Modelling hospitalization, home-based care and individual withdrawal for people living with HIV/AIDS in high prevalence areas

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Abstract

In sub-Saharan Africa, the model of care for people who are living with HIV/AIDS has changed from hospital care to home-based care. In this paper, a mathematical model describing the dynamics of HIV transmission, hospitalization and home-based care is constructed and analyzed. The model reproduction number R_e is determined and discussed. The equilibria are determined and analyzed in terms of R_e. It is shown that if $R_e < 1$, the disease free equilibrium is both locally and globally asymptotically stable. The model has a unique endemic equilibrium which exists and is locally asymptotically stable whenever $R_e > 1$. Five cases arise in the discussion of R_e pertaining to intervention strategies. Numerical simulations are done to compare the impact of each strategy on the dynamics of HIV/AIDS. A comprehensive evaluation of the efficacy of community home-based care (CHBC) in preventing new infections was done. The number of infections and deaths averted are determined for the different intervention strategies with the aim of establishing the best strategy. It is shown that pre-AIDS interventions are important in averting new infections but not necessarily deaths due to the disease. The study also shows that effective control of new HIV infections should be done to reduce the infectivity of individuals in CHBC. The model is fitted to the prevalence data estimates from UNAIDS on Zimbabwe. The implications of some key epidemiological parameters are investigated numerically. Projections are made to determine the possible long term trends of the prevalence of HIV in Zimbabwe.

Keywords *Hospitalization; Community Home-based Care; Withdrawal; Reproduction number, Stability.*

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