Analysis of a mathematical model of influenza dynamics with drug resistance aspect

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Abstract

Influenza has posed a terrific public health concern. It has led to unacceptably high mortality rates especially to immune compromised persons worldwide. Efforts to effectively treat and combat the spread of influenza can be put in place if its dynamics are well understood. Numerous challenges have been faced in the event of controlling the spread and eradicating this pandemic, a major impediment being the rise of drug resistance. In light of this, a deterministic model is formulated and used to analyze the transmission dynamics of influenza having incorporated the aspect of drug resistance. A system of differential equations that models the transmission dynamics of influenza is developed. The basic reproduction number (R0) is calculated and stability of the equilibrium points analyzed. Results of the analysis show that there exists a locally stable disease free equilibrium point, E0 when R0 < 1 and a unique endemic equilibrium E*, when R0 > 1. The effect of drug resistance and transmission rate of the resistant virus on the infected and the recovered is discussed.