receive 5 min of preoxygenation with 100% oxygen by a face mask with a PEEP of 7 cm $H_2O$ or HFNC set at 70 L $min^{-1}$. Anaesthesia induction was followed by bag-mask ventilation continued until laryngoscopy or HFNC maintained during apnoea and intubation. The primary endpoint was fraction of end tidal oxygen ($ETO_2$). The secondary endpoints were arterial oxygen partial pressure ($Pa_{O_2}$) and peripheral capillary oxygen saturation ($SpO_2$). Measurements were performed at baseline, after 2.5 and 5 min of preoxygenation, and repeated immediately after intubation. Apnoea time was defined as time from last spontaneous breath *vs* time from discontinuation of bag-mask ventilation to confirmation of correct tracheal tube placement in the HFNC and face mask group, respectively.

Nineteen patients were available for statistical analysis. The mean BMI was 42 (2.5) kg $m^{-2}$ in the face mask group ($n$=8) and 40 (4.3) kg $m^{-2}$ in the HFNC group ($n$=11) ($P$=0.23). There was no significant difference in $ETO_2$ or $Pa_{O_2}$ at any time during preoxygenation, and all patients reached an $ETO_2$ >0.90 within 5 min. The mean apnoea time was significantly longer (206 [28] *vs* 43 [12] s; $P$<0.0001) and $Pa_{O_2}$ was lower (38 [12] *vs* 53 [12] kPa; $P$=0.013) after intubation in the HFNC group. No patient experienced a $SpO_2$ <100% during intubation. The maximal apnoea time was 264 s owing to a case of unexpected difficult intubation in the HFNC group.

Both HFNC and face mask with PEEP provided effective preoxygenation in the morbidly obese. Despite a significantly longer apnoea time and lower post-intubation $Pa_{O_2}$ compared with bag-mask ventilation, HFNC maintained $SpO_2$ at 100% throughout the induction and intubation procedure.

## References

Nightingale CE, Margarson MP, Shearer E, *et al*. *Anaesthesia* 2015; **70**: 859–76

## C-MAC VA Video Stylet in clinical practice: an observational study of intubation success

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Rigid scopes are an alternative to flexible fibreoptic scopes for predicted or unpredicted difficult airway management. The semi-rigid C-MAC VS (Video Stylet; Karl Storz, Tuttlingen, Germany) is a rigid video stylet with a flexible tip. Clinical data collected from this new tool are rare; hence, this study aims to gather data from 3000 to 4000 patients undergoing airway management under general anaesthesia in everyday clinical practice to establish oro-tracheal intubation success, the side-effects, and the safety issues of the C-MAC VS. This is a preliminary report of an ongoing observational study.

The Cantonal Ethics Committee, Bern, Switzerland, waived the need for informed consent if the general research consent defined by the Swiss Research Act is available. Patients requiring general anaesthesia, who have given general consent and have at least one predictor of difficult airway management (e.g. Mallampati ≥2, mouth opening <4 cm, thyromental distance <6 cm, head and neck movements <90°, short neck, reduced neck extension, or ENT/maxillofacial surgery) have been and will be included. After induction of general anaesthesia, orotracheal intubation is facilitated with the C-MAC VS. The primary outcome is the first-attempt orotracheal intubation success rate. The secondary outcomes are time of intubation (the moment when the tip of the device passes the patient's lips, until the device is out of the tube), overall success rate, difficulty of intubation, complications during intubation, and technical problems with the device.

So far, 47 patients have been included. The mean BMI was 26 kg $m^{-2}$ (standard deviation, 5) and the age 54 (20) yr. ASA physical status classification distribution was: 1 (17%), 2 (40%), 3 (36%), and 4 (6%). Most (63%) underwent ENT/maxillofacial surgery.

The first attempt at orotracheal intubation was successful in 91%, and in 9% a second attempt was needed (100% overall success rate). The median time (IQR) from the start of intubation was 27 (18–44) s. Time until the first $EtCO_2$ reading was 53 (30–64) s. One patient suffered from bleeding and oedema during intubation, another from hypoxaemia <90% $SpO_2$. Both had no sequelae on the next day. Thirty-seven ENT patients could be followed up; meanwhile, 33% reported sore throat and 5% hoarseness.

Although the number of patients included in this early preliminary report about oral intubation success rate and complications of the C-MAC VS was small, the intubation success rate was surprisingly high. Time to successful intubation and complication rates seem comparable with the results of studies using intubation stylets such as the Levitian or the Bonfils.[1]

## Funding

Karl Storz (C-MAC VS).

## References

1. Webb A, Kolawole H, Leong S, *et al*. *Anaesth Intensive Care* 2011; **39**: 1093–7

## Training on three-dimensional airway models improves confidence in managing a cannot intubate-cannot oxygenate situation

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Cannot intubate, cannot oxygenate (CICO) events are rare, extremely stressful, and potentially catastrophic. Anaesthetic airway emergency preparedness is crucial, and this includes skills in performing an emergency front-of-neck access in a CICO crisis. However, anaesthetists may not be familiar or confident in performing emergency cricothyrotomies owing to the rarity of these situations. In view of this, we initiated a refresher training course in a tertiary Asian hospital, on managing CICO crises using three-dimensional airway models.

Our objectives were to provide an update on the CICO algorithm recommended by the Royal Perth Hospital,[1] and to give a refresher on CICO techniques. At the end of the training, participants were expected to be able to use the CICO algorithm to aid decision-making, critique the use of various jet oxygenation devices, proficiently perform CICO rescue airway techniques and recognise the potential pitfalls of each technique. We modified and printed three-dimensional (3D) cricothyrotomy models, based on a free-of-charge download from the website www.airwaycollaboration.org. Four training