May 8th, 12:30 PM - 1:30 PM

Cluster Randomized Trials and Statistical Power

Stephen A. Lauer  
*University of Massachusetts - Amherst*

Nicholas G. Reich  
*University of Massachusetts - Amherst*

Follow this and additional works at:  [http://escholarship.umassmed.edu/cts_retreat](http://escholarship.umassmed.edu/cts_retreat)  

Part of the [Biostatistics Commons](http://escholarship.umassmed.edu/bio-stats-commons), [Epidemiology Commons](http://escholarship.umassmed.edu/epidemiology-commons), and the [Translational Medical Research Commons](http://escholarship.umassmed.edu/cts)

This work is licensed under a [Creative Commons Attribution-Noncommercial-Share Alike 3.0 License](http://creativecommons.org/licenses/by-nc-sa/3.0/)

[http://escholarship.umassmed.edu/cts_retreat/2013/posters/38](http://escholarship.umassmed.edu/cts_retreat/2013/posters/38)

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in UMass Center for Clinical and Translational Science Research Retreat by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
The cluster-randomized trial (CRT) is a common study design in public health research. In situations where dividing a group of individuals into treatment and controls is unethical or impossible, a CRT design maintains the strengths of a randomized study design. By comparing the outcomes of small populations (clusters), we can observe the impacts of interventions on the community as a whole. Public health researchers around the world have utilized CRTs to measure the effect of, for example, de-worming medication on school attendance, financial incentives on doctor absenteeism, and providing chlorine to waterholes.

The CRT can be a potent tool, however it is not without flaws. As with an individually randomized trial, it often requires a large sample size (i.e. many clusters) to achieve adequate levels of power for its results. Existing formulas to estimate power for a study design frequently rely on simplifications of the study design. Addressing common challenges that researchers face when calculating power – such as variability in cluster sizes and uncertainty in between-cluster variability – we illustrate how these features affect power and demonstrate the utility of a simulation-based power calculation methodology.

Using R and the clusterPower package, we conducted a simulation study to quantify how variability in cluster size can influence the statistical power of a study. From this study, we provide concrete guidelines that can assist in the design phase of future CRTs, whether for testing a vaccine in Thailand or legislation in America.