

Protection device during aerosol-generating procedures. Regarding the COVID-19 pandemic

Dispositivo de protección durante procedimientos generadores de aerosoles. A propósito de la pandemia de COVID-19

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To the editor:

In December 2019, the city of Wuhan, China, became the center of an epidemic of pneumonia of unknown cause with global implications, but it was until January 2020 that Chinese scientists identified a new coronavirus (SARS-CoV-2) as the cause, and due to its high contagiousness, the disease became a pandemic¹. The management of patients with COVID-19 has had the support of different groups that have created alternatives at different clinical fronts. One of them is the development of prototypes for protection against the transmission of this virus to health personnel, especially during aerosol-generating procedures, such as tracheal intubation, tracheostomy, non-invasive ventilation, tracheal extubation and others². The first one of these devices was created by Lai Hsien Yung, an anesthesiologist from Taiwan³. This first design consists of a box that acts as a barrier between the patient and the medical staff during the intubation procedure. Taking this device as reference, countless boxes have been designed for intubation, with different names being received (Fluid Box, Aerosol Box, etc.)⁴.

Through this forum open to the expression of opinions on different medical topics, we present a proposal for the design of a protective device that, among its advantages over the previous ones^{3,4}, includes the following:

- Usefulness in the operating room, both on general anesthesia (endotracheal intubation) and regional and local anesthesia, because it allows to reduce contamination by aerosol-generating procedures since it is maintained on the patient throughout the surgical procedure.
- Usefulness outside the operating room during endoscopic procedures and at COVID areas.
- Higher stability at the time of intubation, since it has an acrylic base on which patient head rests.
- Access route for the use of a flexible laryngoscope in the event of difficult intubation, as well as entry routes on lateral aspects that allow access to other personnel to help the doctor and also allow the passage of anesthetic circuits, monitor cables of and aspiration tube.

Its cost is low, as in previous devices, although at this time of contingency there is a shortage of this material due to its high demand. This device, which we have called “EliPri insulating device for COVID-19” (Fig. 1), is of a single piece and is made of 4-mm thick acrylic material. Due to the characteristics of this material, such as high transparency, lightness, inalterability by weather conditions and passage of time (10-year half-life), impact resistance and four times lower thermal conductivity than that of glass, is designed to serve as a protective barrier for all health personnel (doctors,

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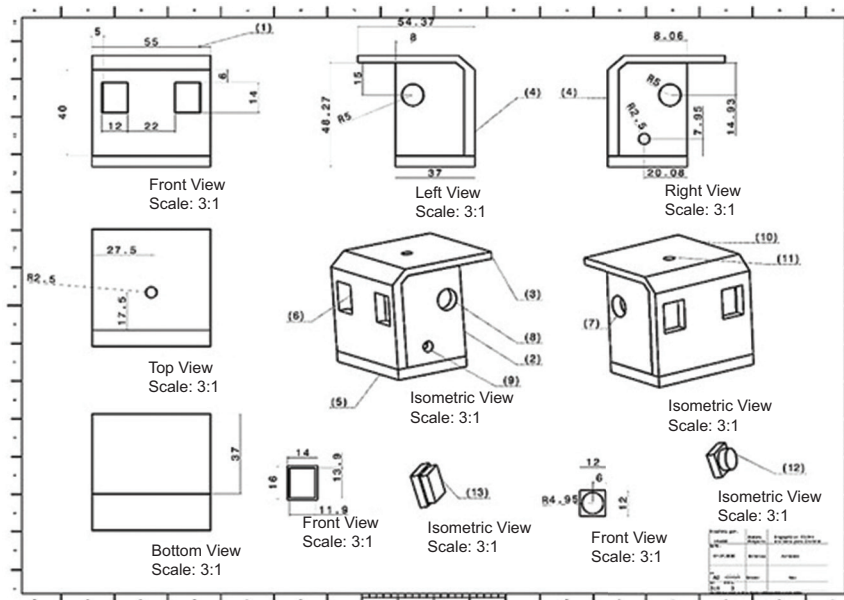


Figure 1. Diagram of the EliPri insulating device for COVID-19.

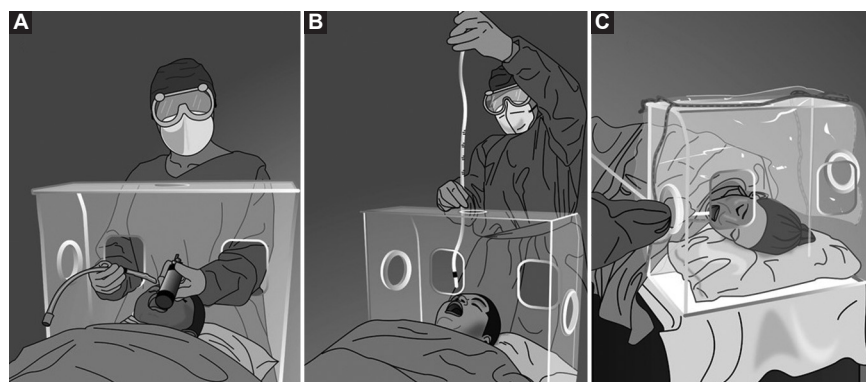


Figure 2. Physician-device-patient perspective of the use of the EliPri insulating device for COVID-19 in three different scenarios. A: Conventional endotracheal intubation. B: Endotracheal intubation with flexible laryngoscope. C: Endoscopy or bronchoscopy procedures.

nurses and cleaning staff). Its dimensions are 55 cm in width, 49 cm in height and 60 cm in length. It consists of a 35-cm long base, two vertical lateral faces parallel to each other, a front face that has an inclination of 65° and thus prevents the reflection of light on the acrylic for better visualization⁵, and two rectangular holes of 12 x 14 cm each that allow the arms of the professional to be introduced for the procedures. The left lateral wall has a hole that allows access for another person to provide support. The right lateral wall has two holes, one for another access route for support and the other for introduction of the anesthetic circuit, etc. The top cover has a 5-cm orifice that can allow

the introduction of a flexible laryngoscope. Finally, a disposable field is placed on the posterior part that keeps patient airway isolated. It also has six caps to keep sealed the holes that are not being used (Figs. 1 and 2). The cleaning protocol of this device is simple and must be carried out before it is placed at the head of the operating table, stretcher or patient bed, as well as during and at the conclusion of the procedure. It is carried out inside and outside the device with alcohol or any disinfectant solution since acrylic is resistant to this type of solutions.

The design and development of this type of devices is important in these times of pandemic, given that

they constitute a physical barrier against diseases that can be transmitted to health personnel by aerosols.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

References

1. Organización Mundial de la Salud. Brote de enfermedad por coronavirus (COVID-19). (Consultado el 3 de julio de 2020.) Disponible en: <https://www.who.int/es/emergencias/diseases/novel-coronavirus-2019>.
2. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PlosONE*. 2012;7:e35797.
3. Noticias de Taiwán. Médico taiwanés diseña dispositivo de protección de bajo costo en medio de la crisis del COVID-19. (Consultado el 4 de julio de 2020.) Disponible en: <https://noticias.nat.gov.tw/news.php?unit=101&post=174051>.
4. Chen G, Irie T. COVID-19 safety innovations: intubation-extubation boxes v3: thinking inside the box. (Consultado el 3 de julio de 2020.) Disponible en: <https://www.mskcc.org/clinical-trials-updates/msk-covid-19-innovation-hub/covid-19-safety-innovations-intubation-extubation-boxes>.
5. Serway RA, Beichner RJ. Física para ciencias e ingeniería. Tomo II. 5.^a ed. México: McGraw-Hill, 2002. p. 1139-84.