World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:17, No:03, 2023

Development of an Aerosol Protection Capsule for Patients with COVID-19

Authors : Isomar Lima da Silva, Aristeu Jonatas Leite de Oliveira, Roberto Maia Augusto

Abstract : Biological isolation capsules are equipment commonly used in the control and prevention of infectious diseases in the hospital environment. This type of equipment, combined with pre-established medical protocols, contributes significantly to the containment of highly transmissible pathogens such as COVID-19. Due to its hermetic isolation, it allows more excellent patient safety, protecting companions and the health team. In this context, this work presents the development, testing, and validation of a medical capsule to treat patients affected by COVID-19. To this end, requirements such as low cost and easy handling were considered to meet the demand of people infected with the virus in remote locations in the Amazon region and/or where there are no ICU beds and mechanical ventilators for orotracheal intubation. Conceived and developed in a partnership between SAMEL Planos de Saúde and Instituto Conecthus, the device entitled "Vanessa Capsule" was designed to be used together with the NIV protocol (non-invasive ventilation), has an automatic exhaust system and filters performing the CO2 exchange, in addition to having BiPaps ventilatory support equipment (mechanical fans) in the Cabin Kit. The results show that the degree of effectiveness in protecting against infection by aerosols, with the protection cabin, is satisfactory, implying the consideration of the Vanessa capsule as an auxiliary method to be evaluated by the health team. It should also be noted that the medical observation of the evaluated patients found that the treatment against the COVID-19 virus started earlier with non-invasive mechanical ventilation reduces the patient's suffering and contributes positively to their recovery, in association with isolation through the Vanessa capsule.

Keywords : COVID-19, mechanical ventilators, medical capsule, non-invasive ventilation
Conference Title : ICBDEM 2023 : International Conference on Biomedical Device Engineering and Materials
Conference Location : Doha, Qatar
Conference Dates : March 20-21, 2023