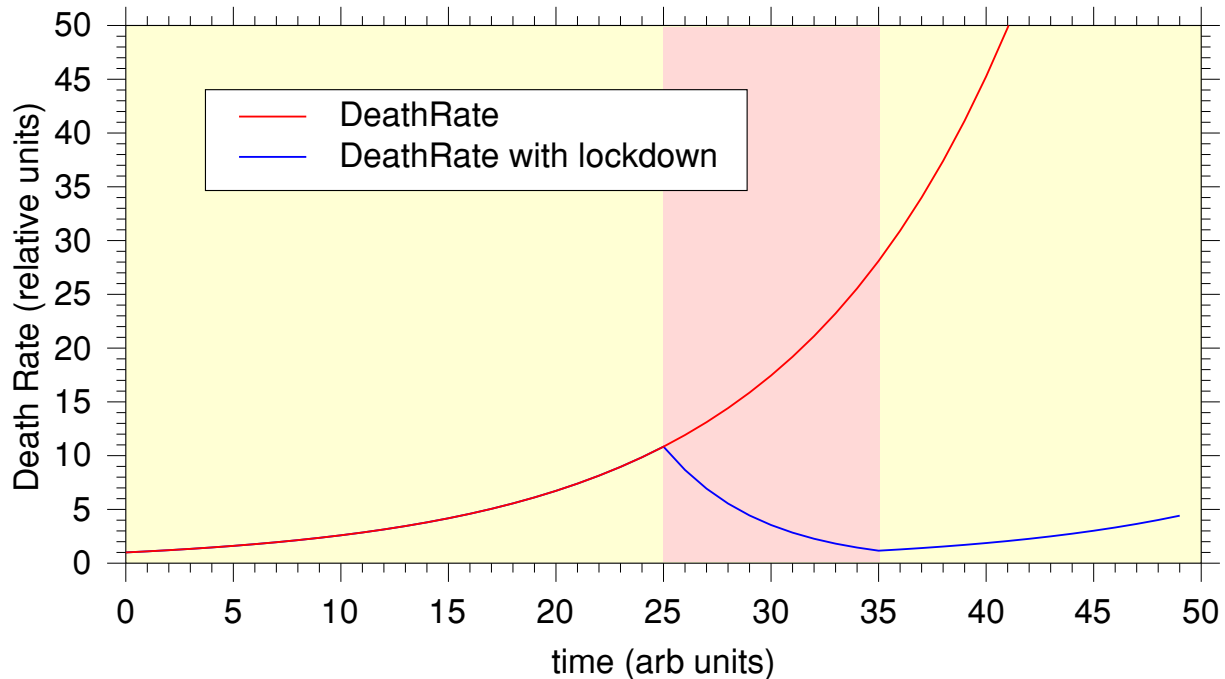


There has been a lot of argument wrt the advantages/drawbacks of employing a time-limited ‘lockdown’ to reduce the death rate inflicted by covid. Some of the comments made make me suspect that many politicians and others may not fully understand the implications of the relevant mathematical behaviour involved. So I thought it might be useful to provide a simple example as an illustration to make one specific point a bit clearer.

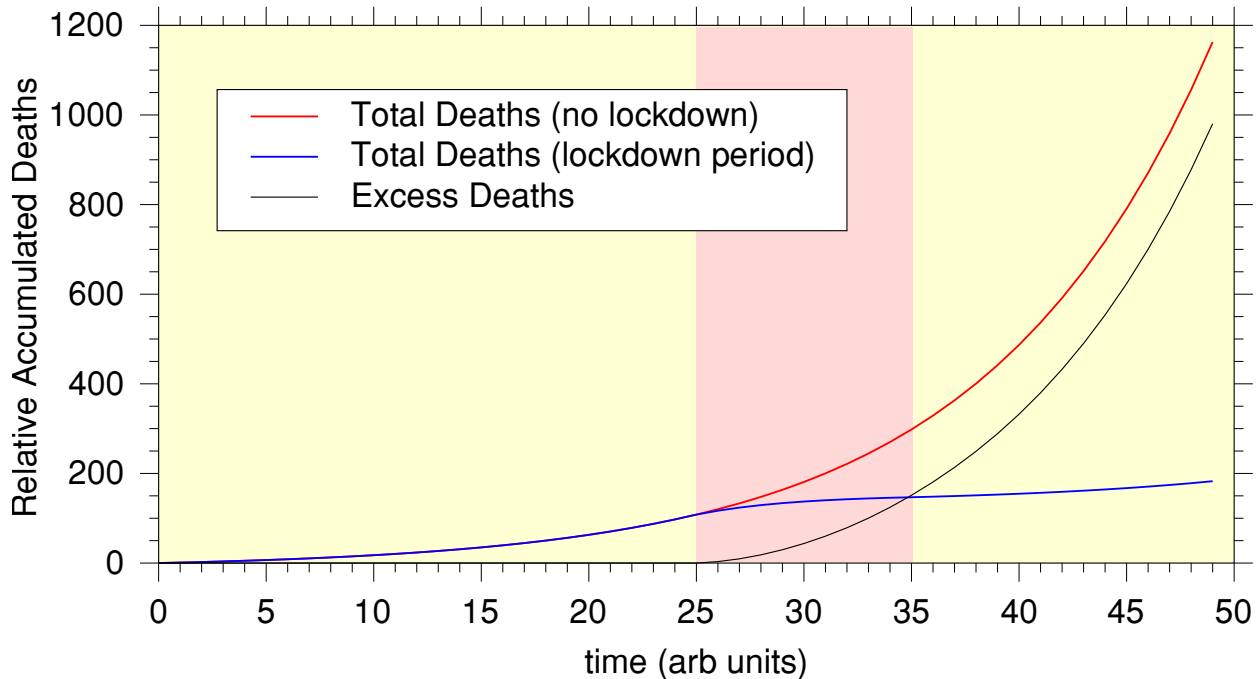


For that reason I’ll use a graphic approach, starting with the above image. Note that the units here are abstracted so in any real epidemic you’d need to multiply the numbers by some scaling values that depend upon the specific epidemic. But the general pattern would remain much the same.

The graph shows how the death rate varies with time in two situations. In one case the epidemic grows quasi-exponentially. One of the key features of exponentials is, of course, that the rapidity of the rise of a value will, itself increase with the value at any given moment. The red line assumes we do nothing and, as time passes, the death rate rises increasingly steeply as time passes. After about 40 units of time the death rate is almost 50 times greater at the chosen start time (‘0’). i.e. almost 50 times as many people are dying per day at this point than at the start of the displayed times. This would rise to well over 100 times the initial death rate by time ‘50’, but that goes above the range I show on the plot, so isn’t visible.

The blue line shows the effect of applying a ‘lockdown’ for a specific period – from time ‘25’ to time ‘35’. This was assumed to reduce the death rate to being just a bit higher than at time ‘0’. i.e. quite effective in its short-term impact but *not* sufficient to eliminate the infections. As a result, after this lockdown the epidemic regains its original behaviour and rises with the initial ‘r’ value again.

I suspect this kind of presentation has led to some dismissing the use of a time limited ‘lockdown’ as “Kicking the can down the road”. However the above way of looking at the behaviour tends to hide a point which may well be worth people considering.



The above graphic uses the same situation as the previous one. However in this case It does not show the death rate. Instead, it shows how the total number of deaths accumulates as time passes. Thus here we can see that – as before – the number of deaths rises exponentially if we do nothing (red line). However the ‘lockdown’ can be seen to have two consequences. The blue line illustrates this. We can see that – as we’d expect – during lockdown the rate at which more deaths accumulate slows down. And after ‘lockdown’ the rate starts to rise again. But it is now much lower than if we had ‘done nothing’. Hence during the time after lockdown the rate of accumulation of more deaths remains markedly lower than the ‘do nothing’ case.

The result is shown by the black line. In effect, the total number of deaths in this ‘after lockdown’ period is much lower than if we’d done nothing! What’s more, this *improvement* rises as time passes! In effect, we save far more lives as time passes than it may seem if we just consider the death rate values without considering this consequence. In the example, this shows that for every death-per-day at the start of the considered period we will have enabled over a 1,000 people to remain alive by the end of the plotted period! And this number continues to grow! I’ve labelled the difference above as ‘Excess Deaths’ and drawn a black line, but a more optimistic way would be to say: ‘Lives saved thus far’!

This point is in addition to helping keep down the death rate and avoid having the NHS, etc, overwhelmed by the flood of people coming to hospitals, etc, and hence can help avoid extra deaths due to that problem.

In the long run, of course “we are all dead”. But before that we can expect to obtain vaccines, better treatments, improved testing, tracing, etc, to have more impact. And we can choose to repeat the exercise if needed to gain another saving if needs must. However the key point here is that the advantage in the sheer number of deaths avoided is larger than you might think from the way ‘lockdown’ is usually discussed.