Will evidence-based medicine be another casualty of COVID-19?

It is often said that the first casualty of war is the truth. In April 2020, soon after the global pandemic began, we speculated (McCrae & Watson, 2020) that evidence, the concrete basis of truth, may already have been abandoned in governments' rush to act in the context of public and media alarm. However, we were merely speculating as there was little research to which we could refer, our only reference-point being historical pandemics predating modern evidence-based medicine. Specifically, we queried the severity of the contagion, the effectiveness of lockdown measures and the necessity for universal and draconian protection measures.

Now, we have the benefit of hindsight and some accumulated data on which to reflect. This is not a systematic review. By keeping abreast of government policy and practice on COVID-19 we are aware of the type of evidence the UK government has used to support its measures and also the aspects of evidence that it seems to have ignored.

The appliance of science in the COVID-19 response has been selective, and certainly controversial (Mohammed, 2020). Much of the research on the pandemic has been published without the normal peer review, typically published by journals as preprints. Some studies have been published and subsequently retracted (https://retractionwatch.com/retracted-coronavirus-covid-19-papers/; accessed 11 August 2020). This fast-tracking is justified by circumstances, but its necessity has exposed the pitfalls of the global trend towards open science (https://en.wikipedia.org/wiki/Open_science; accessed 11 August 2020), which encourages early sharing of research results with the scientific community and with the general public. Naturally, we support open science, but its potential for misuse in a global health crisis was

not foreseen. At the beginning of the year, nobody would have predicted the ensuing panic and media-inspired hysteria not only in the general public but also among political leaders and within the healthcare professions. Others, however, took a more sanguine approach. Societies are now divided between those who prioritise safety and those who want to get back to normal. The former support state controls such as lockdown, quarantine and mandatory masks, while maximising the purported threats to humanity. The latter are opposed to loss of basic liberties for what they see as a futile attempt to eradicate a virus that has a mortality risk not much greater than seasonal influenza outbreaks. Both sides of this debate have access to the same pool of evidence, and it has been salutary to see how the same evidence can lead to diametrically opposed views and entrenchment in these views which juxtapose both people and policies.

Face masks

COVID-19 has caused scientists, advisers and policymakers to reflect on existing evidence regarding the effectiveness of face masks, as well as a few studies conducted in the wake of the pandemic. Wearing disposable masks is a cultural norm in the Far East and South East Asia, especially since the advent of SARS in 2003 (Smith, Ng & Watson, 2020). In the west it has been customary to question this practice on the basis that there is no evidence to support their use (van der Haegen, 2020). Indeed, that was the conclusion of a Cochrane systematic review (Vincent & Edwards, 2016), the only rigorous such review in print. However, the possibility that widespread wearing of face masks may provide some marginal advantage in stopping the spread of COVID-19 led to a revisionist mentality in the West. Where wearing face masks was actually discouraged, they are now a corner stone of government policy in most European countries. In the meantime, the evidence did not

change, only the policy and, if pushed beyond the evidence to explain why we should wear masks, morality emerges. A mask is a virtue signal that shows solidarity – although with whom is not clear – against the COVID-19 nemesis (Kolstoe, 2020). It suggests that the wearer is a good person who cares about other people, thereby implying that anyone who does not comply is a bad and uncaring person (McCrae, 2020). Neither of the studies most influential on this policy shift (Leung et al., 2020; Chu et al., 2020) produced very convincing results, even by the admission of the authors, and their recommendations were couched in conditional language: 'could'; 'may'; 'potentially' etc. The study by Leung and colleagues (2020) was designed to test the use of surgical face masks in preventing droplet and aerosol infection, distinguished by the size of the droplets, in normal breathing. Masks were found to be effective against droplets but not aerosol. Clearly the prevention of droplets is important, but droplets do not travel far and do not persist in the air. Maintaining a safe distance from other people, especially infected people, and self-quarantine when knowingly infected – how we normally manage influenza and colds – is probably good enough defence. For aerosol, considered to be a major route of transmission, surgical facemasks are demonstrably ineffective. An excellent recent review of the potential routes of transmission by Jayaweera and colleagues (2020) confirms that droplets are a risk when people cough, sneeze and speak directly into your face at close distance, but such risky behaviour does not need masks for prevention. There are other ways, which we have been using for centuries, to prevent droplet infection in sneezing and coughing. An interesting observation by Leung and colleagues (2020; p. 969) was that: 'among the samples collected without a face mask, we found that the majority of participants with influenza virus and coronavirus infection did not shed detectable virus in respiratory droplets or aerosols.' It seems that people with such a virus do not readily transmit it – a fact that is completely overlooked in government

modelling or policies. The study by Chu and colleagues (2020), based on a systematic review and meta-analysis, concluded that face masks were effective despite reporting that the studies they reviewed were generally very poor. Three meta-analyses were performed, and at first glance the forest plots (used to display the results graphically) appear persuasive, with all reviewed studies having results on the positive side of the line of effect. But no funnel plots were published alongside these. According to Wikipedia (https://en.wikipedia.org/wiki/Funnel_plot; accessed 20 August 2020): 'A funnel plot is a scatterplot of treatment effect against a measure of study precision. It is used primarily as a visual aid for detecting bias or systematic heterogeneity. A symmetric inverted funnel shape arises from a 'well-behaved' data set, in which publication bias is unlikely.' Publication bias arises when studies that do not support a hypothesis are not published. There were absolutely no studies showing that any of the parameters in the study (which included social distancing and eye protection) had negative outcomes on the side of no effect. This overall outcome is statistically improbable. The phenomenon of regression towards the mean, especially when the studies are copious, commonly leads to some negative outcomes even when common drugs such as paracetamol and aspirin are tested. Deborah Cohen, the respected BBC science correspondent, reported on *Newsnight* (19 June 2020, URL no longer available) that several scientists were questioning the validity of the Chu paper, some calling for retraction. The general rush to print (Watson & Hayter, 2020) and the standards of peer review during the pandemic have been questioned (Chiroco et al., 2020).

Lockdown

A major element of the pandemic strategy in the UK, as in other countries, has been 'lockdown', whereby movement of the population is restricted, social mixing is to some extent prohibited and services (including health care) operate at a limited level.

A large study using data from several European countries – still at the preprint stage (Meunier, 2020) – suggests that lockdowns, regardless of how restrictive they are, have no visible effect on the trajectory of the pandemic. Another pre-printed study by Hunter and colleagues (2020; p. 2) reports:

> We found that closure of education facilities, prohibiting mass gatherings and closure of some nonessential businesses were associated with reduced incidence whereas stay at home orders, closure of all non-businesses and requiring the wearing of facemasks or coverings in public was not associated with any independent additional impact.

The provisional publication status of the above two studies should be noted, but of over 100 comments on each study on *medRxiv*, none have taken the authors to task over either their methodology, findings or conclusions.

Another large retrospective study using data from 50 countries (Chaudhry et al., 2020) showed that, while lockdowns and border controls correlated with improved recovery rates – possibly by not overburdening health services and permitting better care for patients with COVID-19 – rapid border closures and full lockdowns did not improve survival rates from the virus. Other factors related to the quality of health services were also, independently, involved. A striking finding was that the number of nurses relative to the population of the country was inversely associated with deaths attributed to COVID-19. However, countries with more nurses tend to have better health provision.

Conclusion

Neither of us claims any special knowledge regarding the origins, spread and interventions related to the COVID-19 pandemic. We differ between ourselves on the approach that should be taken. However, we both read the same evidence and, as stated above, both sides of the argument regarding the necessity of and extent of interventions have access to the same evidence. We stand to be corrected and reserve the right to be wrong but we are united in one conclusion: the mainstays of the current interventions against COVID-19 – wearing facemasks and full economic lockdowns – which are prevalent across much of the world, are simply not based on evidence.

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