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A Protection Tent for Airway Management in Patients With COVID-19 Infection

To the Editor:

Airway management is clinically challenging. Along with a proper environment and the use of personal protection equipment, several modules have been proposed to enhance safety during advanced airway management for patients with coronavirus disease 2019 infection.^{1,2} The process of intubation is a high-risk period for aerosol-based transmission, especially when clinicians are in close proximity to the patient's airway.^{3,4} We therefore developed a novel, low-cost, easy-to-make protection tent to provide a protective barrier between clinicians and the patient, containing possible aerosol during intubation.

The concept of the protection tent was inspired by an umbrella and a raincoat. The tent consists of 2 components, including the frames and film (Figure, A). We used 2 L-shaped, solid-iron frames as a skeleton, set along both sides of the patient's head and upper chest. The frames were covered with a transparent, plastic film, which was made of polyvinyl chloride, as a tent. Scissors were used to cut the film to create holes as necessary, allowing

physicians and nurses to put their hands through the holes and perform procedures.

The tent has several advantages. First, it is inexpensive and easy to make, with a cost of only \$20. The materials for the frames and film are easily accessible in most areas. The film is disposable, and the frame is reusable after being sanitized with 70% ethyl alcohol or 0.5% sodium hypochlorite.⁵

Second, compared with rigid hoods or chambers, the tent provides a more flexible and expansible space and thus allows clinicians to operate various types of intubation equipment, such as video laryngoscopes (Figure, B).

Third, the tent is stable, lightweight, and easy to assemble, which makes it applicable in out-of-hospital settings. It can also be an accessory for mechanical resuscitation devices, even on stretchers (Figure, C).

In the fight against emerging infectious diseases, this newly designed tent can give physicians and nurses a much safer environment during airway management.

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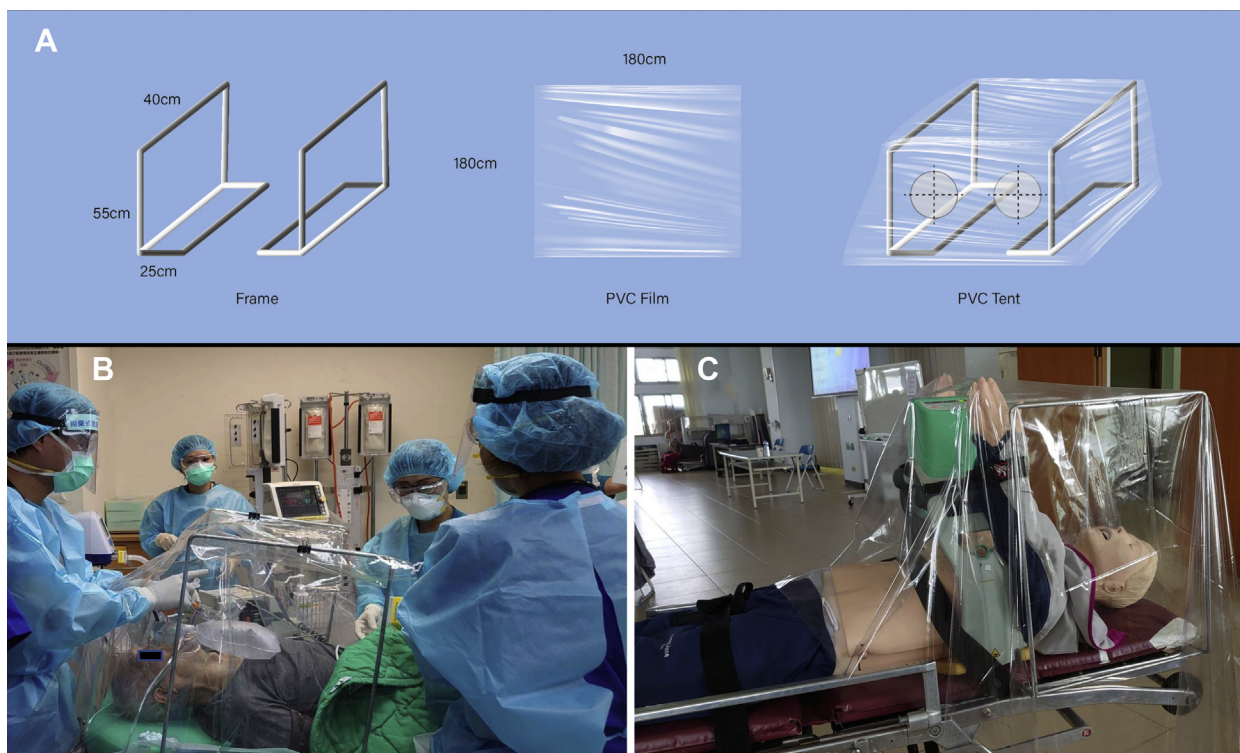


Figure. A, The tent consists of the frames and film. Compared with rigid hoods, the tent provides a more flexible and expansible space, allowing clinicians to operate video laryngoscopes (B). The tent can be an accessory for mechanical resuscitation devices (C).

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1. Resuscitation Council. Resuscitation Council UK statement on COVID-19 in relation to CPR and resuscitation in healthcare settings.

- Available at: <https://www.resus.org.uk/media/statements/resuscitation-council-uk-statements-on-covid-19-coronavirus-cpr-and-resuscitation/covid-healthcare/>. Accessed March 20, 2020.
2. Zuo MZ, Huang YG, Ma WH, et al. Expert recommendations for tracheal intubation in critically ill patients with novel coronavirus disease 2019. *Chin Med Sci J*. <https://doi.org/10.24920/003724>.
 3. Tran K, Cimon K, Severn M, et al. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PLoS One*. 2012;7:e35797.
 4. Brewster D, Chrimes N, Do T, et al. Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group. Available at: <https://www.mja.com.au/journal/2020/consensus-statement-safe-airway-society-principles-airway-management-and-tracheal>. Accessed March 22, 2020.
 5. Centers for Disease Control and Prevention. Environmental cleaning and disinfection recommendations: interim recommendations for US households with suspected/confirmed coronavirus disease 2019. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/community/home/cleaning-disinfection.html>. Accessed March 20, 2020.