Table 1 Clinician accuracy and hypothetical incision lengths.

	0–1 yr old	1–8 yr old	9–16 yr old
Subjects	14	58	25
Total assessments	17	63	34
Clinician accuracy (%)	29	296	38
Inaccuracy range (mm) (above to below CTM)	13.2 (+5.7 to −7.5)	30.3 (+8.6 to −21.7)	38.4 (13.2 to −25.2)
Incision lengths (mm)			
Clinician estimate	15	45	55
Neck midpoint	20	30	35

approval was granted by the hospital research ethics committee (REC Ref: GEN/596/17). (1) CTM height measured by ultrasound was compared with that measured by MRI (n=22). (2) We assessed clinician (anaesthesiologist) accuracy in CTM localisation by digital palpation using ultrasound as a reference standard (n=97). (3) We estimated hypothetical eFONA vertical incision lengths required for CTM exposure based on three incision commencement points (clinician estimate of CTM location, the suprasternal notch, and the neck midpoint). A vertical incision that would expose any portion of the CTM was considered successful. All assessments were performed in the extended neck position in ASA physical status 1 and 2 children undergoing elective general anaesthesia.

(1) CTM height measured by ultrasound correlated well with that measured using MRI (r=0.98; 95% confidence interval [CI], 0.95–0.99; P<0.0001). Data for (2) and (3) were analysed according to age group (0–1, 1–8, and 9–16 yr old). (2) Clinician accuracy was 29%, 29%, and 38% by age group and did not differ with clinician experience or repetition. (3) Hypothetical incision lengths varied by both age group and by starting point (Table 1). The smallest incision was projected using clinician estimate of CTM location in the 0–1 yr old group and using the neck midpoint in the other groups.

Bedside ultrasound is accurate for the measurement of paediatric CTM height. Clinician accuracy was low in paediatric CTM localisation across age groups. Optimum eFONA incision strategy varied by age group.

Categorical data are presented as n (%). Continuous data are presented as median (range). Incision lengths are rounded to nearest 5 mm. Clinician estimate incisions utilise the clinician estimate of CTM location as midpoint of incision. Neck midpoint incisions use the midpoint of the neck as the starting point of the incision.

Optimising videolaryngoscope use: a video-assisted flexible-optical intubation and CMAC® D blade multidisciplinary training programme

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Universal videolaryngoscopy has been used in our hospital since 2017.[1] Optimising videolaryngoscope (VL) use has involved disseminating Video-Assisted Flexible-Optical Intubation (VAFI)[1] and a specific technique for using the CMAC® D blade (KarlStorz, Slough, UK) using a rigid KarlStorz stylet.[2] VAFI is a two-person intubation technique that can be used when the larynx is visualised using a hyperangulated VL but a tracheal tube cannot be passed despite using a stylet: intubator one optimises the laryngeal view using a hyperangulated VL blade; intubator two (standing next to and to the right of intubator one) preloads a tracheal tube onto a flexible bronchoscope, guides the bronchoscope into the trachea, and then railroads the tracheal tube over the bronchoscope into place. This technique can be used electively for an anticipated difficult intubation or as a rescue technique in a 'can't intubate, can oxygenate' situation.

We designed and delivered a VAFI and CMAC® D blade training programme for our department: a CMAC® D-blade/VAFI guide was disseminated by e-mail; VAFI and CMAC® D blade stations were included in out-of-theatre airway workshops; a 'Bath Tea Trolley' training programme provided multidisciplinary VAFI and CMAC® D blade training in the workplace during the normal working day, using a previously described teaching method.[3] Participants were given hand-outs to facilitate reflective learning and completed a feedback form.

Fifty-four staff members received training: 17 consultants, five associate specialists, eight registrars, nine core trainees/clinical fellows, and 15 anaesthetic assistants/students. Results showed that before training, 31 of 54 (57%) participants reported that they were quite/very confident in CMAC® D-blade use and 16 (30%) for VAFI; after training, 44 (82%) of participants reported an increase in confidence of ≥1 on a 5-point Likert scale for CMAC® D blade use and 48 (89%) for VAFI; 94% of participants reported that their ability to manage a difficult airway would be improved after this training; 100% of participants requested that this training be repeated in Bath; 100% recommended this training to other hospitals. Confidence scores before or after training are shown in Figure 3.

In summary, optimising videolaryngoscopy has involved dissemination of VAFI and CMAC® D blade techniques using a multimodal approach. 'Tea trolley' training proved very

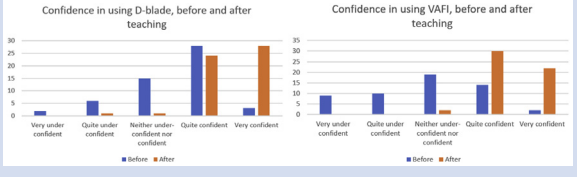

Fig 3 Confidence levels before and after training

effective for teaching both techniques. Only 57% of staff felt quite/very confident in CMAC® D blade use before training *despite* multiple previous teaching programmes, showing the high frequency of skill decay and the need for regular training; continued training is planned to address this.

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Evaluation of a tissue superobese emergency front-of-neck access model using the scalpel-bougie-tube technique

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Commercially available part task trainers for emergency front-of-neck access (eFONA) teaching do not replicate the anatomy encountered by clinicians in extreme obesity where the tissue depth between the skin and the cricothyroid membrane can exceed 3 cm.[1 2] We created and evaluated an eFONA bench top trainer using commercially sourced porcine larynx with super obese model of porcine larynges, skin and varied depth fat layer between 0 and 30 mm (non-obese *vs* super obese).

After obtaining ethical approval, consent from participants, and standardised training with the Difficult Airway Society (DAS) advocated scalpel–bougie–tube technique, participants were randomised to perform eFONA in the non-obese and super obese models. Our primary outcome was passage of tracheal tube in trachea, and secondary outcomes were time, success in less than 40 s, anatomical accuracy, injury score, and tracheal ring injury.

Seven anaesthesia trainees performed four repetitions in each model. Failure was significantly more common in obese models (eight/28 [obese] *vs* 25/28 [non-obese], $P< 0.001$, Fig. 4). There was a significant difference in the proportion of successful eFONA in less than 40 s (seven/28 *vs* 19/28, $P<0.003$). The time taken in the non-obese model was significantly shorter than that in super obese models (35 [27–42] *vs* 50 [43–59] s, $P<0.001$). Accidental direct tracheal entry was found in one super obese model but none in the non-obese model. Five false passages were observed in the super obese model and none were observed in the non-obese model. There was no significant difference in injury scale between the obese and non-obese groups (1.0 [0.0–1.5] *vs* 0.0[0.0–1.0], $P=0.07$). Tracheal injury was more common in the obese group than in the non-obese group (12/28 *vs* one/28, $P<0.002$). There was a negative correlation between number of attempts and time in the non-obese ($R=-0.55$, $P=0.03$) but not in the super obese models.

In summary, the relatively inexpensive super obese model was consistently more difficult than the non-obese model during eFONA with the DAS advocated scalpel–bougie–tube technique. More than four repetitions may be required to improve performance.

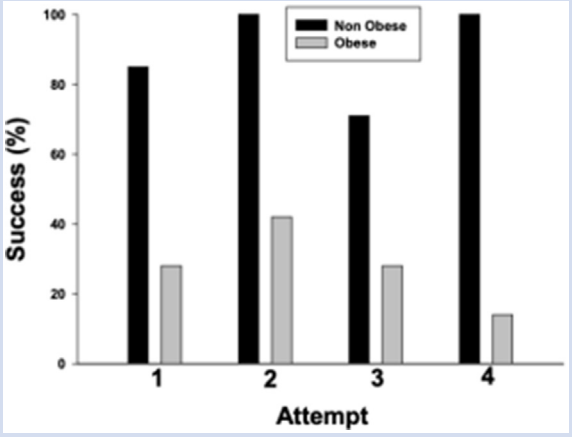

Fig 4 eFONA success rates (%) in non-obese and obese training models

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First pass success is important in prehospital tracheal intubation to minimise the risk of physiologic deterioration

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Pre-hospital tracheal intubation of the critically ill and injured can be challenging and patients are at risk of serious complications. The purpose of this study was to determine the association between the number of intubation attempts and the occurrence of physiologic deterioration.

This institutional review board (IRB)-approved project was an observational study conducted in a large USA helicopter emergency medical service (HEMS) of patients undergoing rapid sequence intubation in the field by the flight crew (flight nurse/flight paramedic) over a 4 yr period from January 1, 2015 to December 31, 2018. Data were collected on patient, operator, and procedural characteristics, and included method of intubation, drugs and devices used, difficult airway characteristics, number of intubation attempts, outcome of each attempt, and complications associated with intubation. The predictor variable was first pass failure, which was defined as failure to achieve tracheal intubation on a single laryngoscope insertion. The outcome variable was physiologic deterioration, which was defined as the occurrence of any one of the following three physiologic complications: hypoxemia (SpO_2 <90%), hypotension (systolic blood pressure <90 mm Hg) or cardiac arrest (loss of pulses requiring cardiopulmonary resuscitation). Patients