Actions Re Science & COVID-20 in the UK v0.9

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Abstract

What actions should we take when we are getting conflicting advice from seemingly-authoritative sources? Non-specialist citizens are planning their lives, and the medical science of COVID-19 is for specialists with experience. In the UK citizens have found it difficult to understand the political and administrative communication of policy. On 20th March 2020 the UK government at Westminster finally published the scientific advice they have been relying on, and the international science and technology community commenced its review. This document focusses on just a few of the hundreds of points in the UK scientific evidence. These conclusions do not always agree with what the UK Prime Minister and his staff have been saying, and citizens may choose to direct their actions accordingly.

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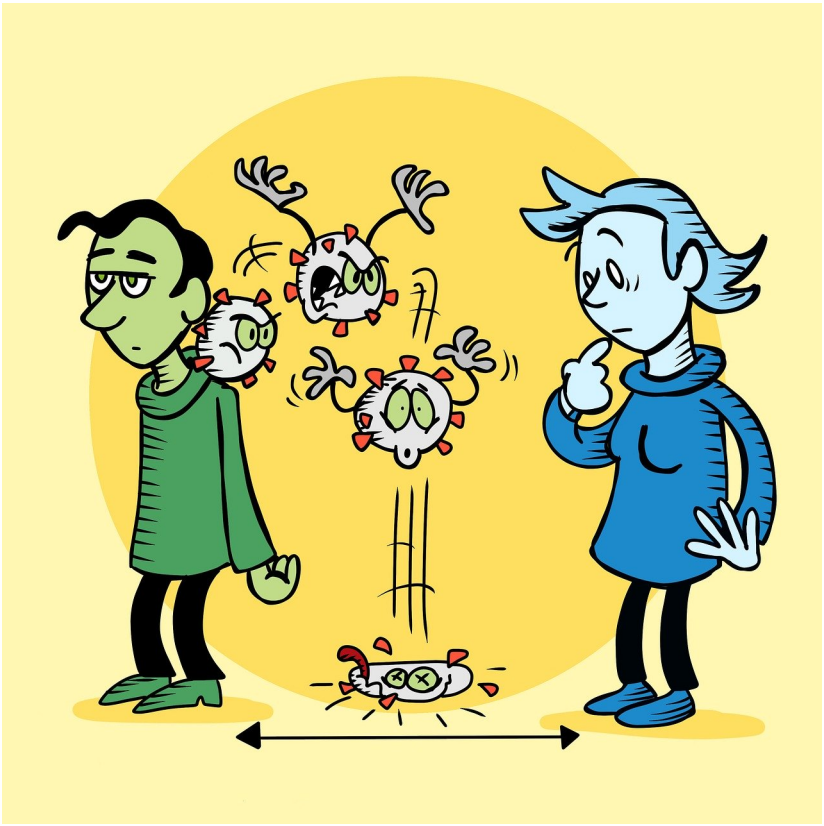

Figure 1: Social Distancing (from Pixabay)

I am Dan Shearer.

This paper is being developed to assist in my own decision support, and others say they have found it useful. All improvements and suggestions gladly received; send them to dan@shearer.org .

Status of This Document

COVID-19 is changing fast, so this document may already be out of date.

There are many claims that the UK is "not being driven by science" when it comes to practical actions. Since the science is in public and being reviewed by many teams worldwide, we can see if these claims stand up. On 25th March 2020, two specialists published an opinion piece in The Guardian The UK's coronavirus policy may sound scientific. It isn't and compares the UK government's approach to scientism:

> "scientism" – things that have the cosmetic attributes of science but without its rigour.

Some of these claims relate to computer source code written by an academic at Imperial College a long time ago. Many more of these claims relate to the overall science approach.

I deal with computer source code and analysing human and computing information. Science specialists worldwide have been clear and generous with their research results, so we can come to valid conclusions to the best of current knowledge. I have keyworkers and fragile people in my immediate circle, so I need to feel informed.

Summary

This document relates to just a handful of points among the many hundreds of points in the published UK government scientific coronavirus advice, as identified by UK epidemiologists. Most of the UK scientific advice is in line with WHO guidelines, some is not. Some of the official UK government statements are out of line with its own scientific advice, and even further out of line with WHO.

Most of the UK actions and advice are good and helpful, if late. Catastrophic mistakes were made in the UK (and in most other countries) but they can't be fixed, and we have to deal with what we have. We are not Brasil and we are not the US, and even if our UK-level leadership is lacking, what we have is a fair chance from now on.

Scotland is in a different situation to England it would seem, and if quick action is taken now perhaps Scotland can have a reduced impact. On 25th March 2020 Scotland announced it was setting up a Scotland-specific COVID-19 science advisory body with the Chief Medical Officer Dr Catherine Calderwood and Nicola Sturgeon quoted as saying at the press conference that different suppression rules may be needed in Scotland and different parts of Scotland.

Action Items

- The UK science advice says that children must practice social distancing immediately. Summarising across other parts of the advice this must mean especially including those children that remain in collective care because their parents are key workers. Keyworkers need to require their childcare/school facilities to practice distancing among the children. The UK government has not discussed this despite it being part of the COVID-19 cluster management.
- The UK science advice is completely silent on the topic of contact tracing, while WHO and many countries are very clear that coronavirus cannot be managed without it. All citizens need to be aware that at some point the UK government will have to catch up with the world and initiate tracing. We can do that by recording who we know who has it (there are several apps now, see Appendix A, although most of them are tangential to tracing which should be a government function.) Childcare/school facilities need to realise that their records will be important evidence in tracing contacts, and also that the

staff knowledge of each child's circumstances could also be vital (for example, who is living with a grandparent.)

- The UK science advice appears to be advocating multiple waves of on-off-on-off suppression. If this becomes policy, and if the UK still does not undertake WHO-approved testing, then citizens should be very hesitant to engage with this.
- Door-to-door health checks are essential part of WHO advice. This can only be government-led, but in anticipation communities can be actively monitoring their neighbours now in the absence of leadership on this issue. This virus is very unlike the flu in how clustered it is, so friends can put together a list of people who should be tested when someone comes up positive. Many communities are doing this informally: they should be recording the health of their neighbours if they can. The Kings College App partially helps with this, and there are at least two other tracking apps.
- For computing and robotics/mechanics people, there are several actions to consider, some of them quite simple. This is a respiratory disease and carers need respiratory protection while some patients need respiratory support.
- As an action for legal or political people, and directly arising from the science, there is an outline of the legal import of the Precautionary Principle and decisions the UK Parliament is about to make but which have been paused for COVID-19.

Detail of the UK Science

On Friday 20th March the UK government published, after much pressure, the scientific advice it is relying on to develop policy. The contents do not appear to be advice that contradicts WHO advice, although the recommendations are mild and the information sparse. Journalists suggest it was requested after weeks of delay from a small and non-representative selection of experts who were not expecting the task.

The advice document SPI-B insights on combined behavioural and social interventions (4 March 2020) says "school closure will need to be accompanied by social distancing advice directed at children to be effective" and other similar statements are elsewhere in the documents. We can see from other statements in the advice that this is about avoiding creating disease clusters centred on keyworkers, especially those who are otherwise at low risk.

In the document SPI-M-O: Consensus view on behavioural and social interventions (16 March 2020) the strong recommendation is for on-off-on-off suppression over a period of a year at least. This is not what the UK Prime Minister has said, and on-off-on-off suppression idea has been strongly objected to including in work published in The New England Complex Systems Institute, see below. Fragile people need to be aware that if this is indeed the approach the UK government promotes, that they should definitely not engage with the "off cycles", at risk of their lives. The UK government no longer advocates herd immunity (see next section) but this is something approaching it. With the UK government's refusal so far to engage in targetted testing and also tracing+quarrantine, according to WHO-compatible advice this is concerning.

This same advice document also mentions future "regional controls", which is not some-

thing any UK government has acknowledged yet. WHO recommends regional controls. Geographically obvious control points include the Irish Sea and an approximation of the England/Scotland border, and other geograpghic areas within England, plus smaller islands. Is this perhaps where COVID-19 responses could become perceived as politically motivated, and therefore the science would not be applied?

Critiques, and Imperial College Modelling

Professor Bruce Aylward of WHO has been through many pandemics, and lead the WHO COVID-19 mission in China and given many recent interviews. In his interviews he invariably makes points that conflict with some of the UK science advice, especially:

- response speed (needs to be fast for every reported case)
- testing all suspected cases
- tracing contacts for all confirmed cases

Two of Aylward's interviews are the New Scientist, on testing and the slightly older but very hard-hitting Vox interview.

Professor Aylward declines to criticise the two doctors who have defined England's medical response, he just keeps explaining why WHO is recommending countries do more than the UK is.

In the New Scientist on 23rd March 2020 there was a critique of the UK government's scientific advice .

From the New Scientist article:

- Testing is barely mentioned, despite WHO and other countries telling us it is completely essential
- Tracing is barely mentioned, which is what informs successful testing and quarrantining cases before they show symptoms
- The Imperial College modelling seems to be the only modelling that is used rather than more usual combination of modelling teams. The Imperial College work was very important because it convinced the government to agree at least partially with science, but it has been shown to have some serious errors and oversights.

The Imperial College modelling was reviewed by The New England Complex Systems Institute . Complex systems research is about mathematical modelling, and the UK government's science is based on a single mathematical model, so this is a helpful source.

The March 17th 2020 Review has this summary paragraph (references not copied in here):

> However, they make structural mistakes in analyzing outbreak response. They ignore standard Contact Tracing [2] allowing isolation of infected prior to symptoms. They also ignore door-to-door monitoring to identify cases with symptoms [3]. Their conclusions that there will be resurgent outbreaks are wrong. After a few weeks of lockdown almost all infectious people are identified and their contacts are isolated prior to symptoms and cannot infect others [4]. The outbreak

> can be stopped completely with no resurgence as in China, where new cases were down to one yesterday, after excluding imported international travelers that are quarantined.

The Imperial College modelling seems to have been critically important to turn around the Uk policy of "do nothing". Neil Ferguson is to be congratulated on his work. As to the computer code underlying the model, he wrote on Twitter on 22nd March 2020:

> I'm conscious that lots of people would like to see and run the pandemic simulation code we are using to model control measures against COVID-19. To explain the background - I wrote the code (thousands of lines of undocumented C) 13+ years ago to model flu pandemics… I am happy to say that @Microsoft and @GitHub are working with @Imperial_JIDEA and @MRC_Outbreak to document, refactor and extend the code to allow others to use without the multiple days training it would currently require (and which we don't have time to give)…

There is no doubt that Neil Fergusson is an authoritative voice, but to those of us who live in a world that often has "thousands of lines of undocumented C code", this is extremely worrying. From this description, the Computer Science fact is that this code can only in its current state embody the thinking, both correct and incorrect, of a single individual. To his credit Neil is seemingly putting his code on github. But in the meantime we are left wondering why the UK government did not employ the use of other large pandemic modelling code bases including:

- EPIMODEL on github, written by 9 people and kept current with models for many diseases and mathematical approaches
- ringbp on github, as described in Lancet on the 28th February: Feasibility of controlling 2019-nCoV outbreaks by isolation of cases and contacts

There are just two of the most obvious of many projects. It takes a medical and mathematical specialist to work out which ones are best to use, but it also requires competent computer science to implement what is chosen. The approach chosen by the UK government was definitely not best practice.

Pandemic specialists have commented on this C source code revelation as explaining why the the UK science advice seems unusual. A flu pandemic has very different behaviour to COVID-19.

I am watching developments on this codebase. Ideally the outcome would not be just to see it published and improved, but other codebases involved immediately.

To further illustrate how important a multiplicity of science voices are, on 25th March 2020 Sunepta Gupta of the Oxford Evolutionary Ecology of Infectious Disease was widely published starting in an article in the Financial Times that "Coronavirus may have infected half of UK population" however:

- Comentators most do not seem to have noticed that this is, once again, a pile of computer code without population testing to confirm or deny the mathematics, or to inform an evolution of the mathematics, as Sunepta Gupta herself states, and
- Sunepta draws into question about the reliance of the UK government on a single model from Imperial College, and supports the evidence so far that not a single other specialist

> epidimology department in the UK was contacted by the UK government, which in turn supports the notion of “sciencism” determining UK policy.

Open Source Action Items

In the Vox interview discussed above, Professor Aylward describes the Chinese approach as both innovative and advanced. He said:

> they find cases fast, get them isolated, in treatment, and supported early. Second thing they do is ventilate dozens in the average hospital; they use extracorporeal membrane oxygenation when ventilation doesn’t work. This is sophisticated health care. They have a survival rate for this disease I would not extrapolate to the rest of the world. What you’ve seen in Italy and Iran is that a lot of people are dying.

(extracorporeal membrane oxygenation, ECMO is a form of heart-lung machine that can be used for a week or two at most for patients with collapsed pulmonary systems)

His point is that it is unlikely that Western countries such as the UK can match the sophistication of healthcare available in China in the sense that they were able to both deploy equipment and also try many different imaginative approaches on the job to arrive at scientific consensus of how best to react.

To a technologist, his comments are also a very pointed reminder of the daunting complexity of the software and hardware required at scale. Ventilators are difficult, and ECMO machines much more so. Nevertheless, we need them, and people are dying. The Italian healthcare system is excellent (for example, more beds than in the UK system) and yet people are dying. Many African healthcare systems are nothing like as good.

There are three levels of pulmunary assistance that can be provided:

- Powered Air Purifying Respirator (PAPR) - for carers, not patients! As many have pointed out, most well-meaning ventilator build projects would be better using the same parts at much less risk to protect medical staff. Code and instructions here
- Ventilators. The open source efforts have been scattered, but start here. Ventilators are very hard indeed. There is a collective EU ventilator procurement project that the UK has declined to participate in. The last resort ventilators produced by open source developers and doctors in Spain and Italy are not ones you would choose to be used on you unless you are about to die. More advanced designs are seemingly ready in Germany and the Czech Republic, with backing from other EU countries. The key is testing.
- ECMO machines are just too advanced for the UK to consider at scale. A recent parliamentary question revealed that in all of England there are just 15 ECMO ICU beds. Building an ECMO is very complex, although German manufacturers are increasing production as fast as they can. Testing an ECMO is difficult.

Apart from building PAPRs (which seems quite obvious thing to do) there is scope for code:

- analytics from ventilators and ECMOs needs to be gathered as a priority national resource. Noninvasive logging into an open form in public is a low-risk, high-reward ac-

tivity.
- analytics from ECMO machines even more so, perhaps assisting in better allocating their usage as the scarecest of resources

Agreement In Science-based Opinions

Who Can I Believe?

For citizens wondering "who do I believe?" there is comfort that all of the basic science recommendations worldwide are agreed, even among scientists who disagree so far on one aspect or another of this unknown virus.

The following two pieces represent hugely differing views from eminent scientists and mathematicians. Unlike the UK science advice, a multiplicity of views is important for solid science to emerge. England has had regular events and intensive study on pandemic responses in places such as the Cambridge Centre for the Study of Existential Risk and their research on Global Catastrophic Biological Risks , and any of these could have been called on.

Nicholas Taleb and Yaneer Bar-Yam, authors of the Complex Systems Institute paper wrote in the non-scientific Guardian article on 25th March 2020 quoted in the abstract of this document:

> when one deals with deep uncertainty, both governance and precaution require us to hedge for the worst. While risk-taking is a business that is left to individuals, collective safety and systemic risk are the business of the state. Failing that mandate of prudence by gambling with the lives of citizens is a professional wrongdoing that extends beyond academic mistake; it is a violation of the ethics of governing.
>
> The obvious policy left now is a lockdown, with overactive testing and contact tracing: follow the evidence from China and South Korea rather than thousands of error-prone computer codes. So we have wasted weeks, and ones that matter with a multiplicative threat.

In contrast, the Nobel prize winner Michael Levitt who successfully and almost exactly predicted the outcome of the Wuhan COVID-19 experience so far, is very upbeat about the trajectory of COVID-19, and why people should not be overly worried. And yet on 23rd March 2020 he was interviewed in the LA Times he agreed with pretty much every other scientist involved, except perhaps the Chief Medical Officer of England, when he said:

> The goal needs to be better early detection — not just through testing but perhaps with body-temperature surveillance, which China is implementing — and immediate social isolation.

His other views are interesting and encouraging, and let's hope they are borne out over the next few months.

Jiayou 加油

In January 2020, tens of thousands of tonnes of supplies were shipped from the EU to Wuhan. Two months later, Wuhan is opening up and we live in a world where Jiayou (“keep strong”) is part of the Italian language, emphasised by hundreds of emergency doctors coming from China to Italy, and millions of testing kits arriving in the EU from China. This time, let’s not forget about pandemics, and that no country can possibly do this on their own.

Appendix: The UK Precautionary Principle

Are you into campaigning or influencing how the UK runs? When the UK’s various parliaments return after COVID-19, the Precautionary Principle will be one of the things they need to continue legislating on, especially the UK parliament.

Current political thinking in England is that the Precautionary Principle is a bad idea. There is also a lot of ignorance around it. Since the PP, and its absence, is very much at the heart of the UK’s COVID-19 response, perhaps MPs can be persuaded to have a different view.

What is the PP?

In 2018 the British Academy wrote Legal Aspects of the Precautionary Principle:

> The precautionary principle is an environmental principle enshrined in the Treaty on the Functioning of the European Union. Where there is scientific uncertainty about risks to human health or the environment, the precautionary principle allows decision-makers to adopt protective measures without having to wait until the reality of those risks become fully apparent.

The Precautionary Principle is a feature of law that I and others have worked with for years, and it is no secret that those leading the Brexit charge disliked it intensely, and the United States rejects it outright. On 31st January 2020, a well-known writer on economics topics produced a summary of these sorts of views in a Spiked article:

> The British government should adopt a similar independent approach in setting aside the precautionary principle deployed by the European Commission. This principle means that in the case of ‘scientific uncertainty’, the EU often adopts a high level of caution with regard to debatable risks. This holds back innovation, not least in areas such as genomics and new materials, and leads to banning certain products.

There isn’t much point in critiquing the article because there is more non-fact than substance, but it feels broadly representative of the views of people who dislike the PP.

There is a lot more work to be done, and COVID-19 will be endlessly discussed. But the PP should be a central part of this.

Health, environment, climate change, quality of life and fun - these are all intimately linked and need both bold innovations and also the Precautionary Principle.