



Disposable protective barrier enclosure prevent aerosol contamination during aerosol-generating procedures

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DEAR EDITOR,

During the severe coronavirus disease 2019 pandemic, clinicians performing endotracheal intubation acquired infection at a 6-fold greater rate than their colleagues.¹ Endotracheal intubation is a high-risk, aerosol-generating procedures (AGPs) that requires personal protective equipment, including an N95 respirator or equivalent. We have innovated a protective barrier enclosure “aerosol box”² and suggested using this or other similar designs for tracheal intubation on February 2020, from the preoxygenation and induction stage, where ventilation with a bag valve mask may be necessary, until after intubation. The original box is a transparent, plastic cube that encases the patient’s head and neck. The front panel facing the clinician contains two openings to insert the arms during maneuvers. These concepts or similar devices have been shown to decrease the spread of aerosol droplets.³ In the past few months, there are many variations and improvements of the protective barrier enclosure. Many of these variants have been built from materials ranging from simple acrylic boxes and plastic wraps to complex thermoplastics. The concept follows the original aerosol box by Lai et al,⁴ providing a physical barrier between a highly infectious patient and healthcare workers.

At first, the aerosol box was designed for tracheal intubation in coronavirus disease 2019 pandemic, but the tracheal intubation is not the only AGPs. This box or similar devices were then used in some AGPs such as suction, nasogastric tube placement, bronchoscopy, tracheostomy, and upper GI endoscopy.⁴

More than 30 similar designs were published and used for different circumstances, but one very important concern while using these devices was the sanitizing problem, the cross infection problem should be taken into consideration. Usually, after usage, all the protective barrier enclosure may

be contaminated and require stringent disinfection. There are several hospital-grade disinfection agents like sodium hypochlorite, hydrogen peroxide, and isopropyl alcohol, which can be sprayed on the inner and outer surfaces of the barriers, but during this procedure, the healthcare workers face another risk of cross infection. A disposable and only for single use design of protective barrier enclosure will be safer and recommended.

Thus, we developed a new version of disposable protective barrier enclosure “AERO BOX.” It was very easily assembly and disassemble, especially for single use to avoid cross infection. The material was changed from acrylic to polyethylene terephthalate, then the weight of the box can be largely reduced from around 4 kg to only 600 g. Each AERO BOX is composed of three flat individual parts. It consists of one main body, one left piece, and one right piece. The three pieces can be assembly by pressure the moulded square studs into round studs (Fig. 1). After using the AERO BOX for AGPs, it is very to disassemble the box only need to open triangular reinforcing tabs at corners at first and then open combined stubs along the side. The demonstration of how to assemble and disassemble the AERO BOX was provided in the Supplementary Appendix (<https://youtu.be/IT3DPUjWp1c>).

The presence of any protective barrier enclosure technique provides only extra layer of barrier protection to healthcare workers in addition to personal protective equipment. To ensure the safety of healthcare workers after using these relative barrier enclosures during high-risk procedures, we would recommend the use of disposable and single use version of barriers.

APPENDIX A. SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <http://doi.org/10.1097/JCMA.0000000000000457>.

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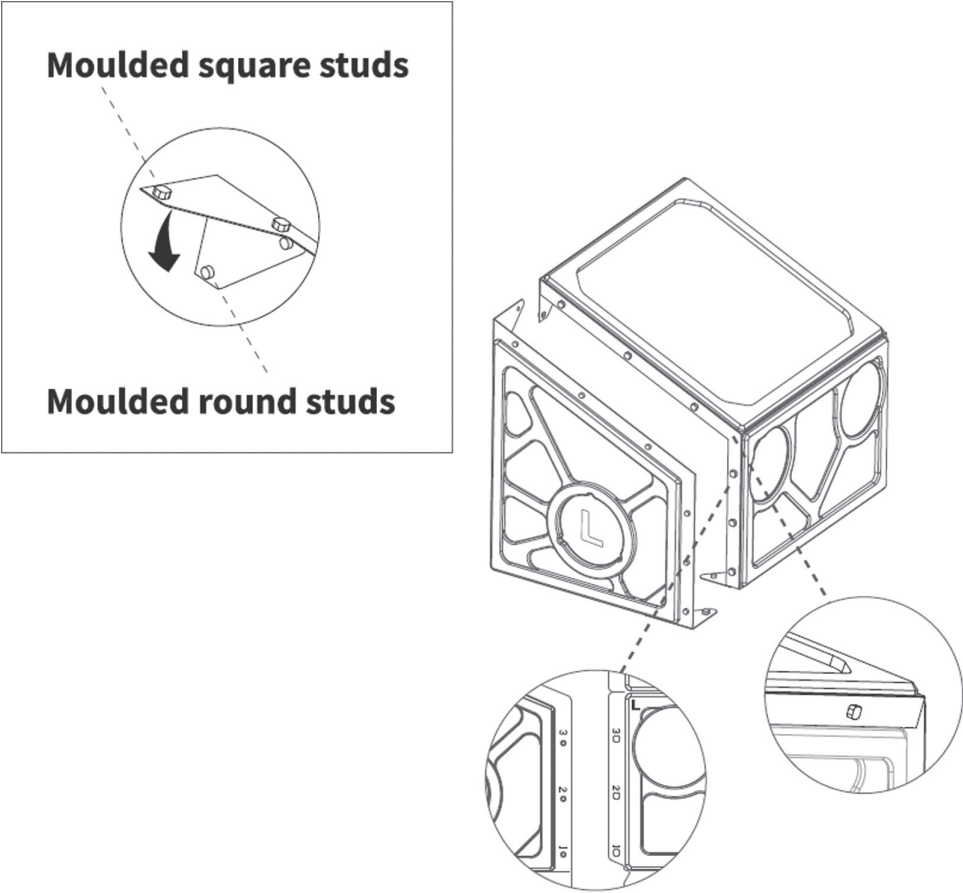


Fig. 1 Studs design for easy assemble and dissemble of AERO BOX.