

# The bougie and first-pass success in the emergency department: Journal Club review

Emily W. Stewart, MD<sup>\*</sup>; Kerry P. Spearing, MD<sup>\*</sup>; Riyad B. Abu-Laban, MD, MHSc<sup>†</sup>

**Clinical question:** Is bougie use associated with increased first-pass success in emergency department (ED) intubations?

**Article chosen:** Driver et al. The Bougie and First-Pass Success in the Emergency Department. *Annals of Emerg Med* 2017;70(4):473–478.

**Objective:** To compare data and assess whether bougie use is independently associated with first-pass success in ED intubations.

**Keywords:** Airway, bougie, emergency department, intubation

## METHODS

### Design

A retrospective observational study using motion-activated video recording of emergency department (ED) intubations. A structured review of resuscitation room videos was conducted for eligible patients. Three trained investigators independently reviewed all videos. Reviewers were aware of the general nature of the study but blinded to specific study aims. The analysis adjusted for neuromuscular blockade, use of video laryngoscopy (VL), abnormal airway anatomy, and patient positioning.

### Setting

An urban, Level 1 trauma centre in Hennepin County, Minnesota, during 2013.

## Patients

Inclusion criteria were adults > 17 years of age and intubation using a Macintosh laryngoscope blade. Exclusion criteria included patients with missing videos, those intubated before arrival to the ED, and cases in which a bougie was used with a hyperangulated VL blade such as the GlideScope (which can make it difficult to pass a bougie).

## OUTCOMES

The primary outcome was first-pass success, which was defined as a successful tracheal intubation with a single laryngoscope blade insertion, confirmed by waveform capnography.

## Primary data analysis

Baseline and intubation characteristics were compared between bougie and non-bougie cases, and a series of logistic regression models were fit in to determine whether bougie use was independently associated with first-pass success.

## RESULTS

There were 676 adult ED intubations during the study period, with videos available for 593 (88%). Of these, 543 (92%) had a first attempt with a Macintosh blade,

From the <sup>\*</sup>Royal College of Physicians and Surgeons Emergency Medicine Residency Program, The University of British Columbia, Vancouver, BC; and the <sup>†</sup>Department of Emergency Medicine, The University of British Columbia, Vancouver, BC.

**Correspondence to:** Dr. Emily Stewart, Diamond Health Care Centre, 11th Floor, 2775 Laurel Street, Vancouver, BC V5Z 1M9; Email: [Emily.stewart@alumni.ubc.ca](mailto:Emily.stewart@alumni.ubc.ca)

and of these, a bougie was used for the first attempt in 435 (80% of cases).

First-pass intubation success was 95% (95% CI: 93%–97%) with a bougie versus 86% (95% CI: 79%–93%) without a bougie. This represented a difference of 9% with a 95% CI of 2%–16%. The median intubation attempt duration was 40 seconds with a bougie, compared with 27 seconds without a bougie (a median difference of 14 seconds). Hypoxemia data were incomplete, with missing data in 181 participants. The multivariable analyses indicated that bougie use was independently associated with increased first-pass intubation success. A sensitivity analysis of 70 patients with missing video data was also performed, which suggested that bougie use would remain associated with significantly increased first-pass success regardless of the findings in this cohort.

### **COMMENTARY**

The bougie is commonly advocated as an initial rescue device after a failed initial intubation attempt. Data from the National Emergency Airway Registry indicate that bougies are used during only 3.5% of ED intubations, with a first-pass success of 85%. Similarly, a 2017 systematic review and meta-analysis by Park and colleagues<sup>1</sup> found a first-pass success rate in ED intubations of 84.1%.

While this study involved a widely understood primary outcome, it is important to note that first-intubation success is not a patient-centred outcome. Passing an endotracheal tube between the cords is only one component of a successful intubation. Other parameters as important, if not more important, for their effect on patient morbidity and mortality include the avoidance of hypoxia and hypotension, neither of which were rigorously assessed by the investigators.

However, this study did address a focused issue using an appropriately recruited cohort given the significant design limitations. Efforts were made to mitigate the limitations of retrospective analysis, including an explicit video review methodology with repeated examination by multiple viewers, and reviewers were blinded to the specific aims of the study. In addition, efforts were made to control for confounders through multivariate modelling.

The authors of this study practise at a centre with an extremely high rate of bougie-assisted intubations, and acknowledged the lack of previous research on how bougies perform as a primary ED intubation device, rather

than as a difficult or failed airway device. This was a single-centre U.S. study where 80% of intubations were done with a bougie on the first attempt. Despite this, their non-bougie, first-pass success rate of 86% is consistent with the aforementioned systematic review. However, the 80% bougie use rate in this study is substantially different than most other centres' and raises issues regarding generalizability. It is logical to conclude that physicians who performed the intubations in this study are likely more experienced with the bougie than without, a situation that could exaggerate the effectiveness of bougie-use given that first-pass success is highest using the device with which one is most experienced. While the results of this study do not necessarily support the conclusion that bougie use will lead to a higher first-pass success rate in suboptimal airway conditions, it does seem clear that, in experienced hands, bougie-use can be highly effective.

The classical indication for using a bougie is a grade 3a or worse larynx view; however, information of this nature was not captured in this study, and it remains possible that the airway characteristics were similar in both groups. It is unfortunate that potentially important data were not captured by the investigators, including validated measures of predicted difficult anatomy that could correlate with first-pass success such as the Intubation Difficulty Scale or the Mallampati score III or IV, Apnea syndrome (obstructive), Cervical spine limitation, Opening mouth 3 cm, Coma, Hypoxia, and Anesthesiologist nontrained (MACOCHA) score that could have influenced first-pass success, the reason for initial bougie non-use in a centre that uses bougie a great deal, missing videos in 70 eligible participants (albeit with an encouraging sensitivity analysis), complications related to direct airway trauma, and hypoxemia.

Table 1 in the paper suggests that characteristics between *Bougie* and *No Bougie* groups were different, particularly with respect to VL screen use, suggesting the possibility that perhaps difficult airways prompting the use of VL are more likely to be associated with bougie use. The lower incidence of VL screen use in the *No Bougie* group may arise from a situation where bougies are used more often when VL screens are not used. In fact, it is possible that the entire findings could be explained by an increased first-pass success associated with VL given the increased VL screen viewing in the *Bougie* group. Although, countering this was the fact that overall VL usage was identical in the *Bougie* and *No Bougie* groups. Finally, because this was a Macintosh VL

study, the results are not necessarily generalizable to a hyperangulated VL device.

There are two important “take-home messages” from this study:

- 1) In the hands of experienced emergency physicians, the use of a bougie is associated with higher first-pass success rates.
- 2) The results of this study support the suggestion that emergency physicians should seek to gain more experience with bougies on easy airways, because doing so would likely be helpful when the device is truly needed.

This study, although carrying significant limitations, is a helpful addition to the airway literature. Future research should address more patient-centred outcomes, such as overall success, hypoxia, hypotension, airway trauma, and mortality. This could be accomplished in a prospective randomized controlled trial that captures

validated measures of predicted difficult airways and provides more information on characteristics between the *No Bougie* and *Bougie* groups, as well as the appropriate statistical power to assess patient-centred outcomes.

## **CONCLUSION**

This study showed that in a single-centre with significant bougie experience, bougie-use was associated with increased first-pass intubation success.

**Competing interests:** None declared.

## **REFERENCE**

1. Park L, Zeng I, Brainard A. Systematic review and meta-analysis of first-pass success rates in emergency department intubation: creating a benchmark for emergency airway care. *Emerg Med Australas* 2017;29(1):40–7.