrained expertise and flexible combinations of modalities. Applications to trauma severity and unhealthy alcohol use illustrate the approach and evaluate the contribution of information beyond clinical text.

Finally, I introduce a causal framework and benchmark for evaluating whether LLM simulations recover heterogeneity in human responses to interventions. The results show that agreement on average treatment effects can coexist with exaggerated heterogeneity and limited value for treatment targeting. These findings highlight the need to validate AI simulations against randomized human outcomes at the level of the subgroup analyses and decisions they are intended to support.

Bio: Guanhua Chen is an Associate Professor in the Department of Biostatistics and Medical Informatics at the University of Wisconsin–Madison, where he also serves as Associate Director of the Biostatistics and Epidemiology Research Design Resource in the Institute for Clinical and Translational Research. He received his PhD in biostatistics from the University of North Carolina at Chapel Hill. His research develops statistical and machine learning methods for causal inference, individualized treatment decisions, and clinical prediction, with additional work in microbiome data analysis. He leads research supported by NIH, NSF, and PCORI and collaborates with clinical, biological, and health services researchers.

School of Medicine and Public Health
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Subject: Guanhua Chen at the BMI Seminar this week

Hi everyone,

This week, we have professor Guanhua Chen from the Department of Biostatistics & Medical Informatics at University of Wisconsin School of Medicine and Public Health giving a talk at the BMI seminar. Please, see more information in the attached document.

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Thank you,

Juan