

# Keep Calm, But DON'T Carry On? (In This Situation)

by

Duncan Austin

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*Written as a quick effort to help convey the 'flatten the curve' idea at a time when the concept was only just dawning on people. Not updated since original, though see footnote at end about my misplaced confidence in UK policymakers.*

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*[Note: I'm not an infectious disease expert. Only trying to help people comprehend the basic shape of COVID-19 problem and the difficult and urgent questions it raises for leaders and experts. Their capacity to act decisively will benefit from as many people as possible understanding the problem.]*

## THE SHAPE OF THE PROBLEM

The basic shape of the COVID-19 problem is a highly challenging one in which *exponential growth* in infections threatens to crash against the *fixed capacity* of our healthcare system.

The fixed capacity part is straightforward. We have fairly set quantities of hospitals, healthcare equipment, doctors, nurses etc. that can only be slightly increased in a short period of time.

The harder point to grasp is exponential growth as our brains seem to have evolved to not understand it. Even if you think you are current, you are probably not. When a lily pad doubles in size every day and finally covers a pond on the 28<sup>th</sup> day, it will have covered only half the pond on the 27<sup>th</sup> day and less than 1 percent of the pond on the 21<sup>st</sup> day. With exponential growth, almost nothing happens for a long time and then it all happens at once. Convincing a lay person on the 21<sup>st</sup> day that a lily pad covering less than 1 percent of the pond will cover all of the pond in a week's time is nigh on impossible.

COVID-19 is not doubling at quite that pace, although it's not far behind: doubling every 4 days outside of China. (In the example, after 3 weeks about a quarter of the pond would be covered, and then in the last week the remaining three-quarters of the pond would be covered).

## The Difficult News

Unfortunately, when an infection is growing exponentially against fixed healthcare capacity, the result is a 'tale of two fatality rates' – a fatality rate *before* hospital capacity limits are reached and a higher fatality rate *after* hospital capacity is maxed out.

Data on COVID-19 outcomes are mixed at this stage, for lots of reasons, but we have a rough sense of a 'fatality rate' (approx. 1-4%) and a rough sense of a 'serious complication rate' (approx. 7-16%).

As hospital capacity maxes out and patients with serious complications cannot be treated, the fatality rate will drift up towards the level of the serious complication rate. How far the fatality rate will migrate up, exactly, depends on how many of the 'serious complications' are survivable with no or sub-optimal medical care.

**The tragic dynamic of pandemics is not that people can't be treated in isolation, but that not everyone can be treated at the same time.**

Exponential growth working against fixed capacity carries a double whammy: once healthcare capacity is reached, not only will that occur because more people are getting the infection, but the fatality rate as a percentage of those infected will start to rise.

## The Better News

The better news: **we are not powerless in the face of this difficult dynamic.** The ultimate toll of the virus is hugely dependent on how we self-organize, **though we have to make very quick decisions.**

Figure 1 conveys the benefits. In the first curve *without* preventative measures (i.e. handwashing, isolation, distancing, cancellation of major gatherings, closure of schools etc), transmission of the virus is rapid and quickly overwhelms healthcare capacity, forcing the fatality rate up towards the serious complication rate.

In the second scenario, the flatter hump shows how transmission can be slowed with preventative measures. This gives healthcare providers as much chance as possible of keeping up with the flow of patients and so minimizing preventable deaths by keeping the fatality rate to the lower level. It is 'peak shaving' or 'demand smoothing' for emergency healthcare.

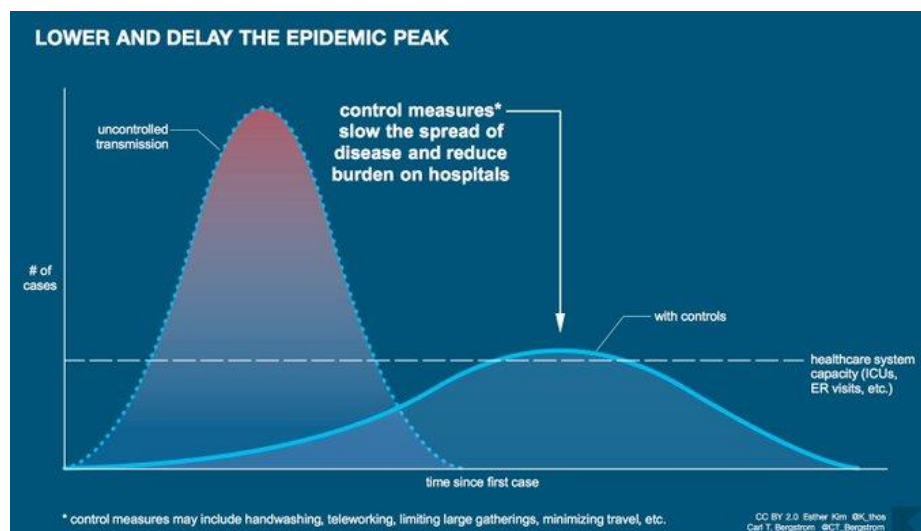


Figure 1: From Carl T Bergson and Esther Kim

Figure 1 is illustrative. The key variables are how quickly the disease is transmitted (the 'doubling rate') and what hospital capacity actually is. To monitor progress, pay less attention to the numbers of infections and deaths, and focus on the doubling rate of infections. We are making progress when the doubling rate slows down (i.e. increases in terms of 'days required to double').

**The key point is that early preventative action has huge benefits for the ultimate course of the pandemic. And that is a behavioural and policy choice we can make.**

### Historical Evidence

This is borne out by historical evidence. Figure 2 shows the contrasting experiences of Philadelphia and St Louis in the 1918 Spanish flu epidemic. Philadelphia took 2 weeks to respond to the first cases in their city, St Louis acted after 2 days. St. Louis had the huge advantage of having been able to observe events in Philadelphia and other cities, but their leadership had learnt the lesson **and acted quickly – at a time when excess deaths in their city had barely moved the needle. They knew what was coming and did not hang around for the confirmation of local evidence.**

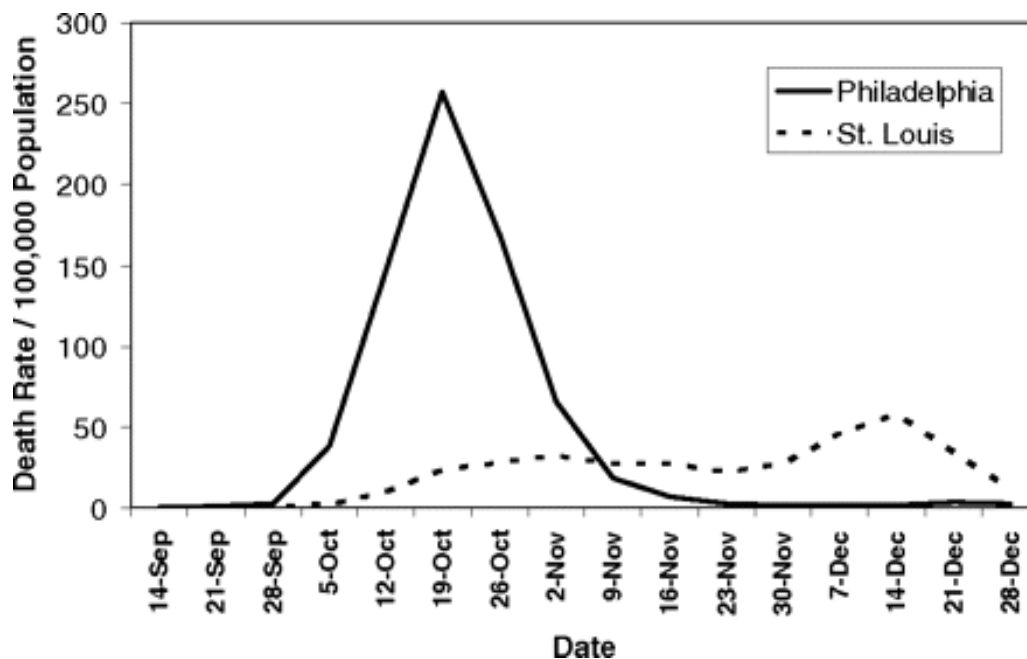


Figure 2: Excess pneumonia and influenza mortality over 1913–1917 baseline in Philadelphia and St. Louis, September 8–December 28, 1918. Philadelphia waited two weeks before implementing protective measures. St Louis waited two days. (Hatchett et al, 2007)

### Recent evidence

Recent modelling of the Wuhan outbreak, reflecting the specific transmission rates of COVID-19, shows how exquisitely time-sensitive the policy choices are. If preventative measures had been implemented one week *earlier* than they were in Wuhan, cases would have been reduced by 66%; two weeks earlier: by 86%; three weeks earlier: by 95%. Or, if preventative measures had been implemented one week *later* than they were, cases would have been 3x greater; two weeks later: 7x greater; three weeks later: 18x greater. (Lai et al. 2020.03.03; Medrxiv paper)

**The key challenge for politicians in exponential growth situations is that, for preventative actions to work effectively, measures have to be implemented much sooner than appears reasonable to anyone who doesn't understand exponential growth.** It helps our politicians enormously if as many people as possible comprehend the shape of the problem.

Further, when preventative measures are implemented, they don't yield immediate results but have a short time lag as the infection within the newly distanced or contained populations runs its course

within that group. So there is no immediate vindication for politicians implementing unpopular measures, **but they do work with a lag of a week or two.**

## **KEEP CALM BUT MAYBE NOT CARRY ON?**

The UK might be tempted to reach for its much-loved WW2 'keep calm and carry on' attitude. But, when the 'enemy' thrives on our social interaction, 'keeping calm and NOT carrying on' for a short while may be a directionally better strategy for this situation. We are not facing a war; we are facing a pandemic.

In a way, it's a pity that it's a virus we are confronting and not aliens. If defeating aliens somehow just required hunkering down for a couple of months, we'd be all in, no questions asked. You can imagine the spectacled genius hero: 'I've worked it out! They are feeding off our social interactions. We just have to separate a bit and slow down!' We need to view the COVID-19 situation as something like this.

### **How Much 'Not Carrying On'?**

This does not imply we can afford to do absolutely nothing. Our experts and leaders have the exquisitely difficult challenge of working out the right amount and the right sort of 'carrying on' that will be beneficial.

On one hand, 'not carrying on' involves significant economic costs and social dislocation. On the other, a lot of our normal 'carrying on' involves precisely the social interaction the virus thrives on.

Also, there are critically important feedback loops between the economy and healthcare. Aspects of our healthcare capacity – from food to masks to beds and more – are dependent on certain parts of the economy running as fast as they can, possibly much faster than normal. Many other types of economic activities can be done safely and provide psychological benefits of keeping people busy and feeling normal. But, the overall economic picture is likely to be one of considerably lower activity - for a short while.

A 'pandemic economy' looks very different to a 'war economy'. The latter requires mass mobilization for a 'war effort'. But, when the innate challenge of a pandemic is social interaction, a pandemic economy must be a more selective mobilization of what is essential and/or can be safely produced and a short-term suspension of much else.

We have to face the fact that for the near-term future, economies will be able to run only at the pace that their healthcare capacity permits. For a short while, healthcare capacity will effectively act as a governor on the economic engine. Of course, over weeks and months, that capacity will gradually expand.

## **Conclusion**

This, too, shall pass. When the dust settles – as it will – we will discover that some countries and communities will have had a Philadelphia experience and others a St. Louis experience. We have the knowledge to create as many St. Louis experiences as we can.

Democratic governments are now having to contemplate extreme measures that were unthinkable even 6 weeks ago. Time is of the essence.

I cherish living in a free society and appreciate the long-term benefits of economic growth. Yet, I recognize that protecting a free society and a strong economy for the long-term may require giving up some freedom and economic growth in the short-term.

To implement beneficial measures in a free society, there needs to be a confluence of top-down leadership and bottom-up freely-given support. The latter can only come from an informed public understanding why some highly unusual measures may be needed temporarily, so giving our leadership the room for manoeuvre they need.

For a short while, we may need to **keep calm and *not* carry on quite as normal**. We have good experts to determine the details [\*], but having a knowledgeable public enhances their capacity to act.

**Duncan Austin, March 2020**

**(Caveat: I am not an infectious disease expert, but just trying to communicate the basic shape of the problem to help public understanding.)**

[\*] Alas, a few days after I wrote this, it became clear that UK policy was leaning towards the 'herd immunity' strategy, which had distinct traces of a 'Keep Calm and Carry On' bias...

