

Mobile Diagnostic facility for COVID-19

COVID-19 is a highly contagious viral disease which affected the whole world within two months from the first case report from china. Even though the death rate is lower than most other pandemics in the history, COVID-19 spreads through community at a rapid phase.

Sri Lankan Government has taken all the measures currently possible to contain the disease. But, based on some case histories there is a possibility of community spreading which would jeopardise all efforts by the government. Testing is only permitted in specific locations due to the available resources and the lack of expert knowledge on safe handling of contagious samples.

Downside of this is time between sample collection and the testing is high due to long distance transportation. This directly affects quality of the sample and the test results because RNA viruses (like SARS-COV-2) can start to deteriorate rapidly resulting erroneous results. Also, if the testing station gets samples from several collection sites, it can cause delays in reporting of the results as well. All of these can be mitigated by making the test facility available on site.

This proposal describes a way to setup a RT-PCR laboratory in a 20 ft cargo container with all the necessary equipment. Design has key features of an PCR diagnostic laboratory required for handling bio safety level 2 pathogens.

Sample reception area can be utilized with permitted disinfectant to disinfect the packages received to the laboratory and initial documentation. Lab logs can also be maintained in this area. It can also be used as a temporary holding area of samples until it can be processed (room temperature for short period of time or can utilize a +4 C fridge to store for several hours if needed)

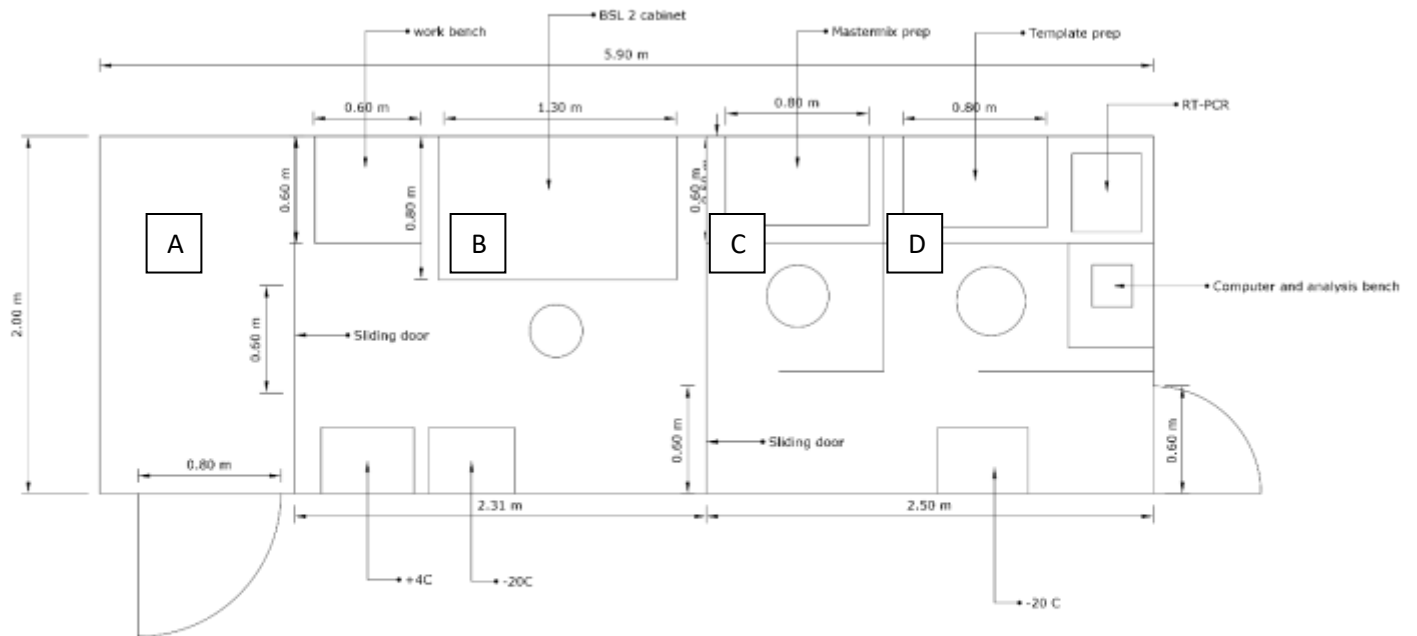
Extraction room is equipped with a BSL 2 safety cabinet and a work bench to keep the necessary centrifuges and other equipment needed. Also, it has a separate storage freezer to keep the sample aliquots for further testing or storing them for later analysis. Extraction room is separated from other rooms to avoid contamination.

Master mix preparation area is separated to avoid any contamination of reagents from the extracted samples, hence assuring accurate results. It has a dedicated freezer to keep the reagents separated from extracted samples.

Template preparation and Cycler area is dedicated to sample pipetting and running the test as well as analyzing the results. This area has a dedicated entrance/exit to avoid going through the extraction room or sample reception area to minimize the risk of exposure and easy access to the reporting area.

Design has been made considering WHO guidelines for the COVID-19 diagnostics and general lab practices and safety procedures to minimize the risk of exposure to the laboratory workers and also avoiding contaminations of reagents and samples for more accurate results.

Design



- A- Sample reception documentation
- B- Inactivation and extraction
- C- Master mix preparation
- D- Template preparation, running of the test and analysis



Advantages

1. Mobile and can be transported to local hospital with less facilities and space
2. Can be mobilized to a quarantine facility.
3. Sample transport time is minimized, and reporting is faster
4. Optimised space.
5. No other facilities needed other than electricity and water
6. After the pandemic these can be placed at hospitals for diagnosis of other infectious diseases

References

- “Laboratory Biosafety Guidance Related to Coronavirus Disease 2019 (COVID-19).” Accessed April 9, 2020. [https://www.who.int/publications-detail/laboratory-biosafety-guidance-related-to-coronavirus-disease-2019-\(covid-19\)](https://www.who.int/publications-detail/laboratory-biosafety-guidance-related-to-coronavirus-disease-2019-(covid-19)).
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