Modeling optimal control of Cholera disease under the interventions of vaccination, treatment and education awareness

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Abstract

In this work, our main purpose is to formulate and analyse a mathematical model of the dynamics and optimal control strategies of cholera epidemic. We present and analyze a cholera model with controls, u1 for vaccination of the human population, u2 for treatment and u3 for health education campaigns. The basic reproductive number, R0, the effective reproductive number, Re as well as disease free equilibrium and endemic equilibrium points are computed. We derive and analyze the conditions for optimal control of the cholera disease using the Pon- tryagin's maximum principle and simulated it for different control strategies. The results show that vaccination and education campaigns should be applied from the start of the epidemic followed by treatment.