

Editorial

## Role of Clinical Microbiologist in COVID-19 Pandemic

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The COVID-19 pandemic due to SARS-CoV-2 commenced in China in December 2019, was declared as a public health emergency of international concern by the World Health Organization (WHO) on January 30, 2020, and a pandemic on March 11, 2020. (1) India reported its first case on 30th January 2020, imported from China. (2) The COVID-19 outbreak has had a major impact on clinical microbiology laboratories in the past several months.

This editorial covers current issues and challenges for the laboratory diagnosis of infections caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In the pre-analytical stage, collecting the proper respiratory tract specimen at the right time from the right anatomic site is essential for a prompt and accurate molecular diagnosis of COVID-19.

Appropriate measures are required to keep laboratory staff safe while producing reliable test results. In the analytic stage, real-time reverse transcription-PCR (RT-PCR) assays remain the molecular test of choice for the etiologic diagnosis of SARS-CoV-2 infection while antibody-based techniques are being introduced as supplemental tools. In the post-analytical stage, testing results should be carefully interpreted using both molecular and serological findings.(3)

The Microbiologist plays Torchbearer role as a COVID WARRIOR. Some of the ways in which Microbiologists are stepping up to play a crucial role by conducting tests and confirming new cases can be placed in various roles.

- Specimen collection and transportation
- Establishment of Virology Laboratory
- Laboratory diagnosis of COVID-19 by performing tests; Tests (PCR based)

- Development and production of the COVID-19 vaccine
- Mass and field screening of COVID-19 suspected population by rapid tests
- Development and production of new tests (Rapid & Confirmatory) with high sensitivity and specificity regarding COVID-19 disease
- Infection Control in Hospital - Hand hygiene and other infection control practices
- Biomedical Waste Management
- Teaching and training of supporting medical staff about the COVID-19 disease
- Research perspectives regarding diagnosis, prevention and vaccination
- To develop effective antiviral therapy to COVID-19 disease
- Educating regarding the role of antiseptics and disinfectants in the prevention of COVID-19 disease

### **Specimen collection and transportation**

Within 5 to 6 days of the onset of symptoms, patients with COVID-19 have demonstrated high viral loads in their upper and lower respiratory tracts. The sample collection should be done by wearing Personal Protective Equipment (PPE) kit. A nasopharyngeal (NP) swab and/or an oropharyngeal (OP) swab are often recommended for screening or diagnosis of early infection. A single NP swab has become the preferred swab as it is tolerated better by the patient and is safer for the operator. NP swabs have inherent quality control in that they usually reach the correct area to be tested in the nasal cavity. After collection, swabs should be placed in viral (universal) transport medium for rapid transportation to the clinical microbiology laboratory, ideally under refrigerated conditions.

### **Establishment of Virology Laboratory**

India did not have many laboratories that could provide diagnostic support at the beginning of the COVID-19 pandemic. The testing capacity of the entire network was limited to a few thousand samples. It was swiftly scaled up.

The key elements for the establishment of a virology laboratory and diagnostic services are:

- (1) Physical infrastructure
- (2) Human resources
- (3) Equipment and supplies

Virtually all diagnostic techniques used in virology are based on the following principles:

- (1) Isolation and identification of viruses
- (2) Detection of virus antigens
- (3) Detection of viral nucleic acid
- (4) Detection of virus-specific antibodies

### **Laboratory diagnosis of COVID-19 by performing tests; Tests (PCR based)**

Processing of COVID-19 specimens should be done in class II biological safety cabinet, although some laboratories would argue that biosafety level three (BSL-3) work procedures should be used and that the safety cabinet should be in a negative-pressure room within the laboratory such as that used for mycobacterial cultures. For nucleic acid extraction, before real-time RT-PCR is performed, the specimen should be transferred to lysis buffer under this BSL-2 cabinet. The lysis buffer should contain a guanidinium-based inactivating agent as well as a nondenaturing detergent. Indeed, the buffers swabs used to collect the clinical specimens should be quickly added to lysis buffer to disinfect the specimen as well as to stop the degradation of the coronavirus RNA. The clinical specimens/swabs should not be heated to 56°C for 30 min as evidence suggests that this process may also degrade the coronavirus RNA even as it inactivates viable coronavirus.

### **Development and production of the COVID-19 vaccine**

A COVID-19 vaccine is intended to provide acquired immunity against COVID-19.

### **Mass and field screening of COVID-19 suspected population by rapid tests**

Currently, both COVID-19 antigen and antibody tests, are used for mass and field screening of COVID-19 suspected population.

### **Development and production of new tests (Rapid & Confirmatory) with high sensitivity and specificity regarding COVID-19 disease**

Indian Council of Medical Research (ICMR) encourages the development and production of new tests for COVID-19 disease.

### **Infection Control in Hospital - Hand hygiene and other infection control practices**

All healthcare workers should be trained for wearing Personal Protective Equipment (PPE) – Donning and Dopping, hand washing techniques, fogging of working area, etc.

**Biomedical Waste Management**

PPE kit used in screening, treatment, management and immunization, lab diagnosis, sample collection, etc. while dealing with COVID-19 patients and their samples should be discarded in the yellow bag without pretreatment and then sent for incineration.(4)

**Teaching and training of supporting medical staff about the COVID-19 disease**

Educating health care workers about the COVID-19 disease, its treatment, quarantine methods, social distancing, clearing the doubts regarding myths about COVID-19, counteracting the stigma due to COVID-19 disease, the psychological impact of COVID-19 disease.

**Research perspectives regarding diagnosis, prevention and vaccination**

Providing support to the development of new drugs against COVID-19, usage of plasma therapy, vaccination trials.

**To develop effective antiviral therapy to COVID-19 disease**

Setting up an institutional protocol for COVID-19 treatment.

**Education regarding the role of antiseptics and disinfectants in the prevention of COVID-19 disease.**

Coronavirus disease 2019 (COVID-19) is a respiratory infection caused by SARS-CoV-2 (COVID-19 virus). The COVID-19 virus is transmitted mainly through close physical contact and respiratory droplets, while the airborne transmission is possible during aerosol-generating medical procedures. The following disinfectants are recommended:

A) Ethanol 70-90%.

B) Chlorine-based products (e.g., hypochlorite) at 0.1% (1000 ppm) for general environmental disinfection or 0.5% (5000 ppm) for blood and body fluids large spills.

C) Hydrogen peroxide >0.5%.

Ultimately, good communication between the Clinical Microbiologist and the Consultant or the physician helps to fight the COVID-19 pandemic battle.

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