FIRST WORKSHOP
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ABSTRACT | David Greenhalgh

Title

Modelling the Spread of HIV/AIDS amongst Injecting Drug-Users taking into Account Variable Infectivity and Loss of Infectivity

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Abstract

This talk aims to show how mathematical models describing the spread of HIV/AIDS in a population of injecting drug users over time can be improved by including the assumption that infectious needles corresponding to three different infectivity stages lose infectivity over time with per needle rate δ_i for i=1,2,3. We start with a short introduction. This is followed by the derivation of a model of a relatively optimistic scenario using addict-needle interaction assumptions. This assumes that a needle is always left in the infectious state of the last infected addict to use it. The model incorporates assumptions describing the spread of disease through the three stages of infectivity. We describe the results of an equilibrium and stability analysis on the model and obtain some global stability results. There is a threshold parameter R_0 which determines the behaviour of the model. If then there is a unique endemic equilibrium which an approximation argument and later numerical results suggest is locally asymptotically stable. Otherwise if R_0 < 1 then system will tend to the unique equilibrium where the disease has died out. Finally we present some numerical simulations which confirm the results. We conclude with a brief discussion.