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ABSTRACT | Cristina Paulo

Title

High mortality of 1918 influenza pandemic triggered by multiple contacts with infectious people

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Abstract

The rise in mortality, during the second wave of the 1918-1919 influenza pandemic, has been attributed to a change in pathogenicity of the circulating virus resulting from either antigenic drift or reassortment. Although accepted, it remains questionable if such events, including the spread of the new virus around the world, could happen during the few months elapsed between the first and second waves. We propose a new hypothesis based on the relation between the size of the viral inoculum and the outcome of influenza disease. We assume that the size of the viral inoculums increases with the number of infectious persons simultaneously contacting a susceptible one and that this will result in severe disease. We used a simple mathematical model to illustrate how the increase of infectious persons along the epidemic leads to the increase of persons with severe disease. The model illustrates the two to three-wave pattern observed in 1918 and we show that the rise in mortality during the second wave was caused by the increase of severe cases, whereas the third wave was mostly caused by waning immunity. The parallelism with influenza pandemics of the 20th century and the adoption of proper control measures are discussed.