MSCS AND BIOLOGY COLLOQUIUM

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Coping with Cross-Community Contacts in Cluster-Randomized Trials of Infectious Disease Prevention

Typically, treatment effects in cluster-randomized trials are estimated under the assumption that the outcomes of the clusters are independent. In infectious disease prevention, it is often not plausible to assume that the disease does not spread between communities, and hence this independence assumption is violated. Thus, the estimate of the treatment effect obtained under randomization will be attenuated (relative to that which would be observed if the treatment were implemented population-wide, the "overall treatment effect") if a fraction of the exposures in the treatment clusters come from individuals who are outside those clusters. This contact mechanism is, however, measurable. We make use of the rich history of epidemic modeling to infer how a given level of cross-cluster contact influences the force of infection upon members of a cluster. This leads to the development of an intuitive estimator of the overall treatment effect, effectively using a treated fraction in place of the usual treatment indicator.

MONDAY, DEC 7
3:30 PM
RNS 310