Computation of Consequence: Systems Science Approaches to Policy-directed Problems

Session Chair:
Eric Lofgren, MSPH,PhD

Systems science approaches to addressing epidemiological questions have a unique place among epidemiological methods for their ability to ask large-scale, hypothetical policy questions. Many of these research questions are inherently consequential, examining or directly informing public policy, outbreak response, or intervention design and evaluation. This symposium seeks to highlight this avenue of research – the use of systems science to directly address questions of policy and human health, ranging from vaccine policy to social determinants of health. In doing so, it will help examine the role of systems science research within epidemiology as a whole. Additionally, it will identify commonalities in research questions and methods between more established areas of systems science (such as infectious diseases) with those emerging social epidemiology, and other disciplines.

Schedule and Speakers:

"Modeling for Outbreak Response Support". This presentation will focus on the use of large-scale systems science models as they relate to supporting national level responses to emerging outbreaks, including the West African Ebola outbreak and the 2009 influenza pandemic among others. It will particularly focus on the challenges inherent in answering questions from policy and decision-makers during a rapidly evolving epidemic with large amounts of uncertainty and scarce data.
20 minutes.
Stephen Eubank, PhD
Network Dynamics and Simulation Science Lab, Virginia Tech

"Network Effects of Differential Sentence Length on Incarceration". We use an agent-based model of incarceration to show that the observed racial disparities in incarceration rates between racial groups can be explained as the result of differential sentencing rates. We demonstrate that if the social and economic pressures incarceration places on an inmate's social network increases the risk of incarceration of members of that network, even small differences in sentencing length can result in large disparities in actual incarceration rates.
20 minutes.
Kristian Lum, PhD.
Human Rights Data Analysis Group

Getting to zero: how agent-based modeling can identify strategies to eliminate HIV transmission in high-risk populations - In this presentation, I will discuss how agent-based modeling and other microsimulation approaches have been used to inform real world decision-making in the allocation of HIV prevention & treatment resources. I will focus on how agent-based modeling approaches are particularly

useful in the identification context-specific interventions that account for distinctive micro-epidemic characteristics driving HIV transmission among high-risk populations. The strengths and limitations of these models within a consequentialist epidemiological paradigm will be discussed.
20 minutes.
Brandon Marshall

Relative effects of different vaccination strategies for meningococcal disease in Africa - The so-called “African meningitis belt” experiences periodic epidemics of meningococcal disease, primarily due to Neisseria meningitidis serogroup A (NmA). In 2010, a new low-cost NmA vaccine became available. This presentation will describe the use of systems science models to identify optimal NmA vaccination strategies for minimizing meningococcal disease.
20 minutes.
Michael Jackson

Discussant. 10 minutes.
Sandro Galea, MD, MPH, DrPH
School of Public Health, Boston University