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**From:** WOOLHOUSE Mark [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9C4153BCEE124D7181397F6F48883523-MEJW]  
**Sent:** 25/01/2020 13:00:23  
**To:** CMO@gov.scot  
**Subject:** RE: novel coronavirus CONFIDENTIAL

**Importance:** High

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 <CMO@gov.scot>

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

**To:** WOOLHOUSE Mark <Mark.Woolhouse>

I&S

**Subject:** RE: novel coronavirus

Dear Mark,

Many thanks for your email.

I wanted to reassure you that I am well aware of developments regarding the novel coronavirus associated with Wuhan (WnCov). I am receiving information from various sources including HPS. However, I am very grateful for your comments and reflections.

I am not surprised by the announcement of human to human transmission and am awaiting news from the surveillance developments in order that we can better gauge the impact of this novel virus. I am grateful for your views that this could become a widespread epidemic fuelled by mild cases but with mortality among vulnerable patients. I can reassure you that both Health Protection and Health Resilience colleagues are closely monitoring the situation and keeping me informed.

I will bear in mind your views on the potential surveillance difficulties facing us with WnCoV. I know that PHE and HPS are actively considering the detailed surveillance needs and investigations required for this novel virus and have no doubt that they, like you, feel surveillance systems need to be in place before the arrival of any cases. I am very much aware of the public health value of such systems and the need to prevent or control any epidemic if it becomes established.

I note your fears that this might develop into a potential pandemic and can assure you that response plans are in place. Colleagues are monitoring the situation and any developments closely and we will respond as required. I am assured by my advisers that, as far as we can judge, the potential public health impact of WnCoV is being appropriately assessed.

Kind regards

*Catherine*

Dr Catherine Calderwood MA Cantab FRCOG FRCP Edin

Chief Medical Officer for Scotland

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**From:** WOOLHOUSE Mark <[Mark.Woolhouse@I&S](mailto:Mark.Woolhouse@I&S)>

**Sent:** 21 January 2020 09:19

**To:** Chief Medical Officer <[CMO@gov.scot](mailto:CMO@gov.scot)>

**Subject:** re: novel coronavirus

Dear Catherine,

You will be well aware of developments to the ongoing outbreak of respiratory disease caused by a novel coronavirus and currently centred on Wuhan, China.

I expect that my comments here will reflect and repeat what you are hearing from our colleagues in HPS and NHSS. But I am writing in the spirit that this is better said twice.

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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