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Coronavirus outbreak changes how scientists communicate

By **Kai Kupferschmidt** | Feb. 26, 2020 , 2:05 PM

On 22 January, Dave O'Connor and Tom Friedrich invited several dozen colleagues around the United States to join a new workspace on the instant messaging platform Slack. The scientists, both at the Wisconsin National Primate Research Center, had seen news about a new disease emerging in China and realized researchers would need a primate model if they were going to answer some important questions about its biology. "We put out a call to a bunch of investigators and basically said: 'Hey, let's talk,'" O'Connor says. The idea is to coordinate research and make sure results are comparable, Friedrich adds. (They named the Slack workspace the Wu-han Clan, a play on the hip-hop group Wu-Tang Clan.)

The Wu-han Clan is just one example of how the COVID-19 outbreak is transforming how scientists communicate about fast-moving health crises. A **torrent of data is being released daily by preprint servers** that didn't even exist a decade ago, then dissected on platforms such as Slack and Twitter, and in the media, before formal peer review begins. Journal staffers are working overtime to get manuscripts reviewed, edited, and published at record speeds. The venerable *New England Journal of Medicine* (*NEJM*) posted one COVID-19 paper within 48 hours of submission. Viral genomes posted on a **platform named GISAID**, more than 200 so far, are analyzed instantaneously by a phalanx of

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evolutionary biologists who share their phylogenetic trees in preprints and on social media.

"This is a very different experience from any outbreak that I've been a part of," says epidemiologist Marc Lipsitch of the Harvard T.H. Chan School of Public Health. The intense communication has catalyzed an unusual level of collaboration among scientists that, combined with scientific advances, has enabled research to move faster than during any previous outbreak. "An unprecedented amount of knowledge has been generated in 6 weeks," says Jeremy Farrar, head of the Wellcome Trust.

Sluggish scientific communication has often been a problem during past outbreaks. Researchers sometimes sat on crucial data until a paper was accepted by a high-profile, peer-reviewed journal, because they were worried competitors might run with them. Even if researchers were willing to share their findings early, there wasn't a natural platform to do so.

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Lipsitch realized a few years ago that preprint servers, which publish findings prior to peer review, could change that. Scientists could post fresh data rapidly and still get some credit, regardless of where the work was ultimately published. In **a 2018 paper**, he and others concluded that preprints sped up data dissemination during the Zika epidemic of 2015–16 and the West African Ebola outbreak of 2014–16. Most of the preprints appeared more than 100 days before a journal published the work. But overall, less than 5% of the journal articles about the two epidemics were first posted as a preprint.

The COVID-19 outbreak has broken that mold. Early this week, more than 283 papers had already appeared on preprint repositories (see graphic, below), compared with 261 published in journals. Two of the largest biomedical preprint servers, bioRxiv and medRxiv, "are currently getting around 10 papers each day on some aspect of the novel coronavirus," says John Inglis, head of Cold Spring Harbor Laboratory Press, which runs both servers. The deluge "has been a challenge for our small teams … [they] are working evenings and weekends."

Much of that work, done by staff and outside scientists, involves screening the submissions to weed out pseudoscience and opinion pieces. The manuscripts that make it through vary wildly in quality, says University of Hong Kong epidemiologist Keiji Fukuda. "Some of them are not that helpful and some of them are extremely helpful." Lipsitch calls it "a firehose." Anthony Fauci, head of the U.S. National Institute of Allergy and Infectious Diseases, says he's so busy that he often reads preprints late at night. "Eleven o'clock, 12 o'clock comes and you have 25 of these things to read," Fauci says. "You can't ignore them." But sometimes, "It gets a little confusing what you can really believe."

That's even harder for journalists and the public at large. A **31 January preprint on bioRxiv** by scientists in India pointed to "uncanny" similarities between SARS-CoV-2, the virus that causes COVID-19, and HIV, fueling conspiracy theories about genetic engineering. The paper was widely discussed on Twitter and covered by some news outlets—even though **some scientists immediately said it was**

Information revolution

Scientists are sharing more information using preprints than they did during any previous outbreak. The number of published papers is exploding as well.

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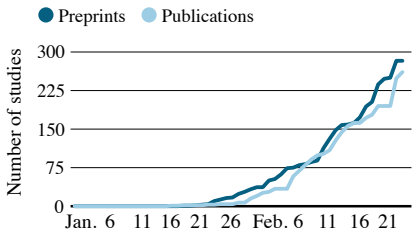
flawed. Inglis points out that the paper received 90 critical comments within 48 hours and was swiftly retracted. (A formal paper debunking the findings **was published in *Emerging Microbes and Infections* 2 weeks later**.)



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Still, such data are becoming part of an "infodemic" of bad information, says virologist Marion Koopmans of Erasmus Medical Center, and the science community needs to debate how to deal with it. "There has been strong advocacy for open science, open data," she says. "OK, this is open science, open data. Now, what do we do?" BioRxiv and medRxiv have both put up **prominent notices** emphasizing the preliminary nature of the information in preprints. "We urge journalists to include in their reporting the caveats about the use of the information," Inglis says.

Still, Farrar says the benefits of rapid information sharing far outweigh the disadvantages. Moreover, even publication by a top journal isn't a guarantee that a claim is correct. A peer-reviewed Letter to the Editor **published on 30 January by *NEJM*** that suggested a Chinese woman who showed no symptoms of COVID-19 had transmitted the virus to people in Germany **later came under heavy criticism** because it turned out the authors had not actually spoken to the woman. A later interview showed that she had some symptoms; the journal has **added that information as an appendix**.

NEJM Editor-in-Chief Eric Rubin concedes there is a tension between rigor and speed. The journal's review process for COVID-19 papers, he notes, is basically the same as always but much faster. "We and authors could do a more careful job if we had more time," he wrote in an email. "But, for now, physicians are dealing with a crisis and the best quality information available quickly is better than perfect information that can't be accessed until it's not helpful."

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To speed up research, it's also crucial to share things that don't work, O'Connor says—for instance, when experiments show an animal species can't be infected with the novel virus. "That's important information that is not typically shared through traditional channels," he says, which is why groups such as the Wu-han Clan are so handy. Its members also discussed whether to infect animals the traditional way, by putting a liquid virus suspension in their nose, or through an aerosol, a new way of exposure that more closely resembles a sneeze. (They will probably try both.) "By openly sharing plans, we can reduce redundancy," Friedrich says.

It's not clear whether such scientific collaborations will help mitigate the worldwide blow from COVID-19. But many scientists welcome the way the outbreak has already changed the way they communicate. "It feels like things are transitioning to a completely new culture of doing research," says virologist Isabella Eckerle of the Geneva Centre for Emerging Viral Diseases. "It's exciting."

Clarification, 27 February 2020, 12:5o p.m.: *This story has been changed to reflect that the data about asymptomatic transmission were published as a Letter to the Editor in NEJM.*

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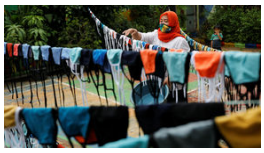

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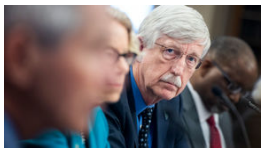

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