An SVEICRD model for assessing the impact of the lock-down intervention and vaccination strategies on the spread of COVID-19

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Abstract

In this research, we aim to forecast the trajectory of the COVID-19 pandemic in terms of the number of exposed, infected, vaccinated, hospitalized, recovered, and dead people, and observe the effects of different vaccination strategies on the spread of the COVID-19. We simulate the ongoing trajectory of the outbreak in three countries, namely, Canada, the UK, and Israel using the susceptible - vaccinated - exposed - infected - critical - recovered - dead (SVEICRD) model. We consider two vaccination strategies and investigate their effects on the number of exposed and death cases. We perform an extensive numerical study to assess the implications of different strategies and spread scenarios. Our findings confirm that the fourth wave has begun in all three countries, and already reached its peak. We observe that starting second dose vaccination as early as possible is the most effective in mitigating the spread of COVID-19, although it does require more vaccination supply than the alternative strategies. Our results show that the SVEICRD model successfully forecasts the changing number of people in each compartment and the vaccination strategy significantly impacts the trajectory of the outbreak.

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1