EFFECTIVE HEALTH SCREENING TO PREVENT INFECTION AND CONTROL THE SPREADING OF COVID-19

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Abstract

Health screening or examinations are of paramount importance from medical perspective as prevention is better than cure. In current pandemic situation, effective health screening is essential to detect COVID-19 in its early stage even when there have been no symptoms or signs of such disease. To prevent the transmission of such contagious infection, source control measures should be implemented for everyone in the facility, regardless of symptoms. Recent literatures stated that infected people having no symptoms also likely to perform a crucial role in the spread of corona virus in the society. To restrict the transmitting of such disease in community, it is imperative to identify the CORONA positive patient at each and every entry point of the market places, railway stations, airport premises, hospital buildings etc. and isolate them in an efficient manner. Rapid qualitative detection of such disease is made through body temperature measurement with IR thermal gun and RT-PCR test. Detection of COVID-19 positive patient early means getting immediate treatment, restrict & control the transmission of such disease within the facility and limit the exposures for other patients and healthcare personnel.

Keywords: Community, COVID 19, Detection, Health screening, RT-PCR test.

1. Introduction:

In the last quarter of 2019, an outbreak of acute respiratory syndrome was identified in Wuhan, a city in the Hubei province of China, in the form of a novel coronavirus designated as SARS-CoV-2 [1]. After 3-4 months later, in the month of February 2020, the World Health Organization (WHO) declared the infection as COVID-19, most dangerous disease of the world in the 21st century as coronavirus disease 2019. The clinical characterization of such corona virus infection ranges from asymptomatic to acute respiratory distress syndrome with very severe pneumonia, septic shock and multi-organ failure, which may lead to death [2]. WHO announced the COVID-19 outbreak as a public health exigency of global burden in the early 2020 and in March 2020, they started to identify it as a pandemic in order to accentuate the weightage of the position and appeal to all nations for taking necessary action in detection and prevention of such infection disease and also take necessary measures to control the spreading of such contagious outbreak.

The virus responsible for COVID-19 is thought to spread primarily from person to person, through respiratory droplets produced by coughs or sneezes of an infected person [3]. These moist beads can transmit in the mouths or noses of people who are in closed vicinity of the infected people and possibly be inhaled into the lungs. Alternative possible routes include through direct contact with contaminated fomites and inhalation of droplets as well as possible transmission of SARS-CoV-2 from asymptomatic individuals (or individuals within the incubation period) to the others [4]. However, the exact reason for spreading of such disease is still not clear.

Unfortunately, there is no such FDA approved medication and vaccine that can control and prevents the spreading of such virus for this global pandemic situation. Although there are high percentage of cures for illnesses and developments made by leaps and bounds in every day, the forceful and most energetic weapon that society has against this virus which is affecting not just health but also economics, mental states and social order, is the prevention of its spread [5].
On 7th March 2020, WHO published interim guideline in their bulletin “Responding to community spread of COVID-19”, explains that preventing and controlling of corona virus from spreading via the development of coordination mechanisms is not just in health environment but in the ranges of transportation, travel, commerce, finance, security and other sectors which encompasses the entirety of society [6]. Preventive measures are the best approach to restrict the spread of cases. Early screening, diagnosis, isolation, and treatment are indispensable to prevent further transmission [7]. Preventive strategies are mainly focused on the isolation of patients and careful infection control, including appropriate precautions to be adopted during entry point of public places like market and effective measures in the diagnosis and the provision of clinical care to an infected patient [8,9].

2. Limiting contact with infectious persons

Isolating people from the contact with infectious persons is essential to prevent the transmission of contagious diseases. When an outbreak is serious, contagious disease spreading very fast, it will often be unattainable or impossible to accurately identify the person and carriers of such disease [10]. For this reason, effective screening of each individual will be limiting the contact with infectious people. Contact tracing is an evidence-based mechanism to slowdown the spread of infectious disease. It is the process of examining individuals who have been infected with a disease, identifying close contacts that they may have unknowingly exposed, and providing those contacts with the clue required to monitor their own health and prevent the continued spread of the illness. Learning effective contact tracing process can help to prevent further spread of COVID-19 [11]. Proper screening of an individual is a true diagnostic process of determining an unrecognized disease in an apparently healthy, asymptomatic population by means of tests, examinations or other procedures that can be enforced easily and quickly to the target population [12]. This rapid test procedure enables health care providers to begin treatment in a timely manner, to manage co-morbidities more efficaciously, to embolden patients to reduce high-risk behaviour and, in certain cases, to identify the need for compulsory treatment [13]. In addition to restricting the severity of illness, early treatment may also limit the transmission rates.

3. Screening Procedure:

There are several diagnostic procedures to detect the COVID-19 affected patients. Some of the easiest, reliable screening procedure includes:

3.1 IR Thermal Gun:

The IR thermal gun is also known as non-contact temperature transducer which reckons temperature from a fraction of the thermal irradiation which often called black-body radiation emitted by the object being measured. This type of temperature measuring gun is able to measure temperature from a distance without contact with the object to be measured. The thermal devices are able to calculate the actual temperature of subject’s body within a specified range by measuring the amount of IR energy emitted by the person and the emissivity of the thermometer. At present we have noticed that there is an increased use of such devices at different entry-points and checkpoints of airport premises, railway station, hospital buildings, shopping mall, and other locations with the ongoing COVID-19 coronavirus outbreak to inhibit the spreading of such infectious disease in the community by easily identifying the COVID 19 affected patient and isolate them in an efficient manner. The main purpose of these devices is to measure the subject’s body temperature from a bit of a distance, when sticking a thermometer in everyone’s mouths or rear ends would be inapplicable, infeasible, and potentially a bit disgusting.

3.2 RT-PCR Test

At present, most of the current Covid-19 test results that have been reported are coming from PCR test. This process mainly detects about the abiogenic information of the virus, the RNA and it is only possible if the virus is present and someone is actively infected [14].
So, PCR assessment tests are usually performed to directly recognise the presence of an antigen, rather than the presence of the body’s immune response, or antibodies. This test can only assure the presence of viral RNA in the system before formation of antibodies or symptoms of the disease that are present.

RT-PCR gives us a good indication of health condition of people whether they are infected or not. An infected person can be easily isolated and get in contact with people they’ve been in touch with than person, so they can be quarantined too, just in case. By grading PCR analysis to screen vast swathes of nasopharyngeal swab samples from within a population, public health officials can get a clear picture of the spreading of such infectious disease like Covid-19 within a population.

### 3.3 Rapid Antibody Test

Rapid antibody test for COVID-19 diagnostics is one of the most effective tools in combating the outbreak [15]. At present, most of the test methods used for COVID-19 diagnostics takes more than 2-3 days to provide the results.

Such kind of typical diagnostic tests used to diagnose the presence of COVID-19 virus by testing the samples of mucous and saliva in lab to see if it contains the coronavirus genomic sequence. This result can take 24-48 hours to show whether the patient has an active infection or not.

On the other hand, rapid antibody test, also known as serological tests, look for the presence of a virus through a blood test and can give the results in 10-15 minutes. However, it is not a confirmatory test. It can be used as a pre-screening analysis to generate data about how many people got exposed to the virus.

### 3.4 SARS-CoV-2 Rapid Antigen Test

This type of Rapid Antigen Test is useful for both symptomatic and asymptomatic people. This diagnostic technique may provide the support the healthcare professionals to determine a SARS-CoV-2 infected people who are suspected to carry the virus with results typically ready in 15 minutes.

Therefore, antigen test accurately screens individuals with known exposure to infected SARS-CoV-2 patients, providing fast answers regarding their infection status and also allowing informed treatment decisions. Portable and reliable, instrument-free testing kit enables convenient use for healthcare professionals at different point of care locations, or in resource-limited settings. Regardless of laboratory testing and/or patient mobility, the Rapid Antigen testing increases the access to high quality diagnostics solutions for the detection of a current SARS-CoV-2 infection in a better way. Additionally, it provides a valuable initial screening result for individuals who have been exposed to SARS-CoV-2 infected patients or a high-risk environment.

There is some alternate pathway for new diagnostic tests available with some advantages.

a) In Rapid, point-care diagnostic tests, a mucus sample is collected from the nose or throat that can be used for analysis at the doctor’s chamber or clinic where the sample is collected and results may be available within few minutes. This procedure may be either molecular or antigen test.

b) In house collection tests procedure is also available only by prescription from a doctor which allow the patient to collect the sample from home and dispatch it precisely to the lab for analysis.

c) Instead of getting swabbed from nose and throat, saliva tests are performed in which patient is allowed to spit into a tube. Saliva tests is more comfortable for some people than any other test available for corona detection and also safer and easier for health care personnel who can be farther away during the sample collection.
Results & Discussion:

4.1 IR Thermometer:
These type of non-contact IR thermometers can measure and display the subject temperature within a quick time. So, a large number of people can be screened individually at checkpoints which may help to reduce the risk of spreading COVID-19 infections.

4.2 RT-PCR Test:
The real time RT–PCR diagnostic testing is highly sensitive and specific and can deliver a reliable diagnosis within a very short period of time i.e., within three hours, though laboratories takes much more time (on an average between six and eight hours) to provide the result. Compared to other predictable methods for virus detection, real time RT–PCR is significantly faster and provide a much accurate results with less potential for contamination or interference because the entire process can be carried out within a closed tube. Therefore, it is the most accurate and effective method available for the detection of the COVID-19 virus.

4.3 Rapid Antibody Test:
In response to the fastest growing of COVID-19 pandemic and shortages of laboratory-based molecular testing capacity and reagents, several diagnostic test manufacturers have designed and developed a rapid and user-friendly device to facilitate diagnosing procedure outside the laboratory settings. These simple test kits are capable of detecting antibody strength in the blood of the people who have already been infected with COVID-19.

4.4 SARS-CoV-2 Rapid Antigen Test
This type of rapid antigen test will reveal whether a person is currently infected with SARS-CoV-2 virus or not. After recovery from infection, the antigen disappears immediately. Unlike RT-PCR test, rapid antigen tests detect proteins or glycans, such as the spike proteins found on the surface of the SARS-CoV-2. They are cost effective and usually provide the test results very quickly. Furthermore, such detection procedure can be more amenable to point-of-care use, which could make them more relevant for testing in the community and in remote locations.

Conclusion:
From the above-mentioned screening procedure, we can easily identify the COVID-19 affected patient at the early stage. All these screening and diagnostic process help the healthcare professionals to separate the infected persons from the other and can start the treatment of infected people at the early stage of COVID-19 infection. If the number of screening test increases in an effective way to each individual, we can prevent the spreading of coronavirus to the community. In addition to that more and more awareness program is required to control the COVID-19 virus transmission within the society.

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