

TRANSCRIPT:

Anne Marie Knott: Why you haven't caught COVID-19

<https://www.youtube.com/watch?v=sTFOsQfDFi8&feature=youtu.be>

Good afternoon, thanks very much for the opportunity to speak with you today. I miss seeing you all in person and I'm hoping that today's talk will actually make it possible for me to see you again sooner.

You probably believe that the COVID adventure began in Wuhan, China, but the COVID adventure that I want to talk about today actually began with Imperial College report number nine date of March 15th. This was the report that triggered the interventions in the United States and the United Kingdom.

That report forecasts that in the absence of interventions, 265 million Americans would catch COVID and 2.2 million of us would die. This forecast was based on an estimate for a parameter known as R_0 that they pegged at 2.4. The bulk of the report was identifying interventions that would bring R_0 below 1 which would reduce the number of deaths and flatten the curve. So the implicit message is that if R_0 is already less than 1, these interventions were unnecessary

We now know that forecast was high by a factor of 20. The consensus forecast in the US is that 120,000 Americans will die from COVID this year and I think the public is left with the impression that this is a testament to the value of interventions. But what I want to argue instead is that his 95% decrease in the deaths actually stems from forecast error. And it's not that the models were wrong, it's that the model's model the COVID cases and they ignore or miss the non-cases which I think is where all the action is here.

The first thing that I want to do to persuade you that this is about forecast error rather than the value of interventions is to take a look at flu deaths because if it's truly the case that interventions are effective they should be equally effective that flu as at COVID.

So I took a look at that and what you can see is that flu deaths this year are actually higher than they were last year. Moreover they're increasing over the period of intervention. So it's unlikely that the COVID decline is due to interventions.

I mentioned R_0 earlier and it's going to loom large this talk. So let's make sure we understand what it is. R_0 is the basic reproduction rate of the disease. It's the number of people that one person will infect during the period that they're contagious.

An underlying assumption when making estimates of our R_0 is that everyone is susceptible to the disease. So there is a refinement of that, known as the effective reproduction rate of the disease. This is taking our R_0 and adjusting it for the people who are immune or become

immune. If measured properly, R serves as a threshold between outbreaks that become epidemics and those that move towards extinction.

The threshold for that is one as I've shown here so we see extinction on the left hand side, epidemic on the right hand side. And what I want you to pay particular attention is the location of flu and COVID.

The R_0 for flu is 1.3 and R_0 for COVID is estimated to be 2.4. This is curious because 50 million Americans catch flu each year whereas only 1.5 million Americans have caught COVID so far this year. So how is it the case that COVID can be more contagious than the flu? How can its R_0 be 2.4 if flu is 1.3?

This isn't just an academic exercise. Policymakers are using R_0 to make their opening and closing decisions so it's important that we get it right.

So I took a look at the models that we're generating the R_0 estimates. And as I took a look at them, I realized that all dynamic models, not a big surprise. But what's nice about dynamic models is that they reach a steady state. And it occurred to me, it would be really nice if we could actually examine a real-world steady state. It then occurred to me we can.

The USS Theodore Roosevelt appears to be a natural Petri dish experiment of COVID. You probably remember this is the aircraft carrier where the captain was relieved of his command after email leaked where he was requesting help from superiors evacuating sailors from the ship after COVID broke out. I don't know how many of you been on an aircraft carrier, but they're excrement claustrophobic. They are packed at a density of a million people per square mile. To give you a sense of that, that's closer to home, this would be like 90 people living in your house, if you have an average sized house. You can see here that there's no opportunity for social distances. These guys sleep three high in very little space, in between the birds.

What's nice about this experiment is that we know quite a bit about it. There were 4,954 sailors on board. They were confined together for 15 days from the time of the first infection. They were all tested. 856 tested positive, 4,098 tested negative. This yields an infection rate of 17.3%, which is also known as the attack rate.

So if we believe we've reached a steady state here in that, COVID had a chance to fully propagate through the ship in a closed population, meaning, nobody was getting on or off the ship. Then we can compute for R_0 for that outbreak.

From the attack rate which I've just told you a 17.3% and when you do that you get an R value of 0.48 which you recognize is below the threshold of 1, but even further below the forecast of 2.4 from the Imperial College report. What's most interesting is it appears that there's a 82% resistance rate. What this means, if true, is that 80% of us won't catch COVID even if we live with someone who has it.

Conveniently, the Roosevelt is not only our Petri dish. The Diamond Princess actually was called a Petri dish in the media at the time of its outbreak. It has characteristics very similar to the

Roosevelt though it has a slightly higher infection rate - 19.1% vs. 17.3%. But the computed R is the same - 0.48.

The main difference between the cruise ship and the Roosevelt is that nine people died on board the cruise ship versus only one on the Roosevelt. And the reason for that is that the average on board the cruise ship was 69 whereas the average age on the carrier is 19, and we've come to understand that the risk of dying from COVID is highly related to people's age. Which is not uncommon for diseases. That's true of heart disease, as well.

About the time I finished my analysis of the ships, I came across an article where researchers had also examined the outbreak on board the Diamond Princess. I thought, this is great. I can be done worrying about COVID. They will have arrived at the same conclusion that I had. But instead they had an R0 estimate of 2.3. So I said, what's going on?

I took a look at what they did and their estimate of R0 came from the first 15 days of the outbreak and boldly they forecast forward how many cases there would be over each of the next 10 days. So here's their forecast and here's the actual.

What you can see is at the end of 10 days, they're off by a factor of 2 which suggests there's something wrong with their estimate R0. So these are smart people. It's not that they're wrong, it's that they're doing something differently than what I'm doing and I wanted to understand what that might be

To help us understand that, I want to remind you of some definitions. R0 is a measure of the contagion under the assumption that everybody is susceptible to the disease. R in contrast, takes into account the people that are resistant to the disease. The two are related in a very simple equation so it's possible for R0 to be 2.4 and R to be 0.48 so long as eighty percent of the people are resistant to COVID.

No, my understanding is that 80% resistance is unusual. It would have to come from unrelated pests infections or vaccinations and I have absolutely no expertise in this area. All I can tell you is that eighty percent resistance matches the observation from the two ships and it reconciles the two R estimates on board the Diamond Princess.

Now, scientists are in the business of developing theories and generating testable hypothesis from those so that you can actually tell whether the theory is valid or not. So in the case of COVID, if it's true that R0 is less than 1, the testable hypothesis is that we should see extinction.

So I took a look at that. What I plot in here is the new deaths per million population for all countries in which there have been more than hundred thousand COVID cases and what you can see, which is nice, is that new deaths have peaked in all of these countries. But what you also see is that we don't see second waves. So it appears that we're moving towards extinction.

I didn't want you to think that I was cherry-picking the eight cases I showed you before. The reason I narrowed this at is because I wanted to actually see what was going on. But here what

I've done is I've shown you little thumbnails for all countries with more than five million people. Below that record keeping seems to be a little sketchy. And what you can see is basically the same thing. COVID seems to have peaked in most places and there is no evidence of second waves.

So far, we've been talking about the risk Of COVID on Petri dishes and ships but we don't live in Petri dishes and ship. We live in cities, towns and countryside so we're naturally more spread apart. The average density in the US is 110 thousand that on the ship. So we have an opportunity to social distance just naturally. And if you take into account the risk of catching COVID is three percent or less than three percent, actually.

This coincides nicely with one of the few studies of the forest. This was done by research its at Stanford. They randomly sampled the population in Santa Clara County California. Now there's already interventions in place and they found that there was a 1.5% COVID risk. So less than 3%, in the absence of intervention, 1.5% in the presence of intervention.

So I've just introduced intervention now. Let's say a little bit more about that.

I've got a natural experiment here. What I'm doing is I'm comparing Sweden to Los Angeles County. They don't have much in common except for the fact that they're both 10.2 million people. Sweden has very lax COVID intervention regime. LA County on the other hand is very restrictive. It's more restrictive than the state of California which, in turn is more restrictive than the US as a whole.

Surprisingly, Sweden has two times the number of cases for any given city density as LA County cities. But what I want you to pay attention to is the fact that this is the difference between two cases in a thousand and one case in a thousand, not the difference between 810 cases per thousand forecast by Imperial College, and half of that which would have been 405 cases per thousand.

So I'm done talking of COVID risk either with or without intervention. Now what I'm going to do is switch to economics. How much are the COVID intervention is costing you. This is going to be exclusively the costs that are going to be passed on to you from the federal government in the form of higher taxes. So that's the costs associated with the bailouts and the stimulus package is to date, as well as lost business income tax from the shutdown. Those costs work out to \$880 per taxpayer at the current interest rates of 2.1% on the new debt. If interest rates revert back to where they were twelve years ago, this tax bill each year will double if we introduce more bailout packages. This will increase and if we continue the shutdown, this will increase.

Of course most of us will be willing to spend \$879 to save a life - that's a no-brainer, but that's the wrong perspective. 2.8 million Americans die each year and if we're going to be spending money saving lives then we should think about what's the best use of our money. Currently we are spending 50 times more per COVID life than we're spending per heart life. And we're spending 80 times more for COVID life than for flu life. This seems a little backwards because it looks like COVID may disappear because of all the great things that are happening with vaccines whereas heart disease and flu disease look to be with us for the foreseeable future.

Let's bring this home. What to know and do about COVID. The first thing to know is that even without intervention, it's unlikely you'll get COVID. Less than a 3% chance. The second thing to know, antibody tests are of little value. In fact, 80% of us are resistant to disease, that means 80% of us won't catch COVID so we will never develop antibodies. Probably the most important thing is that the weight of evidence is consistent with the disease moving towards extinction. 1.5 million Americans have COVID versus the 265 million predicted with an R0 of 2.4.

Furthermore, we look like we're already moving towards this extinction. Deaths have peaked in most countries and there's not evidence of second waves. The 95% difference between the Imperial College forecast and the actual deaths is not due to intervention. Flu deaths are increasing over the intervention which shouldn't be true if the interventions are effective. Second, there was no opportunity for intervention on the USS Roosevelt. These interventions are costing you eight hundred seventy nine dollars per year in new taxes. So I urge you to urge your Senators, your rep, your governor, and mayor, to reopen. Thank you.