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HEALTH

Why even AI and big data couldn't predict the coronavirus

By Margaret Heffernan
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No matter how much information we have and how prepared we think we are, pathogens like COVID-19 move so fast and are so unpredictable that they are almost impossible to stop...

On 11 September 2001, Richard Hatchett was heading to work at the Memorial Sloan Kettering Cancer Center in New York City. Like most New Yorkers that day, what he chiefly remembers is how ordinary it was at the beginning and how extraordinary by the end. Out of the measured pace of the cancer treatment centre, a four-storey field hospital had suddenly appeared and it left Hatchett thinking about how the world might respond better to the endemic uncertainties and surprises in life.

Today, he is the chief executive of the Coalition For Epidemic Preparedness (CEPI) that describes itself as "a global insurance policy to defend against future epidemics". Why preparedness and not planning? Because epidemics are fundamentally unpredictable, so they're impossible to anticipate in detail. We can be sure that they will happen, but not what disease or where or when. From a distance, they may look the same, but up close there is no profile of an epidemic. Different geographies need different kinds of response. What works in one place, with one disease, might not work somewhere else. New strains of diseases appear constantly; since the 1970s, new pathogens

have been emerging at the unprecedented rate of more than one a year and in a world of global travel, they move fast. So these crises take us by surprise and can't be planned for.

That doesn't mean the world just waits. CEPI was founded in 2016 to work at getting ahead of the problem. Even though epidemics can't be predicted, wasn't it possible to build a fundamental ecosystem to accelerate the response to them? Vaccines, says Hatchett, are the be-all and end-all of epidemic responsiveness. But developing candidates is expensive; each disease requires at least three to six, because some will fail. Researchers can't predict which part of the immune response is critical to controlling the disease or how fast the disease will change in response to the vaccine. It would be prohibitively expensive to develop vaccines for every possible disease, so CEPI started initially with three diseases posing the biggest risk and where a successful vaccine seemed most likely. The good news is that beta coronaviruses were one of the three.

The speed of genome mapping has hugely accelerated vaccine development. Today, researchers already know the genes and the molecular structure of the protein in COVID-19 that invades human cells. Starting with that makes sense, because a vaccine that stopped the virus entering humans would halt the epidemic. So it's a smart start but there's no guarantee it will deliver success. All the new information has been published so that dozens of teams working on vaccines can set to work on it. But it's still a slow business, injecting candidates into animals to see if they provoke an immune response. Many attempts won't work, while others could work but with unacceptable consequences. And sometimes, by the time a vaccine is ready for testing, the epidemic has died out, so there's no chance of testing until the next one.

Even when a successful vaccine has been identified, huge amounts of money are needed to manufacture drugs at a scale and pace that conventional drug companies aren't set up for. CEPI has attacked that problem too, putting in place, ahead of time, relationships with financial institutions and manufacturers to ensure that drugs get into bodies as soon as they are safe. Whether they are accepted by the general population, however, depends critically on healthcare networks of trust and understanding that have been built since CEPI first came into being. "You don't want to exchange business cards in a crisis," is the way Hatchett explains that work. But while the world watches the progress of the current epidemic with baited breath, there are no guarantees that other epidemics might not emerge elsewhere.

When will this epidemic end – and how? Everyone would love to know and many speculate. The hard truth is that nobody knows; the range of realistic outcomes is so large it helps nobody. Modern technology has accustomed us to pretty accurate prediction – when parcels arrive, how long it takes to get across the country or around the world – but much in life still remains ineradicably uncertain. We might think history repeats itself but we're lucky that it doesn't; every recent flu outbreak has turned out *not* to be a rerun of the 1918 pandemic that infected roughly 30 per cent and killed three per cent of the world's population. The complex interplay between viruses, human societies and global communication produces possibilities of such immense complexity that anyone claiming to know how this epidemic will play out reveals more ignorance than insight.

“We can win a complete victory over this virus,” the Chinese ambassador to Russia, Zhang Hanhui, declared, adding that in Hubei “the disease will be liquidated next month”. This is propaganda masquerading as prediction, as it so often does. But with epidemics, as with much in life, we’re better off preparing for the uncertain than falling for fantasies.

Uncharted: How To Map The Future Together by Margaret Heffernan (£20, Simon & Schuster) is out now.

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