

# Role of Microbiology in Diagnostic Stewardship during the COVID-19 Pandemic

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When a few cases of an unknown acute respiratory illness were initially reported from Wuhan, China, in December 2019, little did the world know that it was on the brink of a pandemic.<sup>[1]</sup> A cluster of atypical pneumonia cases by a novel coronavirus signaled an outbreak, the World Health Organization recognized this outbreak on January 30, 2020, and declared it a pandemic on March 11, 2020.<sup>[2]</sup> Since then, the severe acute respiratory syndrome coronavirus 2 pandemic has spread across the globe like wild fire infecting as many as 11,500,302 people and causing 535,759 deaths.<sup>[3]</sup> Although India registered only a few cases in the early part of the year, there has been a steep rise in the numbers, the statistics adding day by day.<sup>[4]</sup> The coronavirus disease-19 (COVID-19) is caused by the enveloped RNA virus belonging to the genus *Betacoronavirus*.<sup>[5]</sup>

The current pandemic which caught the world by surprise has seen doctors and health care workers among others, rise to the occasion, and emerge as warriors. Microbiologists too have adorned a new avatar, that of "corona warriors." One of the requisites for diagnosis of COVID-19 is a well-equipped molecular biology laboratory. Laboratory diagnosis is the most important role of the microbiologist and relies on testing respiratory samples for the presence of viral nucleic acid by the polymerase chain reaction (PCR). The real-time reverse transcriptase-PCR is used for diagnosis and detects viral targets such as the envelope (E gene) and RNA-dependent RNA polymerase gene depending on the assay used.<sup>[6]</sup> The assay performance depends on the quality of the sample collected, correct sampling method, and transport of swabs in viral transport

medium till processing, time of sample collection, and trained professionals carrying out testing. However, the results need to be interpreted with caution as there may be false-negative and false-positive results which need to be identified by the microbiologist who is reporting. In case, the PCR results are negative in a patient with clinical features suggestive of COVID-19, multiple sample types in different time points, including lower respiratory tract specimens, should be tested. Good laboratory practices and using kits validated by the Indian Council of Medical Research (ICMR) could reduce inaccurate results. A combination of clinical and radiological features along with the PCR results facilitates disease diagnosis and management.<sup>[7]</sup>

Despite the large population and limited resources, our country has reacted promptly to the pandemic. National bodies like the ICMR have laid down guidelines for countrywide molecular testing for the detection of the virus. There has been a move toward decentralization and democratization of molecular testing. Molecular biology equipped laboratories with required biosafety level have been set up across the country in a record time ensuring laboratory surge capacity required during this pandemic.<sup>[8]</sup> Although the molecular tests are recommended for diagnosis, they are not recommended for serosurveillance. With easing of lockdown restrictions, the disease is likely to spread and it will be difficult to know the actual extent of infection and the people already infected with the disease. Enzyme-linked immunosorbent assay (ELISA)-based antibody tests have been validated and recommended by ICMR for serosurveillance of the population.<sup>[9]</sup> These, however, are not to be used for diagnosis. The surveillance of IgG antibodies shall help to map the extent of spread of infection in the population and help in forming and strengthening public health measures. It is expected that these studies will help us in understanding epidemiology of COVID-19.

For a disease like COVID-19, there is more than what meets the eye and many unknowns yet to be discovered. The role of microbiologists is pivotal in disease control and prevention in hospitals by advising on infection

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control practices and use of virucidal antiseptics and disinfectants. Educating staff and patients suspected of COVID-19 disease regarding hand hygiene, social distancing, and personal protective gear are another role of the microbiologists. From diagnostics and developing newer platforms for testing, to mapping of viral genome and detection of resistant mutants, all are the purview of the microbiologists and virologists. The future is “plug-and-play” diagnostics for early nucleic acid or protein detection as point-of-care tests, thus diagnosing and preventing future epidemics in time.<sup>[10]</sup> With vaccine development in top gear, we have promising vaccine candidates on the horizon. Today, as mankind faces this global health crisis, affecting every country, government, and scientific community, we need to come together to overcome this crisis. In this endeavor, each and every one has an important role to play.

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