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The longer it takes for coronavirus to spread the population, the more time hospitals have to prepare.

By Siobhan Roberts, March 13, 2020, [The New York Times](#)

At the end of February, Drew Harris, a population health analyst at Thomas Jefferson University in Philadelphia, had just flown across the country to visit his daughter in Eugene, Ore., when he saw an article on his Google news feed. It was from [The Economist](#), and was about limiting the damage of the coronavirus.

The accompanying art, by the visual-data journalist Rosamund Pearce, based on a graphic that had appeared in a C.D.C. paper titled "[Community Mitigation Guidelines to Prevent Pandemic Influenza](#)," showed what Dr. Harris called two epi curves. One had a steep peak indicating a surge of coronavirus outbreak in the near term; the other had a flatter slope, indicating a more gradual rate of infection over a longer period of time.

The gentler curve ultimately results in fewer people infected and fewer deaths. "What we need to do is flatten that down," said Dr. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases, during the coronavirus task force briefing at the White House on Tuesday evening. "You do that with trying to interfere with the natural flow of the outbreak."

The infographic reminded Dr. Harris of something similar that he had designed years earlier for a pandemic preparedness training program. "Folks in the preparedness and public health community have been thinking about all of these issues for many years," Dr. Harris said in an email. "Understanding and managing surge is an important part of preparedness." But during the

training course, Dr. Harris's students had struggled with the concept of reducing the epidemic curve, so he added a dotted line indicating hospital capacity — “to make clear what was at stake,” he said.

After his visit with his daughter, Dr. Harris was waiting for his return flight in Portland when the first Oregon coronavirus case was announced; he had dinner at a busy airport bar and thought about how quiet the place would be in a week or two when the reality of the outbreak set in. Once home, he recreated his graphic and posted it on Twitter and LinkedIn, and was pleased to see the enthusiastic interest in flattening the curve.

“Now I know what going viral means,” Dr. Harris said. (For a more detailed analysis, see a recent paper in The Lancet, “How will country-based mitigation measures influence the course of the COVID-19 epidemic?”)

The following is an edited version of our email conversation.

What does it mean to “flatten the curve”?

The ideal goal in fighting an epidemic or pandemic is to completely halt the spread. But merely slowing it — mitigation — is critical. This reduces the number of cases that are active at any given time, which in turn gives doctors, hospitals, police, schools and vaccine-manufacturers time to prepare and respond, without becoming overwhelmed. Most hospitals can function with 10 percent reduction in staff, but not with half their people out at once.

Some commentators have argued for getting the outbreak over with quickly. That is a recipe for panic, unnecessary suffering and death. Slowing and spreading out the tidal wave of cases will save lives. Flattening the curve keeps society going.

What exactly do those two curves show?

Both curves add up the number of new cases over time. The more people reporting with the virus on a given day, the higher the curve; a high curve means the virus is spreading fast. A low curve shows that the virus is spreading slower — fewer people are diagnosed with the disease on any given day. Keeping the curve down — diminishing the rate at which new cases occur — prevents overtaxing the finite resources (represented by the dotted line) available to treat it.

Think of the health care system capacity as a subway car that can only hold so many people at once. During rush hour, that capacity is not enough to handle the demand, so people must wait on the platform for their turn to ride. Staggering work hours diminishes the rush hour and increases the likelihood that you will get on the train and maybe even get a seat. Avoiding a surge of coronavirus cases can ensure that anyone who needs care will find it at the hospital.

What sorts of mitigation measures help transform the red curve into the blue curve?

Diseases spread when one person gives it to one or more others, who go on to give it to more people, and so on. How fast this occurs depends on many factors, including how contagious the disease is, how many people are vulnerable and how quickly they get sick.

The difference between seasonal flu and coronavirus is that many people have full or partial immunity to the flu virus because they have had it before or were vaccinated against it. Far more people are vulnerable to coronavirus, so it has many more targets of opportunity to spread. Keeping people apart in time and space with social distancing measures, self-isolation and actual quarantine decreases opportunities for transmission.

To take the subway example again, a packed car — or a packed subway platform — is a great place to spread the virus. But reducing the number of people on the train or platform, by asking people to work from home or to stagger their working hours, enables individuals to stay farther apart, limiting the spread of the virus. That is social distancing in action.

Mitigation efforts keep people farther apart, making every transmission opportunity marginally less likely. This slows the spread. We should, and will, take the most vulnerable people out of the population altogether by keeping them totally separate. This is what Washington State is trying to do by limiting visitors to nursing homes. Think of this as a reverse quarantine.

What are you doing day-to-day in response to these unusual times?

Like most everyone else, I'm more aware of my surroundings and behaviors. I try to use a sleeve or elbow to open doors, and I wash my hands or use hand sanitizers after I touch a surface that might be contaminated. And I made sure to have a good supply of my prescription and nonprescription medications, just in case any shortages occur after the shutdown of Chinese pharmaceutical suppliers. I'm following the lead of my public health officials here in Philadelphia, where there is only one case as of Tuesday, and travel isn't restricted. I'm avoiding crowds and sick people. I am going out, and will continue to do so unless a quarantine is ordered or public places are closed.

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I know there is a good chance that I will catch the virus before a vaccine becomes available, but I also believe I'm very likely to do fine. I'm not in any high-risk group. But I worry about the more vulnerable folks and want to do what I can to prevent the spread. I also worry about people who lack the resources I have. What happens to the self-employed, hourly workers and people in the gig economy when business stops? What about the homeless who depend upon charity and services for support? It's these second-order effects that could be just as devastating if this epidemic really takes off.