

The hunt for a coronavirus cure is showing how science can change for the better

February 25 2020, by Xin Xu



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The World Health Organization (WHO) recently declared an

[international public health emergency](#) over the global outbreak of the novel coronavirus. One day later, the Wellcome Trust research charity called for researchers, journals and funders around the world to [share research data and findings](#) relevant to the coronavirus rapidly and openly, to inform the public and help save lives.

On the same day, the [China National Knowledge Infrastructure](#) launched a [free website](#) and called for scientists to publish research on the coronavirus with open access. Shortly after, the prominent scientific journal *Nature* issued an editorial urging all coronavirus researchers to "[keep sharing, stay open](#)".

So while [cities are locked down and borders are closed](#) in response to the coronavirus outbreak, science is becoming more open. This openness is already making a difference to scientists' response to the virus and has the potential to change the world.

But it's not as simple as making every research finding available to anyone for any purpose. Without care and responsibility, there is a danger that [open science](#) can be misused or contribute to the spread of misinformation.

Raising barriers

Open science can come in a variety of forms, including [open data](#), open publications and open educational resources.

1. Open data

DNA sequencing is [of great importance](#) to developing specific diagnostic kits around the world. [Yong-Zhen Zhang](#) and his colleagues from Fudan University in Shanghai were the first to sequence the DNA

of the novel coronavirus. They placed the gene sequence [in GenBank](#), an open-access data repository. Researchers around the world immediately [started analysing it](#) to develop diagnostics.

As of February 19 2020, 81 different coronavirus gene sequences had been shared openly via [GenBank](#) and 189 via the [China National Genomics Data Centre](#). They provide the data that will allow scientists to decode the mystery of the virus and hopefully find a treatment or vaccine.

[The WHO](#) and national organisations like the [Chinese Center for Disease Control and Prevention](#) also publish open statistical data, such as the number of patients. This can help researchers [to map](#) the spread of the virus and offer the public [up-to-date and transparent information](#).

2. Open publications

Science publications are costly. One of the most expensive Elsevier journals, [Tetrahedron Letters](#), costs £16,382 for an institutional annual subscription and £673 for a personal one. Even [the University of Harvard](#) cannot afford to subscribe to all journals. This means not all researchers have access to all subscription-based publications.

Authors can publish their articles free to access, which often means they need to pay the publishers [an average £2,000](#) in article processing costs. In 2018, [only 36.2%](#) of science publications were open-access.

As of February 18 2020, there were 500 scientific articles about the novel coronavirus in the comprehensive scholarly database [Dimensions](#). Only 160 (32%) of them were in open-access publications. This includes preprint servers such as [bioRxiv](#) and [arXiv](#), which are widely used open-access archives to publish research before it goes through scientific peer review.

Normally, you would need to pay subscription fees to read any of the other 340 articles. However, articles published by the 100 companies who have signed the [Wellcome Trust's statement](#) on sharing coronavirus research have been made freely accessible by publishers.

Major publishers including [Elsevier](#), [Springer Nature](#), [Wiley Online Library](#), [Emerald](#), [Oxford University Press](#) and [Wanfang](#) have also set up featured [open-access](#) resources page. The Chinese database [CQVIP](#) has offered free access to all of its 14,000 journals during the coronavirus outbreak.

As it takes [on average 160 days](#) for a preprint to be published after peer review, sharing preprints can save time and save life. Free access to articles on the coronavirus can also accelerate global research on this subject.

3. Open educational resources

Due to the outbreak, universities in China have postponed their new semesters and [switched to online learning](#). But alongside the [24,000 online courses](#) open to students, universities (including the elite [Peking University](#), [Tsinghua University](#) and [Xi'an Jiaotong University](#)) are offering free [online courses](#) to the public about the coronavirus. Such courses can offer the public reliable information grounded in academic research, helping them better understand and protect themselves against the virus.

Responsible open science

While all these developments are positive, it is important to remember that open science doesn't mean science without limits. It must be used responsibly by researchers and the public.

To start, researchers need to have mutual respect for the integrity of their work. For example, there have reportedly [already been disagreements](#) over whether scientists need to request consent to reuse pre-publication data from shared coronavirus gene sequencing.

Assuming researchers act in good faith and not to simply further their own careers, it is still important for them to clarify the conditions with which they make their research available, and to carefully check and follow such conditions when using other people's data. Responsible uses of pre-publication data are vital to fostering ["a scientific culture that encourages transparent and explicit cooperation"](#).

There are also issues with making research available without peer review—as happens with preprint servers—as misinterpretations and mistakes can easily happen. [One paper](#) posted on bioRxiv on February 2 2020 claimed to show "insertions" in the coronavirus's DNA that showed an "uncanny similarity" to regions found in HIV DNA.

[After criticism](#) of their work, the paper's authors withdrew it [stating](#) they did not intend to "feed into the conspiracy theories" that the novel coronavirus had been deliberately engineered. Such conspiracy theories were recently condemned by 27 scientists from eight countries in their [open statement](#) to the leading medical journal *The Lancet*.

Yet until February 19 2020, the withdrawn paper was the [most discussed study](#) in the world in online news and social media, according to the academic ranking site [Altmetric](#). The paper may have been withdrawn but it won't have been forgotten.

Open science is vital to tackling the world's big challenges. But when information can be misused, skewed or misinterpreted at global level so quickly, we also need scientists and the public to treat open [science](#) with great care and responsibility.

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