

Antivirals. This isn't my area of expertise so you will need additional, more expert advice on this point. But my understanding is that there isn't a antiviral available for any coronavirus as of now (despite lots of work with MERS coronavirus). As long as that is the case we have to manage without.

So we are back to public health measures.

- 1) Case isolation, infection control and contact tracing. This were absolutely vital for SARS and will surely be the mainstay of any control effort for this virus. They become much more difficult to implement as the numbers of cases rise and resources are stretched. But tremendously important. I am not the one to advise on implementation nor the appropriateness of whatever is already in place. Suspect cases provide an opportunity to learn of course.
- 2) Public messaging. Also tremendously important. So we need to think about the messages (and hopefully are already doing so).
- 3) Social distancing. A big topic covered by preparedness planning so you don't need me to advise on this.

Next steps.

My colleagues in England are pushing for a COBRA meeting asap. Are we planning a SGoRR meeting here? I do think that communication with the public is vital but hugely challenging when there's so much uncertainty. A government statement - one with substance - would be extremely helpful, and the sooner the better. The scenarios I described are already in the public domain.

Kind regards,  
Mark Woolhouse

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**From:** [Catherine.Calderwood@gov.scot](mailto:Catherine.Calderwood@gov.scot) <[Catherine.Calderwood@gov.scot](mailto:Catherine.Calderwood@gov.scot)>  
**Sent:** 25 January 2020 15:08  
**To:** WOOLHOUSE Mark [REDACTED] I&S  
**Cc:** [Gregor.Smith@gov.scot](mailto:Gregor.Smith@gov.scot) <[Gregor.Smith@gov.scot](mailto:Gregor.Smith@gov.scot)>; [CMO@gov.scot](mailto:CMO@gov.scot) <[CMO@gov.scot](mailto:CMO@gov.scot)>  
**Subject:** RE: novel coronavirus CONFIDENTIAL

Mark

Thank you for this. I have shared it with my CMO/DCMO colleagues and we will discuss at our tc meeting on Monday.

With best wishes  
Catherine

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**From:** WOOLHOUSE Mark [REDACTED] I&S  
**Sent:** Saturday, 25 January 2020 13:00  
**To:** Chief Medical Officer  
**Subject:** RE: novel coronavirus CONFIDENTIAL

Dear Catherine,

Thank you for your quick reply. Forgive me bothering you on a weekend but the situation is developing rapidly. I have discussed what I am telling you here with Jeremy Farrar, Director of Wellcome Trust, and Neil Ferguson of the Who Collaborating Centre for Infectious Disease Modelling at Imperial College London. They have independently reached the same conclusions and have advised Chris Whitty accordingly.

WHO reported 2 key numbers in their statement last week. The basic reproduction number (central estimate  $R_0=2.0$ ) and the case fatality rate ( $CF=4\%$ ). Another relevant number is the generation time (we have only incomplete data for that at the moment, but it's not crucial for the main result).

If you were to put those numbers into an epidemiological model for Scotland (and many other countries) you would likely predict that, over about a year, at least half the population will become infected, the gross mortality rate will triple (more at the epidemic peak) and the health system will become completely overwhelmed. We can formalise those predictions (and there are many caveats to them) but those are the ballpark numbers based on information from WHO. Please note that this is NOT a worst case scenario, this is based on WHO's central estimates and currently available evidence. The worst case scenario is considerably worse.

There are very good reasons to suppose it might not be as bad as that, but we need additional evidence (not currently available, but hopefully coming soon) to move the dial on those predictions. The key number is the case fatality rate. If that has been overestimated because of a preponderance of undetected cases that would make a substantial difference.

Your reply to my earlier e-mail did not give any indication that here in Scotland we are preparing for a  $R_0=2$ ,  $CF=0.04$  event. And I don't have the sense that we are from my networks here either.

It is still possible that this outbreak can be contained and that Scotland and the rest of the UK escapes relatively lightly. But I, and others, consider this more of a hope than an expectation at this stage.

Kind regards,  
Mark Woolhouse

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**From:** [CMO@gov.scot](mailto:CMO@gov.scot) <[CMO@gov.scot](mailto:CMO@gov.scot)>

**Sent:** 21 January 2020 13:52

**To:** WOOLHOUSE Mark [redacted] I&S

**Subject:** RE: novel coronavirus

Dear Mark,

Many thanks for your email.

The obvious concern (increased by yesterday's not unexpected announcement of human-human transmission) is that this will become a pandemic, and therefore will affect Scotland. This is not yet certain, but in my judgement it is likely, certainly sufficiently likely that we should be prepared for the eventuality. Other colleagues share this view.

There are some instructive parallels with the H1N1 pandemic in 2009-10. Indeed, one possibility is that this could turn out to be quite similar in some key respects: a widespread epidemic fuelled by mild cases but with mortality among vulnerable patients.

Such an epidemic would be difficult to track. As in 2009-2010 what would be needed is an integrated surveillance set up that combines clinical surveillance, genomic surveillance, and serological surveillance. (The latter requiring an appropriate test; we and, I am sure, many others are working on this already). This should be unexceptionable. My reason for writing now is to emphasize that, based on experience of 2009-10, that system needs to put in place in advance of the arrival of the virus, so the sooner the better. If we wait until after the virus has arrived then we will miss information of public health value and our efforts to prevent or control the epidemic will be compromised.

A key element of any response will be data communication, both between the agencies involved and with the wider public health community. We have corresponded on this issue before and your office has assured me that, however formidable the obstacles to sharing health data in Scotland might be in normal circumstances, it would happen much more smoothly during a health emergency. That assurance may soon be tested.

In 2009-10 we were slow off the mark. Despite the assurances of the then Cabinet Secretary for Health that Scotland was among the best prepared countries in the world, it turned out that we weren't. I am hoping that history won't repeat itself. (And, of course, I am hoping that the situation will not develop as I fear it might, but I do think we have to consider this a real possibility).

Yours sincerely,  
Mark Woolhouse

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