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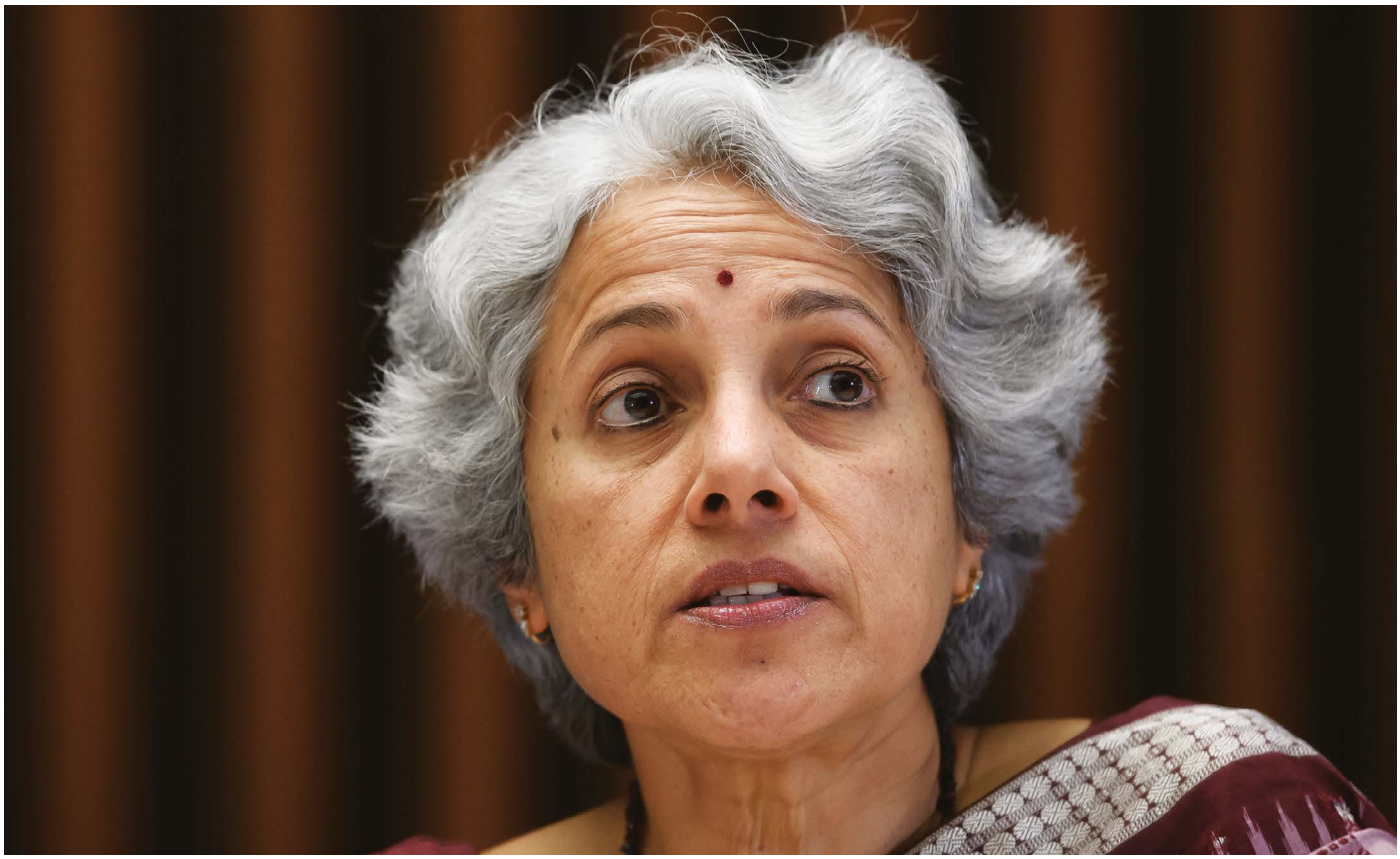

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Clinician-researcher Soumya Swaminathan oversees the gathering of scientific evidence at the World Health Organization in Geneva.

The WHO's chief scientist on a year of loss and learning

Soumya Swaminathan

The head of scientific work at the World Health Organization reflects on the agency's challenges and achievements as it navigates the COVID pandemic.

I was appointed to the new post of chief scientist to the World Health Organization (WHO) by the director-general in March 2019. I was charged with overseeing how the 72-year-old United Nations agency gathers scientific evidence and creates guidelines. My original plan for 2020 included rolling out new processes to ensure the quality of technical documents, such as guidelines on water quality, tobacco advertising and immunization programmes. I'd resolved to find ways to focus research on the right questions and to speed up the development of vaccines, medicines and diagnostics to address unmet public-health needs. With my colleagues in the digital-health department, I intended to finalize a global strategy for that field, incorporating telemedicine, interoperability standards and mobile health, and take it to the World Health Assembly for approval. After that, I would work with member states to make sure pathogen samples were shared rapidly with equitable access to benefits, a subject area that has been the focus of protracted negotiations (see go.nature.com/3ab4q9g).

All those plans changed on 31 December 2019. The WHO was informed about a cluster of viral-pneumonia cases of unknown origin in Wuhan, China: the disease later named COVID-19.

This year has been a roller coaster — a challenging, humbling and painful time because

of the suffering and deaths worldwide. I am proud of many things my team has achieved in the past 12 months, even as the shortcomings of both the WHO and the global community have been laid bare.

What does someone charged with synthesizing evidence into guidelines do when confronted with a virus for which no evidence exists? I remember thinking that the WHO's Science Division, which I direct, was created for exactly this situation: to collect, vet, analyse and apply information quickly.

We drew on experience from the West African Ebola outbreak in 2014–16 and the 2009–10 H1N1 influenza pandemic, but mostly we have been building the ship while sailing it. We've had to balance speed and rigour. We've had to raise alarm without causing panic. We've had to convince countries to heed advice without openly criticizing them (which would risk losing their cooperation). And we've had to fight the 'infodemic', sticking to science amid attacks and false information from all sides.

Accurate and fast

Countries, especially low- and middle-income ones, depend on the WHO to decide how to combat disease and preserve public health. Under international health regulations, the agency has coordinated binding agreements for nations to report single cases of diseases, such as smallpox or polio, within 24 hours of assessing public-health information related to the case. Global health funders, such as the UN children's charity UNICEF and Gavi, the Vaccine Alliance, look to WHO assessments to decide which childhood vaccines to pay for.

In 2007, following much (largely deserved) criticism of some of its procedures, such as not always basing decisions on evidence, the WHO set out rigorous, standardized procedures for the documents that guide these decisions, making sure that their compilation was transparent and based on evidence, and that any potential conflicts of interest were made explicit. Part of the reason the Science Division was created was to boost the compilation speed, rigour and impact of these technical documents.

The COVID-19 outbreak brought a new urgency to these goals. In the second week of February, the WHO held a conference on the new disease, to identify knowledge gaps and prioritize research questions. A typical WHO conference requires months to plan – it takes that long for visas to come through. We pulled it off with three weeks' notice, finding ways to involve those who couldn't travel. Even before the disease or virus had an official name, some 400 scientists from more than 60 countries on all continents came together. That meeting set out many crucial goals: the target product profiles for drugs, vaccines and diagnostics; criteria for vaccine prioritization; evidence-based public-health measures and treatment guidelines.

This groundwork got scientists to focus on important questions – such as what research was needed to identify the virus's incubation period and what mechanisms were responsible for the lung injury being observed – and established a network of expertise. The conference participants and additional scientists met again (virtually) in July, and it quickly became apparent that we needed global coordination for clinical trials – some 2,000 were already under way, most of which were too small to be definitive. We launched prospective meta-analyses encouraging principal investigators running trials of corticosteroids for treatment of COVID-19 to collaborate and share data, so that it could be pooled for more definitive evidence. When we convene again early next year, I expect vaccine logistics and diagnostic use to be much discussed.

In February, the Science Division developed a protocol to expedite reviews of evidence when a public-health emergency of international concern (PHEIC) is declared. During past outbreaks of Ebola, Zika and so on, different WHO programmes produced dozens of technical papers without any central coordination or quality checks, sometimes leading to confusion and mixed messages. Now, a publication-review committee draws in members from WHO headquarters and our six regional offices.

"The WHO has been communicating evidence and debunking misinformation as never before."

This committee, comprising 10–15 people in rotation, vets documents quickly – some 800 have been submitted so far – and eliminates duplicate work. It also connects the dots. When the committee spotted separate reports on how COVID-19 was affecting treatment for many common conditions, such as malaria, tuberculosis and diarrhoea, it pooled them into a single, streamlined document on how health systems in low-income countries could adapt to cope with the pandemic (see go.nature.com/3qzopjw).

In another case, the committee set out guidelines for drugs being tested in clinical trials, such that it could quickly detect and announce evidence for efficacy. It contacted about a dozen researchers running clinical trials of the steroid dexamethasone, and convinced them to share data even while the trials were ongoing. It published the guidelines in September (see go.nature.com/3qfxb3h). Normally, such guidelines take 6–12 months to produce; the committee has cut the time to 6 weeks.

There was initially too little evidence to enable comprehensive, systematic reviews of primary research on COVID-19. These summarize the state of the art in a particular area, and provide the necessary evidence on which to base recommendations for interventions. This led to the WHO engaging more than 90 institutions in a new partnership called the Evidence Collaborative for COVID-19. We set up advisory groups of global experts focusing on more than 20 topics – from mask use and virus-transmission modes to health workers' protective equipment. The groups coordinate with national health systems and meet regularly to review data, debate ideas and discuss public-health recommendations. The Cochrane Collaboration has a similar initiative (see go.nature.com/3gyhdap) – there is more than enough of this work to do.

The sheer volume of new information on COVID-19 means that it is impossible for anyone to keep up. So we assembled a few dozen volunteers – scientists, doctors and technical experts working at the WHO – to screen preprints and journal articles mentioning the virus or disease for quality and novelty. Every day, they assess content published the day before (about 200 items, most of which they dismiss as poor quality or repetitive) and produce a digest. They deposit citations in the WHO Library COVID-19 database, which now contains more than 120,000 vetted papers and preprints in the 6 official WHO languages, plus Portuguese (see go.nature.com/38htjwz). The database has more than 2,500 unique visitors daily.

The one thing I'm proudest of is the setting up by the R&D blueprint team of a multi-country, adaptive clinical trial to test multiple treatments at once. This format adds or removes trialled therapeutic agents as new data emerge, while continuing to recruit participants. The original thought was that some drugs already approved for other diseases might be repurposed as treatments for COVID-19. Interim results from 12,000 participants from 30 countries have been disappointing, with none of the tested drugs showing reductions in mortality or disease progression (WHO Solidarity Trial Consortium *N. Engl. J. Med.* https://doi.org/ghnhnw; 2020). But the approach has shown how to perform high-quality randomized clinical trials to assess potential drugs and answer public-health questions even during a pandemic. I hope we can learn from this and try a similar approach soon for diseases such as tuberculosis and cancer.

Tackling the infodemic

Meanwhile, the WHO has been communicating evidence and debunking misinformation as never before. Launched in March, the WHO Health Alert chatbot counters false information and offers features such as interactive quizzes to let people build and test their knowledge of COVID-19. It is now accessible in 30 languages across platforms

LILLIAN SUWANRUMPHA/AFP/GETTY

Volunteers in Hanoi gave tourists face masks in February to help to prevent the spread of COVID-19 in Vietnam.

including WhatsApp, Facebook Messenger and Rakuten Viber. With about 20 million users, it can reach people even in countries and regions where fragile health systems cannot keep communities informed.

The WHO has also opened lines of communication with other social-media companies. For example, WHO vaccine experts spoke to YouTube's policy team to debunk a number of vaccine myths on the platform. And the agency has worked with Google to ensure that searches produce reliable information on COVID-19 from the WHO or other credible sources. These companies, in turn, have provided insights — about which topics are trending and how to make sure that WHO information gets noticed in search results.

To-do list

So, what's next for the WHO Science Division? One priority is to collect and share more and better data in full. This applies to both routine health data and research data. Some countries lag or lapse in providing information on COVID-19 infections to the WHO. Less than half of the countries that do report to us disaggregate data by sex and other demographics.

We need a stronger infrastructure and culture of sharing. There was a meagre response when the WHO launched a COVID-19 technology-access pool to allow sharing of everything from data sets to methods for 3D-printing personal protective equipment, and to lower barriers to accessing drugs and vaccines. We are working with Gavi and the Coalition for Epidemic Preparedness Innovations (CEPI) on the COVAX initiative to ensure equitable access to COVID-19 vaccines globally — both the world's health and economy depend on protecting vulnerable people everywhere.

The data-science initiative GISAID has been a game changer. It was launched in 2008 to overcome access restrictions to avian-influenza data by creating a transparent sharing mechanism that permits providers to retain their rights to virus data. Since January, GISAID's data-sharing platform has been the primary source of genomic and associated data from SARS-CoV-2 cases. The platform fosters collaboration among researchers and ensures that data providers are acknowledged in publications. GISAID has enabled dozens of web efforts to aid with analyses during the outbreak. Its EpiCoV database already offers more than 260,000 viral whole-genome sequences from 142 countries.

Looking ahead, funders, institutions and other players need to create better mechanisms to reward researchers who share pathogen genomic-sequence data completely openly, especially scientists in the global south.

As I have sought ways to make good decisions quickly, the lesson that repeats itself is how important it is to have thoughtful plans prepared and in place. The countries that have best protected the lives and livelihoods of their citizens have also demonstrated strong, compassionate leadership, at political and technical levels, and generally have health-care systems that engage local and global communities. These qualities require long-standing investments in people and relationships, as well as in research and development.

Not coincidentally, I have also seen the value of listening and two-way communication. Scientists talk to each other, but too often leave others behind. Citizens want to know what the evidence is, and that includes explaining gaps or mistakes. The vetting networks and committees that the WHO has established have the added benefit of letting us know what people are thinking and talking about on the ground, and what messages are or are not getting through.

In many ways, the pandemic has driven the WHO's Science Division to work out how to do what it was meant to do — only much faster.

The author

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