

Little's Law Applied to a Stochastic Model of Poliomyelitis

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Abstract

Poliomyelitis is an infectious disease that is currently endemic in regions such as Afghanistan and Pakistan. The oral poliovirus vaccine (OPV) is an attenuated form of the virus that is used to prevent polio in these endemic regions. OPV is contagious, so it can provide herd immunity. A disadvantage is that OPV can cause paralysis and is no longer used in many countries.

The main concern in regards to the eradication of polio is the silent circulation. After an individual has had an initial contact with the virus, whether through infection or vaccination, the individual will be asymptomatic after any subsequent infection with the virus. We want to answer the following question. In a community of individuals whose immunity to poliovirus has waned, how long can the silent circulation persist? We developed a stochastic model to analyze the silent circulation.