

PORTABLE PATIENT ISOLATION AND SAMPLE COLLECTION SYSTEM TO PREVENT SPREAD OF COVID-19 AND OTHER RESPIRATORY INFECTIONS

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Technology Description

Dr. Zahid Iqbal at Washington University in St. Louis has devised a portable, wearable patient isolation/oxygenation system designed to protect health care workers from respiratory infections (e.g., COVID-19) while facilitating diagnostic sample collection. This viral containment technology combines the benefits of established personal protective equipment (PPE) with features of negative pressure isolation rooms in a device that is similar to an inverted version of a powered air purifying respirator (PAPR).

Currently, healthcare facilities face critical shortages of PPE needed to protect staff from droplets and aerosolized viruses such as SARS-CoV-2. This is particularly problematic when staff must be close to patients while collecting samples for testing. The respiration hood designed by Dr. Iqbal could help address these problems and limit direct patient interaction. The flexible hood is based on modifications to existing PPE but would be worn by the patient instead of the healthcare provider. It is equipped with gas inlets and outlets to facilitate treatment while containing and removing aerosolized pathogens. Additional features include a vacuum pump and HEPA filter that removes viral particles from expired air and a sealed zipper to allow access to the patient's face while maintaining protection. Furthermore, it includes a removable in-line cartridge system that can collect samples from the air exhaled by the patient for diagnostic testing. This technology could reduce the environmental spread of viral aerosols and droplets while maintaining a safe environment for the patient and potentially reducing demand for PPE.

Applications

- **Protective equipment** – portable patient isolation system to reduce exposure and aerosolization of viruses
- **Diagnostic sample collection** – hood is designed with removable cartridges to collect exhaled air for testing, which is particularly useful for serial testing

Key Advantages

- **Reduced risks to healthcare providers** – combines benefits of established personal protective equipment with public health benefits of negative pressure isolation rooms
 - designed to allow patients to access oxygenation and ventilation within an isolated, negative pressure environment reducing the risk of aerosolizing viral particles associated with respiratory infection

- designed so diagnostic samples can be collected with limited direct patient contact
- could reduce demand for personal protective equipment
- **Portable, reusable, compact:**
 - can be worn by patient while being moved or transferred
 - reusable vacuum system
 - flexible and compressible for easier shipping and storage
 - can be adapted to existing technologies

Patents – Application filed