**Title**: Multi-Pathogen Agent-Based Models for Disease Surveillance and Mitigation

**Abstract**: Understanding the dynamics of emerging infections and the efficacy of detection technologies in the context of the endemic circulation of other pathogens is a critical aspect of effective public health responses against infectious diseases. The use of compartmental models to simulate the effectiveness of different detection technologies is complicated by the importance of heterogeneity in numerous aspects of these systems, including underlying patterns of technology distribution within a population and variable in-host immune responses. Compartmental models also present challenges when modeling large numbers of co-circulating pathogens with specific disease characteristics and immunological rules for pathogen-pathogen interactions. In light of this, we present Pathosim, a multi-pathogen agent-based model (ABM) that builds on the open-source COVID-19 model Covasim. Like Covasim, Pathosim allows for flexible population and transmission network structures, and can simulate individual in-host viral kinetics, the implementation of pharmaceutical interventions, and testing and quarantine procedures. In addition, Pathosim allows for the flexible characterization of any pathogen of interest along with the specification of immunological rules for pathogen-pathogen interactions (i.e. cross-immunity and altered disease course during co-infection). We then demonstrate the utility of Pathosim in terms of simulating and modeling various detection and surveillance systems including protocols for serosurveillance and early-detection systems based on sequencing data.