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Review Article

Epidemic waves and covid-19 the seasonality of epidemics

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Abstract

Another wave of coronavirus disease 2019 (Covid-19)? The answer is yes. At least, in Spain, another wave of covid seems to be occurring at the moment. In June 2024, infections have been rising for just over a month, which means hospitalisations of the elderly or people with other illnesses. Covid-19 again: coughs, masks, asthenia, myalgia, sneezing

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Summary:
Another wave of coronavirus disease 2019 (Covid-19)? The answer is yes. At least, in Spain, another wave of covid seems to be occurring at the moment. In June 2024, infections have been rising for just over a month, which means hospitalisations of the elderly or people with other illnesses. Covid-19 again: coughs, masks, asthenia, myalgia, sneezing. This is a summer surge that is beginning to be recurrent. These are inevitable oscillations of a virus that has joined the list of common illnesses of humanity. The good news is that it seems to be getting milder, similar to a cold or flu, in most cases [1, 2].

There is no exact technical definition of what an epidemic wave is or is not. It is a construction in time whose outline is drawn after the worst has passed. A wave implies an increase in the number of sick individuals, a defined peak and a decline. Waves can be thought of as peaks and valleys, but there is no fixed definition of wave in terms of infectious disease. The concepts of wave and peak are taken from previous influenza epidemics and pandemics or other types of cyclical diseases, such as dengue, whose peak of cases coincides with the increased circulation of the mosquito vector of the virus [3, 4], but the patterns may not be the same for covid-19: the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a very different virus from influenza viruses. Estimates are therefore guesses [5].

In the history of the covid-19 pandemic, various variants, Alpha, Beta, Gamma and Delta, had their waves of incidence, and finally Omicron, swept the world in late 2021. A series of Omicron subvariants have subsequently appeared in rapid succession around the world giving rise to successive waves of infections, sometimes appearing seasonal.

Why do seasonal outbreaks of viral infections occur? That is, why are there viruses that depend on the seasons? Many infectious diseases have a seasonal element that increases their incidence in the population based on certain parameters. Each acute infectious disease has its own seasonal window of appearance. The seasonality of certain communicable diseases has been known since ancient times. In a given year, there will be outbreaks of influenza in winter, chickenpox in spring, and gonorrhea, to name some of the most described seasonal outbreaks.

At the beginning of the covid-19 epidemic, it was admitted that it had a higher incidence in the northern hemisphere, during the months of January, February, and March, coinciding with winter in this part of the planet. Today, 4 years after the beginning of the epidemic, it is still too early to say for sure that covid-19 will be a seasonal coronavirus.

However, the situation has become even less predictable as current variants appear to be milder than previous ones, there is a relaxation of public precautionary behaviors, and previous surveillance efforts have been dismantled [6]. Testing is our window into the pandemic and how it is spreading. Without testing we have no way of understanding the pandemic. Testing allows us to identify infected people [7].

But why are some viruses seasonally dependent? First, environmental factors must be taken into account. Many infectious diseases, not just viral ones, are related to environmental conditions and have a higher incidence at certain times of the year. Each infectious disease has its own seasonal window of occurrence, which can vary between geographic locations and differ from other diseases within the same location [8].

It seems plausible to accept that environmental conditions affect the persistence, survival and transmissibility of many infectious agents. Certain environmental factors play a key role in the transmission of the virus and therefore in epidemics. Thus, temperature and humidity are essential for the existence of seasonal influenza during the winter. On the other hand, in vector-borne diseases, such as the Zika virus, the climate and the environment play an essential role in the proliferation of mosquitoes that must lay their eggs in specific conditions of humidity and temperature.

Crowding or human agglomerations also favour transmissibility. For example, children who come close to each other during the school year are a

factor in measles or even in the contagiousness of influenza; meningococcal meningitis increases in periods ranging from October to May or that seasonal influenza has an incidence during the winter. Similarly, other infectious pathologies such as polio are more common during the summer and in temperate climates. In the covid-19 pandemic, an initial expectation had been that there would be an increase during the summer months, with more people travelling and meeting new people and possibly creating new transmission chains [9].

Secondly, there are the particularities of each disease, such as the characteristics of each pathogen, the environment, human behaviour, humidity, temperature and even the diets of the affected population. Also, people's immune systems vary in strength depending on the time of year due to the amount of sunlight they receive [10].

Pretending that incidence rates remain stable throughout the year is impossible, there are factors that cause them to increase: drops in immunity, either due to the time since the last vaccine or infection, combined with social habits; the increase in social interactions, such as at Christmas and spring-summer. And logically, the variants that are more transmissible than the previous ones will prevail. Thus, looking at the incidence curve, one will see increasingly lower valleys, and shorter, less pronounced peaks. That pattern will probably continue [11].

The Russian painter of Armenian origin, Ivan Aivazovsky, who painted more than 3,000 pictures of the sea and its waves, has as one of his most recognized and impressive works, "The Ninth Wave" (1850) [12], which alludes to the seafaring tradition that attributed the most destructive effect to the ninth wave of the storm. Fortunately, this does not seem to be the situation with successive waves of covid-19. But whatever scenario researchers may imagine, the virus will chart its own course. In the end, we just have to wait and see what happens. The general practitioner who continuously cares for a defined population in a given geographic area is in the best position to see those waves of the turbulent or peaceful sea of infections [13-15].

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