McGill | Department of Epidemiology, Biostatistics and Occupational Health

EPIDEMIOLOGY

EPIDEMIOLOGY SEMINAR / WINTER 2019

THE DEPARTMENT OF EPIDEMIOLOGY, BIOSTATISTICS AND OCCUPATIONAL HEALTH, - SEMINAR SERIES IS A SELF-APPROVED GROUP LEARNING ACTIVITY (SECTION 1) AS DEFINED BY THE MAINTENANCE OF CERTIFICATION PROGRAM OF THE ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF CANADA

JOINT EPIDEMIOLOGY/BIOSTATISTICS SEMINAR

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Linking a Dose-Response Model to Observed Infection to Describe Spatial-Temporal Patterns in a Q Fever Outbreak

MONDAY, 28 JANUARY 2018 4:00pm – 5:00pm
McIntyre Medical Building

3655 promenade Sir William Osler – Meakins Rm 521

ALL ARE WELCOME

ABSTRACT

We explore a Netherlands outbreak of Q fever in 2009 by combining a human dose–response model with geostatistics to predict local probability of infection, associated probability of illness, and local effective exposures to *Coxiella burnetii*. We begin with the spatial distribution of 220 notified cases in the at–risk population. Next, we use the dose-response relationship (established via historical experiments) to convert the observed risk map into an estimated smooth spatial field of local dose. The estimated peak levels of exposure extend to the north–east from the point source with an increasing proportion of asymptomatic infections further from the source. Our work combines established methodology from model-based geostatistics and dose–response modeling providing a novel approach to study outbreaks. Such predictions (and associated uncertainties) are important for targeting interventions during an outbreak, estimating future disease burden, and planning public health response.

OBJECTIVES

1. Recognizing how spatial location may inform on the transmission patterns in a zoonotic outbreak;
2. Identifying the role of dose-response functions in modeling infectious disease dynamics;
3. Identifying how hierarchical models may include data of different types into a single analysis.

BIO

Lance A. Waller, Ph.D. is a Professor in the Department of Biostatistics and Bioinformatics, Rollins School of Public Health, Emory University. He is a member of the National Academy of Science Board on Mathematical Sciences and Analytics and has served on National Academies Committees on applied and theoretical statistics, cancer near nuclear facilities, geographic assessments of exposures to Agent Orange, and standoff explosive technologies. His research involves the development of statistical methods for geographic data including applications in environmental justice, epidemiology, disease surveillance, spatial cluster detection, conservation biology, and disease ecology. His research appears in biostatistical, statistical, environmental health, and ecology journals and in the textbook *Applied Spatial Statistics for Public Health Data* (2004, Wiley).