

# Challenges and lessons from COVID-19



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## ABSTRACT

In this review, we elaborate the post-COVID-19 challenges, and also, the lesson learned out of this crisis. With over 700 million people affected worldwide and nearly 6 million deaths, COVID-19 pandemic is of unprecedented nature ever witnessed by the human race. Besides health-care challenges, there were socioeconomic consequences that still have its footprints affecting life of the citizens. We summarized these challenges, addressing the lacunae in terms of enhancing our infrastructure, logistics, and knowledge, not only about this disease, but also to adequately prepare for future pandemic of this proportion.

**Key words:** COVID-19 pandemic; Health care; RT-PCR; Contagious disease; Lockdown; Digital surveillance

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The coronavirus disease-2019 (COVID-19) pandemic had impeccably put a profound impact on the physical, mental, psychological, and socioeconomic well-being of both an individual and society. Although the number of new cases has fallen drastically over the past few months, there has been a significant rise in cases from time to time, thus keeping the status of the pandemic vulnerable. Thus, for decision-makers and policyholders, it stays crucial to analyze and anticipate the epidemic evolution, so as to stay prepared with multi-longed interventions at repressing the impacts of any viral pandemic. Challenges of disparate nature have arisen, since the evolution of this pandemic, be it in the context of detection and monitoring the disease, managing the pandemic, and of course, treating the patients with co-existing protocols and infrastructure. In addition to the above-mentioned health-care aspects, other factors such as psychological and mental issues, education, economy, and unemployment have also shown disturbed and puzzling

data since the birth of the pandemic. Here, the authors have identified the major challenges and discussed some of the promising techniques to battle the same:

1. Detection and treatment of COVID-19: With more than 6 billion tests performed in the world for COVID-19, the testing or detection of COVID-19 not only pertains to diagnostics or treatment of the individual but also acts as a major driver to acknowledge various socioeconomic activities such as domestic-international flights, switching of work from home to offline work, and detect COVID-19 hotspots. There have been several gold-standard methods for SARS-CoV-2 detection such as reverse transcription-polymerase chain reaction, sandwich ELISA, lateral flow immunoassays (LFIs), reverse transcription-loop-mediated isothermal amplification, reverse transcription-recombinase polymerase amplification, reverse transcription-recombinase-

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aided amplification, fluorescence-based sensors, mass spectrometry, chemiluminescence immunoassay, LFIA, and CRISPR-Cas.<sup>1</sup> In addition, other clinical imaging techniques such as X-ray, ultrasound, and CT are also used to determine COVID-19 infection. However, COVID-19 being a highly contagious disease requires minimal transmission rates. Methods such as social distancing and wearing masks have been implemented by the government,<sup>2</sup> but keeping in view the economic limitations of both the individual and the nation, epidemiology management becomes quite tedious. Hence, other methods such as digital contact tracing using blockchain technology,<sup>3</sup> detecting COVID-19 using computational intelligence and waste-water digital surveillance<sup>4</sup> to detect excrete-based COVID-19 viral fragments deduce to be great potential tools for monitoring COVID-19. Research on modern techniques such as negative-pressure masks, nanomaterial-based biosensors, and human soluble ACE2-based therapy should be carried out extensively. Negative pressure masks like aerosol containment masks should be promoted in both design and manufacture, as other commonly used masks like N95 usually get contaminated after their respirator removal, which further might lead to the spreading of the virus. Soluble ACE2 protein has been seen to protect against lung injuries, cardiovascular disorders, reduce inflammations, etc. Keeping in view the RAS balance inside the body, engineered sACE2 proteins should also be analyzed as both a therapeutic and a vaccine candidate against infections like COVID-19

- Challenges in pandemic control: In March 2020, countries around the globe deployed various forms of lockdown that heaved on for more than a year, which again resumed in 2021 under the new variants of SARS-CoV-2. This response to the pandemic dominated the lives of individuals, as well as impacted heavily on the socioeconomic conditions of various nations. Apart from the shrinking GDP of countries, losses in organizations/businesses, negative consequences on education due to lost educational attainment, and unemployment are some of them which led to a drop in national income. On an individual scale, cases such as unemployment, domestic violence, behavioral fatigue, and untreated non-COVID patients also led to a deteriorated quality of life. Unprecedented challenges to the mental well-being of frontline workers due to increased societal pressures and emotionally strenuous environment led to a rise in depression and anxiety among people too. In light of the nature and measurement problems, there have been several models which have tried to estimate the number of deaths with no lockdown; and the numbers remain

20–50% more than the registered deaths.<sup>5,6</sup> However, a moderate control over such lockdowns, observing epidemic incidence, including auxiliary pieces of information like mental health, weather, demographics, employment, and monitoring disease spread would definitely give a holistic approach to percolating a lockdown. From a health-care point of view, vaccines and therapeutic research for the pandemic must be prioritized into agents with acknowledgeable pandemic potential like dengue and Ebola. Switching to online tools and newer strategies can be opted for in such situations. On the contrary, people can be allowed to embrace herd immunity by pulling off all the lockdowns. This would help to break the transmission chain and comparatively flatten the transmissibility curve.<sup>7</sup> Social media and telecommunication should also be promoted to spread awareness and prevent the spread of disease. Assembly lines should also be in ready-to-use stages to prepare makeshift clinics for a future surge in cases.

The COVID-19 pandemic has taken a toll on the public, on a global basis. Policyholders and authorities must take into account not only the health-care and economic effects of isolation and lockdown but also to chalk out plans for parallel health-care services, mental and emotional health, streamlined workforce, and logistic plans and planned assembly lines and think about it as a long-term strategy.

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