

A REUSABLE POLYCARBONATE BOX TO DECREASE DROPLET CONTAMINATION DURING UPPER ENDOSCOPY: A SIMULATION-BASED STUDY FOR THE COVID-19 PANDEMIC

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Background: Upper gastrointestinal (GI) endoscopic procedures are aerosol-generating, increasing the risk of healthcare workers (HCW) contracting Coronavirus disease 2019 (COVID-19).

Aims: To present a polycarbonate box (EndoBox) designed for use in upper GI endoscopy and evaluate its impact on the contamination of endoscopy staff during simulated procedures.

Methods: Simulated gastroscopies were performed using an upper body simulator placed in left lateral decubitus (LLD) and supine positions. The endoscopist and assistant wore personal protective equipment. Droplet exposure was measured using fluorescent abiotic surrogate particles. Two blinded observers independently viewed images from each scenario to qualitatively evaluate contamination levels. The primary outcome was the level of HCW contamination by droplets generated from a simulated cough with and without the EndoBox on the upper body simulator. The endoscopist's ergonomic behaviour was also assessed using the Rapid Upper Limb Assessment (RULA) tool.

Results: Without the EndoBox, there was a higher level of contamination on the endoscopist when the upper body simulator is in the LLD position. A higher level of contamination was observed on the assistant when the simulator is in supine position. With the EndoBox, the contamination levels on the endoscopy staff were lower in both LLD and supine scenarios. The endoscopist's ergonomics were rated 2 to 3 on the RULA tool when using the EndoBox.

Conclusions: The EndoBox reduces macroscopic droplet contamination during simulated gastroscopy. The endoscopist's risk of musculoskeletal injury remained in the low risk categories as assessed by the RULA tool. Another advantage of the EndoBox design is the arch extending from the bottom that allows for removal of the

box without withdrawing the endoscope. This enables rapid access to the patient's airway if they experience respiratory distress. This study was limited by an inability to assess microscopic contamination and contamination at the level of the port or buttons when suction is applied. Within these limitations, the EndoBox may be a useful adjunct to traditional personal protective equipment.

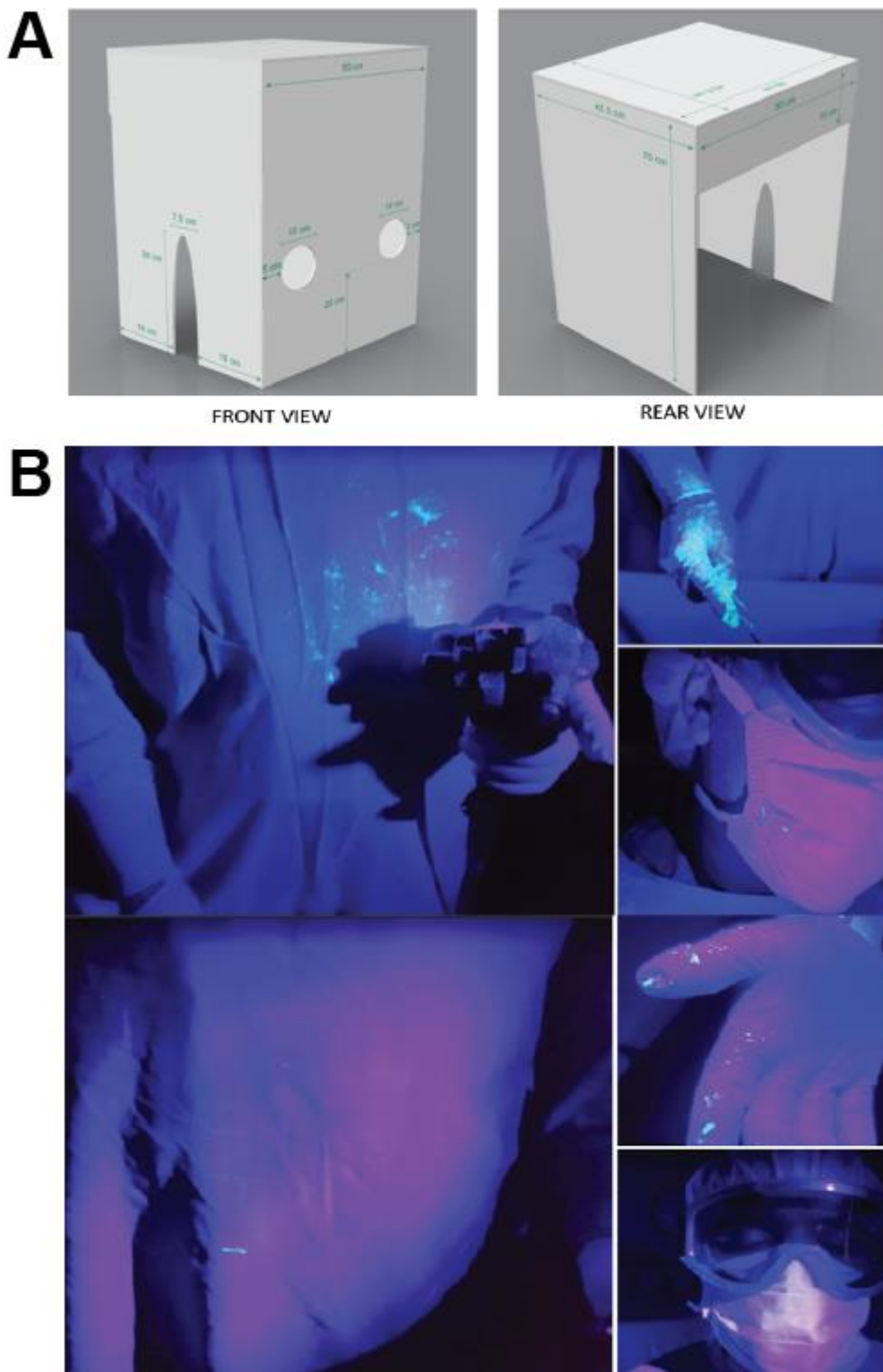


Figure 1. (A) EndoBox schematic (photo courtesy of Klick Health®; image not to scale). (B) Top three images represent contamination without the EndoBox (clockwise: endoscopist's (i) gown without EndoBox, (ii) hands without EndoBox,

(iii) mask and face without EndoBox). Bottom three images represent contamination with the EndoBox. (clockwise: (iv) hands with EndoBox, (v) mask and face with EndoBox, and (vi) gown with EndoBox).

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