

1067-34-919

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Dynamics of the SAIQR Influenza Model.

Mathematical models of disease transmission have been widely used and developed for well over a century. They have become standard “tools” in the study of the spread and control of communicable diseases like measles, tuberculosis, rubella, chicken pox and influenza. Influenza is one of the most common diseases affecting humans. SIR (Susceptible-Infectious-Recovered) epidemiological models or modifications have been used to model the dynamics of viral infections that provide permanent immunity after recovery. The inclusion of a class of individuals that are isolated after infection has gained increasing mathematical attention. The inclusion of a quarantine class Q gives SIQR epidemiological model the ability to support recurrent outbreaks. We introduce an extension of the SIQR model through the addition of a class A of asymptomatic individuals. The corresponding epidemiological model is referred as a SAIQR model. The mathematical and epidemiological properties of this model are studied: Existence and uniqueness of solutions, the basic reproduction number, the disease free and endemic equilibrium and conditions for the existence of periodic solutions via a Hopf bifurcations (in special cases). (Received September 16, 2010)