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Will You Catch the Next Viral Outbreak?

By Julianna LeMieux — September 25, 2016

When a new virus or other pathogen surfaces in the news, like Zika did earlier this year, most people have the same first thought.... will I get it?

Although there are different ways to address this question, epidemiologists have a particularly effective way to guess how infective a virus or bacterium will be. It's called the R_0 (pronounced R naught) or the Basic Reproduction Number. The R_0 of a virus estimates the number infections that are expected to arise from one person during the time in which he or she is infectious.

Let's say a child comes down with a new virus that has an R_0 of two. The model would predict that, at some point during that child's infection, two new people will become infected. Likewise, if the R_0 of a virus is 10, then 10 new people would become infected. But the difference between these two is enormous— a few kids at school getting sick vs. a pandemic. The golden rule among epidemiologists is when R_0 is greater than one, an epidemic is likely. When it is less than one, the disease will not get too far.

The R_0 values of some of the well known pathogens that we are exposed to may surprise you. Maybe even frighten you.

Measles, which is by far the most likely pathogen to start an epidemic, has a frightening R_0 of almost 18.

Other nasty infectious diseases with R_0 greater than 12 are whooping cough, mumps, malaria and rotavirus. Chicken pox, with a value of eight isn't a whole lot better.

Most other common infections fall somewhere in the 2-5 range including; cholera, HIV, Ebola virus, polio virus, seasonal flu, gengue virus and hepatitis B and C.

While some of these numbers may be surprising, remember that that R_0 is an imperfect model,

and assumes that everyone in the population is susceptible to the infection, which is not the case. In real life settings people acquire immunity, either by vaccination or previous exposure to the pathogen. Nor does R_0 does not take into account any measures that are put in place to prevent the spread of infection such as condom usage, isolating infected individuals or providing clean water. R_0 should be thought of as a worst case scenario—the number of cases that would occur if the virus was allowed to run rampant.

Of course, when we worry about catching an infection, we also need to take into account how much damage the infection will cause. Rabies is relatively difficult to get but has a fatality rate of almost 100% if left untreated. Because of that, it must be considered differently than Coxsackie virus (hand, foot and mouth disease) which infects almost every toddler, causes a quick summer fever, and generally passes without too much fuss.
