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Academic publishing in pandemic times

Even though it tends to feel like ages, it has not been that long since the final days of 2019, when cases of severe respiratory illness (now known as COVID-19), caused by a previously unknown coronavirus (since named SARS-CoV-2), were reported from China. The ongoing COVID-19 pandemic has brought unprecedented disruption to almost every area of our daily and professional lives.

Science has not been spared, nor has scientific publishing. Most researchers have been unable to continue with their work, and many had to all but re-invent their teaching. Quite a few have re-invented themselves as coronavirus researchers.[1] As biomedical researchers, we are astonished to see how much interest the public is taking in our findings. For no other disease do members of the public so fervently seek out reports in traditional and social media about the latest research findings. These reports often trigger controversial discussions, mostly on social media platforms, about rather complicated aspects of epidemiology, diagnostics, pathogenesis or therapy. Many of these issues are matters outside the realm of everyday life and normally left to experts to assess the evidence and translate it into practice.

At the same time, public health policymakers urgently need scientific findings as a basis for measures and policies to control the pandemic or to mitigate its consequences. This instils an almost unprecedented sense of urgency for scientists to produce findings and results which is re-shaping the traditional ways in which scientific knowledge has previously been verified. Answers must be found and measures implemented in real time to respond to a rapidly unfolding situation for which no-one has a 'recipe book', as the world has never before faced a pandemic caused by an infectious agent with the characteristics of SARS-CoV-2.

Add to this the unfortunate politicisation of public health measures like the universal wearing of non-medical (cloth) masks, re-opening of schools etc., which in many places are used to support certain ideologies.

Science thus finds itself in a tricky situation. There is a great and urgent need for relevant studies, and there is a flood of funding opportunities which are very tempting, especially as other funding opportunities are expected to dwindle, and there is a significant increase in calls for papers and offers of expedited review. Researchers are heeding the call: as of today (17 August 2020), a simple PubMed search for the terms "COVID-19" OR "SARS-CoV-2" OR "2019-nCoV" yields an astonishing 40 660 results.

There are many pressures and incentives to try and be quick, even though that may be at the expense of thoroughness. It has become the norm to disseminate scientific data without, or prior to, peer review by means of preprint servers, news releases, news reports, and articles on science outreach platforms like *The Conversation*.

If done irresponsibly, this can cause harm – for example by touting unproven treatments with 're-purposed' drugs. One such drug, chloroquine, was said to be beneficial based on a small number of COVID-19 patients treated early on in the pandemic. Such observations should only serve as first leads but subsequently need to be put to the test by performing proper randomised controlled trials. In the meantime, this observational case series has been published, with critical reflection by the editors on weaknesses of the reported work and the merits of publishing data obtained in a sub-optimal manner.[2]

The avalanche of unscientific claims about the benefits of chloroquine sparked by French microbiologist Raoult soon reached the White House in Washington DC. A paper published by the prestigious journal *Lancet* purported to have conducted an analysis of a global hospital patient registry, finding that hydroxychloroquine was not only not beneficial but in fact linked to lower survival in hospitalised COVID-19 patients. After doubts were raised about the existence and quality of the underlying database, and after the registry was not made available for scrutiny, this paper and a second one in another top medical journal, claiming to use the same database for a different analysis, were retracted.[3,4]

A deluge of manuscripts related to the pandemic is being uploaded onto preprint servers; as of 17 August 2020, there are 6132 COVID-19 SARS-CoV-2 preprints on medRxiv and 1626 on bioRxiv. This is cause for concern, as these studies tend to be picked up by journalists before the 'safety net' meant to ensure the quality and integrity of science has fully unfolded.[5]

It is all the more worrying if papers are accepted and published by reputable journals despite serious shortcomings. The two vital components of scientific quality assurance – editorial oversight and peer review – are not foolproof, as the two retracted papers show. While it is comforting that the subsequent layers, critical reception by peers and replication by other studies, exposed the major flaws of these papers, the published retractions provide no evidence for critical reflection by the journal editors.[6] Such nonchalant retraction notices are not a new phenomenon; they might reflect a deeper problem, as the problem keeps recurring.[7] One might have wished that following the MMR vaccine–autism debacle, which continues to cause damage by reducing measles immunisation rates and favouring outbreaks, editors would have learnt their lesson.[8,9]

Lapses such as these are avoidable. Yes, the ongoing pandemic places an enormous burden on editors, reviewers and just about everyone else in the scientific community. Those best placed to provide meaningful peer review on submitted manuscripts are probably the same people who are themselves trying to obtain funding and ethics approvals, conducting trials, analysing data and writing manuscripts and thus do not have time to undertake peer reviews. On the other hand, 'informal' peer review may yield unexpected benefits, even before a paper is submitted to a journal. An example from the early days of the pandemic is the withdrawal of a preprint paper claiming that the SARS-CoV-2 genome contained elements from the genome of HIV.[10] Vigorous 'open' peer review,

taking place on science blogs and on Twitter, seems to have prompted the withdrawal of the manuscript.[5] This is to be welcomed.

A rational approach will go a long way, especially if supported by some knowledge of the field in question. For example, as most antiviral drugs are the end product of painstaking research conducted over decades, starting with basic virology and structural biology, then chemistry, then spending years and fortunes conducting clinical trials[11], it is highly unlikely that a decades-old antimalarial like chloroquine would have major, hitherto unrecognised, antiviral activity, just as it is unlikely that major toxicities not seen in decades would suddenly emerge. Both the poor design of an uncontrolled clinical study and the implausibility (it may well not exist) of an enormous clinical database underlying a major analysis could have been spotted by editors and reviewers alike. The urgency of coming up with therapeutic entities for COVID-19 patients may have clouded their judgement.

But is there a deeper problem? We would argue yes, definitely; and it goes beyond science. Scientists are familiar with the scientific process. Even though it may involve occasionally unrewarding experiences with editors and peer reviewers and sometimes unpleasant exchanges with colleagues, we by and large accept and engage in more or less constructive interactions which may or may not confirm results that themselves are the products of careful experimentation and analysis. It is its ultimately self-correcting nature that makes science robust.[12]

However, in the current pandemic climate, the eyes of policymakers, politicians and the public are on early results. Many are not familiar with how science works and may regard vigorous discussions among scientists, especially when earlier reports are proven wrong, as proof that science is unable to contribute meaningfully. Controversial discussions about the merits and shortcomings of scientific studies and the interpretation of research data are an indispensable component of science. These discussions usually happen 'behind the scenes' with little attention paid by anyone outside the field. Such a discourse can, however, be misinterpreted, or even abused, to paint a picture of discord and cluelessness. Fuelled by hyping of questionable data and reckless politicisation, this may undermine public trust in science and become a major problem, as has been evidenced with vaccines, climate change and the pandemic response.[13]

It may be challenging to communicate nuance, uncertainty and complexity to non-scientific audiences, but not doing so causes harm. Good, responsible reporting requires thorough reading of studies and speaking to experts, not just copying of press releases.[14] Simply contributing to the COVID-19 'infodemic' is not a solution.[15]

Academic institutions, publishers and editors must also assume responsibility. 'Speed science' must be discouraged, enticing as it may appear at first glance.[16] Poor-quality research, with studies that are biased or not properly controlled, that is statistically underpowered or simply repetitive, is a flash in the pan and does not advance science.[17] Journals should formulate and abide by clear policies on how to deal with the flood of COVID-19-related manuscript submissions in a responsible manner, and not by sacrificing quality for speed or volume (see Panda[18] for example).

As Phillips[19] wrote in a recent contribution to this journal, pandemics 'accelerate trends and tendencies already in train but not yet at full pace'. The COVID-19 pandemic seems to be having exactly these effects on scientific publishing. The pre-existing tendencies towards pre-publications being made public and towards open access publishing have gathered pace.[20]

Phillips[19] also mentions the propensity of pandemics to 'highlight the basic features of any society and its modus operandi, especially its shortcomings and fault lines, in ways which are difficult to ignore'. This, too, is very true for COVID-19. The pandemic has highlighted that 'bad science' happens when hype takes over or when people embark opportunistically on research outside their own specialist fields.

Fortunately, the scientific endeavour is by and large intact. Even during the pandemic it will call out poor research in the end. Yet to maintain or restore public trust in science, scholarly publishing needs to ensure high-quality peer review and be prepared to sacrifice high scores on the public relations side in the interest of maintaining the integrity of science.

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