Modeling Influenza Outbreaks on a College Campus

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Disease outbreaks on residential college campuses provide an ideal opportunity for mathematical modeling. Unfortunately, publicly available data on these outbreaks are rare and many of these outbreaks are relatively small, confounding traditional data-fitting techniques. Using data from three non-overlapping outbreaks in 2015 and 2017 at Trinity College, we fit several SIR-type stochastic models using maximum likelihood techniques. We find that the size of the outbreak varies significantly due to stochasticity and is largely dependent on the amount of time between the start of the outbreak and the next school holiday. Our results indicate that in order to prevent or limit the size of an outbreak, school closure is likely to be more effective than increasing vaccination uptake. As influenza is a leading cause of negative academic outcomes, these results offer important guidance for school administrators.