

Singapore designs shield to protect COVID-19 healthcare workers

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NUS-NUH team in Singapore has designed "Portable Droplet and Aerosol Reducing Tent (DART)" which lessens the risk of infection to healthcare workers caring for COVID-19 patients and is also easy to sterilise



A team of researchers from the National University of Singapore (NUS) has invented a foldable tent-like device that serves as a physical shield to reduce the risk of exposure to pathogens for healthcare workers performing droplet and aerosol-generating procedures on COVID-19 patients. Known as the Droplet and Aerosol Reducing Tent (DART), the device was designed in collaboration with doctors from the National University Hospital (NUH).

The DART can lessen the risks of infection associated with procedures such as suctioning, intubation and extubation by providing an extra layer of protection between the healthcare workers and the patient. It also helps to limit environmental contamination, which can be a source of transmission.

The NUS team was led by Professor Freddy Boey, NUS Deputy President (Innovation & Enterprise), and Associate Professor Yen Ching-Chiuan, Co-Director of the Keio-NUS CUTE Center. The team comprises Dr Alfred Chia from NUS Department of Biomedical Engineering, Mr Eason Chow from Keio-NUS CUTE Center, doctoral student Mr Raymond Hon from the NUS Division of Industrial Design as well as researchers from the NUS Faculty of Engineering.

The NUS team worked with Dr Deborah Khoo, Dr Wong Weng Hoa, Associate Professor Ti Lian Kah and Associate Professor Sophia Ang from the NUH Department of Anaesthesia. The multi-disciplinary team took less than two months to develop DART and validate its performance.

"The quick invention and deployment of DART were made possible through a close collaboration between the NUS and NUH teams, which allowed multiple refinements to be made to the prototypes within a very short time. The NUS team was able to come up with the various designs while adhering to the restrictions of the circuit breaker period and found different ways to address design and performance-related challenges when many resources were not available. The NUH team was instrumental in testing our prototypes in a clinical setting, allowing us to interactively and rapidly refine the performance of the device," shared Prof Boey.

The COVID-19 pandemic dramatically increased the need for infection control when intubating patients. Intubation is the placement of a flexible plastic tube into the windpipe to maintain an open airway or to serve as a conduit through which to

administer certain drugs. The removal of this plastic tube is known as extubation. These are risky procedures that may put healthcare workers in danger of becoming infected.

Evidence from the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 showed that healthcare workers involved in intubation were more likely to contract the disease compared with those who did not. This risk has similar implications for the current coronavirus outbreak, affecting anaesthesiologists, operating theatre staff, intensive care unit staff, and even first responders who are required to intubate collapsed patients in the COVID-19 general ward.