

Design of Portable Health Centre for COVID-19

1. Introduction

Portable health centre (PHC) are the mobile hospitals which can give comprehensive care to man, woman & child regardless of financial means. It generally operates in remote locations where hospitals are not available. In India, the use of portable hospitals is not in the trend, this creates serious health problems for the people living in rural areas or remote locations and does not have adequate health facilities. In the study, perspective design of isolation wards for one of the most harmful viruses, COVID-19, was given, along with the design of a generalized portable hospital.

A trolley truck is used for creating isolation rooms for the patients, along with portable medical machinery used to give the required work when needed. The health centre has all the basic requirements as specified by the government and fulfills all the safety standards. The ergonomic study was also done, using Computer Aided Design (CAD) illustration to analyze the complexity and feasibility of the design, and the results were found good.

2. Working

a. COVID-19, PHC

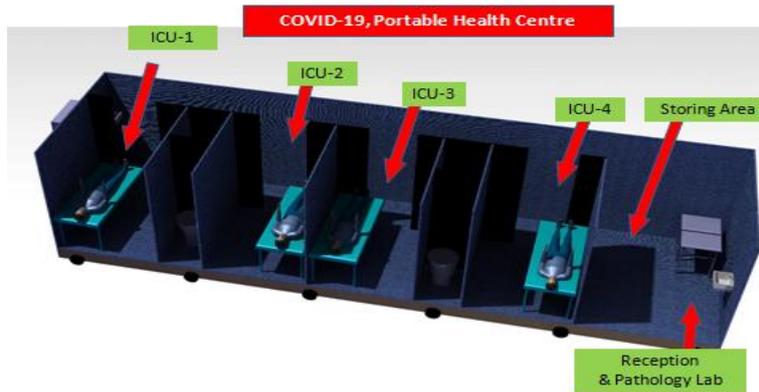


Figure 1: CAD Illustration of PHC

Figure 1 shows the basic structure of the truck trolley. It was such designed that it can be easily loaded to the trucks and can be easily transported and installed to the specific location. A single truck can transport any number of trolleys to the specified location, the traditional PHC were inbuilt with the truck like a vanity van, which decrease its utility, but in this design the transportability and the effectiveness increases. Figure 2 shows the basic amenities of the COVID-19, PHC. It has 4 ICU wards, with all required life support system. A special consideration was taken care to give cure to maximum number of patients and so an optimized utilization of floor area was done. The generalized dimension of the trolley was taken i.e. length, breadth and height as 34, 9 and 8 Feet respectively. The storing area is provided along with the pathology lab, which is today a basic requirement for testing the COVID-19. Every ICU is equipped with toilets and bathrooms and all the safety measures were taken care to stop the CORONA virus from spreading.



(a)

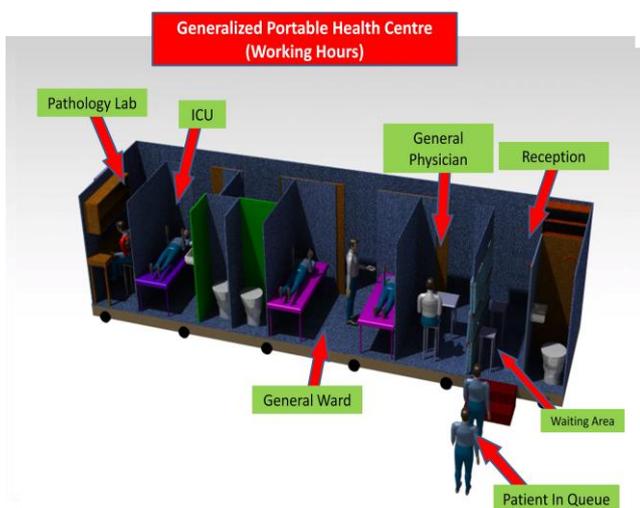


(b)

Figure 2: COVID-19, Isolation ward design Sectional view(a) Path way inside the trolley (b) Various amenities inside the trolley

The walls of the partition are modular and can be arranged to phase any specific situation. Since the whole trolley is detachable the trolley can be transported to the remote location if required, which reduces the spread ability of the virus.

b. Generalized, PHC



(c)



(d)

Figure 3: Generalized PHC (a) During working hours (b) during Non working hours

Generalized PHC are the health centres which provide general medical facilities to the remote location. Pediatrician, radiotherapy, ultrasound, Xray etc. In Figure 4, the fully accommodated facility was designed which can be modularize and give maximum space allocation to the patient and respective facilities. It was

designed to work for continuously 4 days, and so sleeping space, refreshment space, bathing and toiletries were provided to the staff. Foldable seat mechanism gives the freedom to make convertible rooms. General ward along with one ICU rooms is given. Three toilets were there including the ICU toilets. All the medical and safety consideration was given a proper consideration. Pathology lab was established at one side, so that it can work properly. Figure 4: shows the plan view.

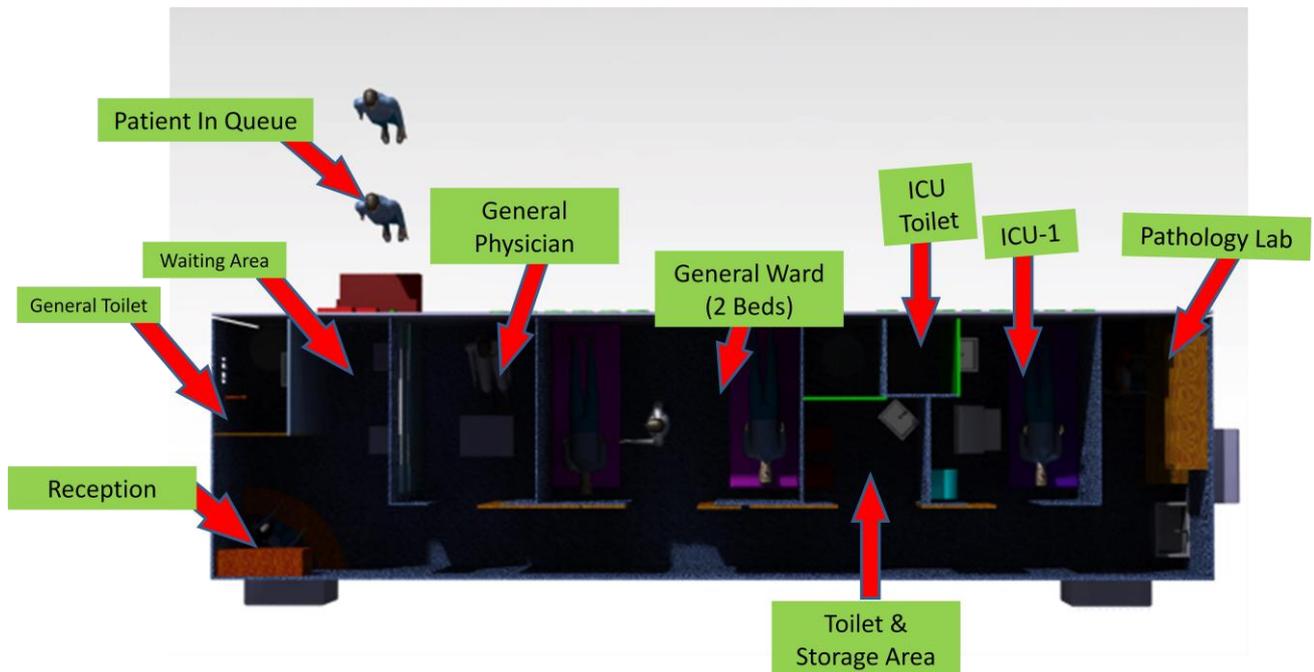


Figure 4: Generalized PHC, modular designs and working plan view

3. Novelty of the design

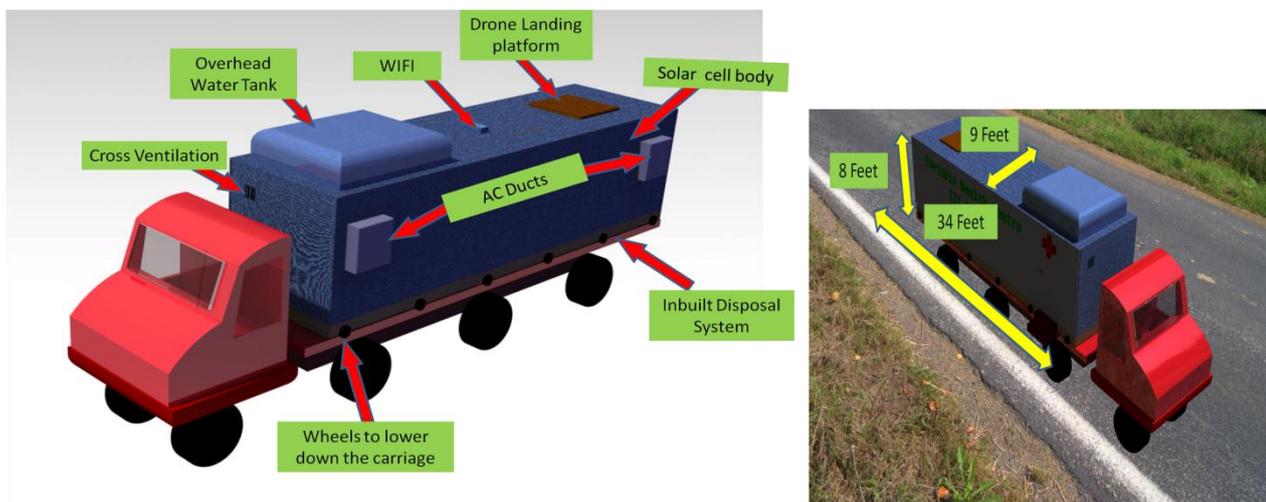


Figure 5: Novelty of the PHC

Today various PHC were operated in the world, but this PHC is far more effective and efficient than the others. A great literature survey was done to make it more helpful and ergonomically well to the patients along with the medical staffs. Some silent features are.

1. Wifi Connectivity (To send data and receive information)
2. Remote GPS location tracker
3. Cloud Data Computing
4. Telemedicine Medicine (to consult more specific doctors, inside the trolley only)
5. 3 Toilets and 1 bathing zone.
6. Drone landing Platform (To receive medicines to remote location)

7. Multiple ICU's
8. Isolation ward for COVID-19
9. Portable Oxygen Concentrators (Instead of Cylinders)
10. Rest rooms for staff
11. Major Medical facilities
12. Pathology Lab
13. Adjustable and Modular Partition
14. AC Duct, which cleans the air every hour
15. Solar Power cell body (To create its own power)
16. Waste disposal System
17. Personal Locker rooms
18. 5 Medical Staff can stay easily for 4 days
19. 4 Days working capacity
20. HVAC
21. Modular Based design
22. Multi outlets Ventilator system
23. Portable machines
24. All the basic medical facilities for the rural India
25. Design for the Future
- 26.



Figure 6: Working of the PHC

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