CHANDRA PODDER, University of Manitoba, 342 Machray Hall, 186 Dysart Road, Winnipeg, R3T 2N2

Mathematical Analysis of a Model for Assessing the Impact of Antiretroviral Therapy, Voluntary Testing and Condom Use in Curtailing HIV

This paper presents a deterministic model for evaluating the impact of several anti-HIV strategies, namely the use of antiretroviral drugs (ARVs), voluntary HIV testing (using standard antibody test and a new DNA-based test) and condom use. The model is rigorously analysed, showing the existence of a globally-stable disease-free equilibrium whenever a certain epidemiological threshold, known as the *effective reproduction number* ($\mathcal{R}_{\text{eff}}$), is less than unity, an endemic equilibrium whenever $\mathcal{R}_{\text{eff}} > 1$.

Simulations, using plausible parameter values, show that for reasonably small testing and treatment rates, as well as modest condom compliance (70%) and efficacy (87%), the use of condoms is the most effective single intervention for reducing HIV burden, followed by the use of ARVs and then voluntary HIV testing. If the testing and treatment rates are increased (by 10-fold) further, the use of ARVs can offer better long-term benefit than any of the other interventions. It is shown that the combined use of voluntary testing methods and condom use can lead to significant reduction in HIV burden than the singular use of ARV treatment if the testing and treatment rates are low. Although it is shown that the use of ARVs is the most effective control strategy, in the long run, for modestly high treatment and testing rates, the lack of widespread availability of these drugs call for the consideration of other affordable interventions. This study shows that the combined use of voluntary testing and condoms can be a cost-effective means of combatting the global spread of HIV.