Responding to a Pandemic: The COVID-19 Story

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The disease now known as COVID-19 was recognized in December 2019 as a cluster of severe pneumonia.\(^1,2\) It was rapidly shown to be caused by a novel coronavirus that is structurally related to the virus that causes severe acute respiratory syndrome (SARS) and was named SARS-CoV-2 or SARS-CoV2.\(^3-5\) As of 08 April 2020, globally 15,65,294 confirmed cases and 91,912 deaths have been confirmed.\(^6\) In India, the pandemic has now caused over 5865 confirmed cases and 169 deaths, as of 08 April 2020.\(^7\)

In just 3 months, the virus has changed the world, with lives and workplaces being disrupted and more than a third of the globe under lockdown. As the COVID-19 pandemic spreads fast, there are huge concerns for countries with weak infrastructure, especially healthcare and for vulnerable populations, including migrant workers and refugees. Although there was a high degree of complacency at the start, most countries have now recognized that the rate of spread of the virus is unprecedented and prevention and suppression of the virus must be a priority, in parallel with ensuring the healthcare systems are prepared to meet the surge of patients with severe illness.

Due to the rapid spread of the virus, the usual tools for diagnosis and management of severely ill patients have not been available when and where they were needed. The world is running out of personal protective equipment, ventilators are in short supply, and supply chains for drugs and equipment are disrupted. In addition to all of these, myths and rumors are growing exponentially. Starting from the virus being a biological warfare weapon to thinking that vitamin C or garlic will protect from disease, unfounded beliefs persist.

In the past 3 months, the scientific and medical communities have come together to collate information and generate evidence that enables us to plan and execute prevention, control, and treatment strategies. In PubMed, there are over 2000 papers and many more not yet reviewed placed in prepublication archives. From physicians and surgeons of every specialty in the medical community to virologists, infectious diseases researchers, and mathematical modelers as part of the scientific community to those not usually engaged in the effort to control or treat disease, such as engineers using 3-D printing to craft enthusiasts making masks, few occupations are unaffected by COVID-19.

As this epidemic grows, the healthcare workers who are at the forefront of treating patients with COVID-19 are likely to be over-burdened with increased patient numbers. Additional hazards include pathogen exposure, long working hours, psychological distress, fatigue, occupational burnout, stigma, and physical and psychological violence. Healthcare staff is at high risk of contracting the infection and appear to be at higher risk of severe disease for reasons yet unclear. These risks are further compounded by the lack of access to personal protective equipment that is necessary to safely manage these patients. The general mismatch in health infrastructure with the expected demand is likely to make the probability of transmission to healthcare workers higher.

We need to think about a response within the healthcare system that allows us to generate evidence that will improve our practices and protect ourselves. To better understand the risk of transmission, we should be tracking prospectively to detect asymptomatic infections in addition to symptomatic infections. We should consider the wide use of serology when well-validated tests are available. We should study the effectiveness of personal protective equipment, shielding during aerosol-generating procedures, disinfection protocols, essentially a host of practice-related questions that
will prevent intra-hospital transmission and inform our actions for the future. Besides, we should consider whether identifying those with protective levels of immunity, having recovered early from an infection, will enable these workers to be at the forefront of patient care. In addition, identifying early predictors of severe disease will enable us to intervene early in healthcare workers who are at higher risk of severe disease.

One of the most encouraging aspects of living through the pandemic is the incredible speed, scale, and ingenuity of the response from all sectors of society. In particular, on the research front, diagnostics, drugs, and vaccines have been center stage as the world looks for identification and measurement of burden, appropriate treatments, and future control through prevention.

Diagnostics became rapidly available as real-time PCR tests, and there have been serology tests developed as well. However, given the issues with serological tests and the fact that the products now in the market were launched for emergency use and without proper validation, these need to be approached with caution at this time.

Several broad-spectrum antiviral agents that were already available have been and are being tried in clinical trials. The World Health Organisation has just launched the solidarity trial which compares outcomes in patients on lopinavir/ritonavir with and without interferon-beta, remdesivir and hydroxychloroquine or chloroquine, and favipiravir has been licensed for COVID-19 in China. Scientists have identified the virus protein-host protein interactions of 26 of the 29 proteins of SARS-CoV2 and found that they have 69 molecules predicted to act against over 60 virus-host interactions, which is a promising start for further new treatments.

For vaccines, the first programs to be funded came from the Coalition for Epidemic Preparedness Innovations, which supported multiple vaccine candidates based on messenger RNA, DNA, and protein-based technologies in January. Many other organizations are also supporting vaccine development and there are over 90 projects at different stages. The first two vaccines, from the US and China, went into first-in-human studies in March 2020, and an additional two candidates will conduct their phase 1 studies starting in April.

From India, efforts are focused on all three technology areas from multiple institutions and companies. There are over 20 projects on the development of diagnostics, multiple groups working on the repurposing of drugs, and new drug discovery and four companies, and at least four groups with vaccine development projects.

There is a lot of hope that science will find a solution. Some solutions to contact tracing through mobile phones have already been developed, but there is much, much more to come before we have the technology for pandemic control. And in the meantime, we have to shape India’s response to the pandemic while protecting our healthcare workforce.

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**References**