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Understanding disease control: influence of epidemiological and economic factors

The goal of our work is to find optimal control strategy of epidemics. We have considered extended SIR model including pre- and symptomatic cases for a disease spreading on regular network.

The effective treatment strategies for a disease control are expected to minimize the total cost of an epidemic. In designing control strategies, however, we have to consider both epidemiology and economics. The most optimal control is determined by the relative costs of treatment and infection, as well as the initial distribution of infectious cases and kinetics of its spread and transformation. It has been shown that the knowledge of pathogen may be unknown and we are able to make prediction based on economics analysis only. Although economics determines control strategies, the range of applicability of scenarios depends on epidemiological factors such as infectiousness, detectability, recovery, removal and map of contacts in population. Some of that factors such as contagion or mortality are strongly connected with particular disease and we can hardly change their properties. However on the rest of parameters we have an influence. So the quicker the symptoms occur or the higher recovery level, the smaller control radius. Moreover, the relationship between control and infected neighbourhood size has been studied and an influence of epidemiological parameters on that relation has been discussed.

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