Table 7 First-pass success rate of emergency front of neck airway procedures in 'can't intubate can't oxygenate' and 'non can't intubate can't oxygenate' events. Results are reported as FPS/Total Attempts (Success %: 95% confidence interval). If denominator was <5 or if FPS=100%, 95% confidence intervals were not calculated.

	Non-CICO (n=85)	CICO (n=174)
Bougie-assisted cricothyroidotomy	32/36 (89: 79–99)	81/96 (84: 78–91)
Surgical cricothyroidotomy	18/23 (78: 61–95)	20/32 (63: 46–80)
Cannula cricothyroidotomy	4/4 (100)	14/20 (70: 50–90)
Wire-guided cricothyroidotomy	3/3 (100)	7/13 (54: 27–81)
Percutaneous tracheostomy	3/4 (75)	2/3 (66)
Open tracheostomy	13/13 (100)	4/6 (66: 28–100)
'Slash' tracheostomy	1/2 (50)	1/3 (33)
Quicktrach II		0/1 (0)

Data are presented as n/N (%).

Which eFONA procedure has the highest first-pass success (FPS) rate is currently unknown, particularly during a 'can't oxygenate, can't oxygenate' (CICO) emergency.

Smartphone technology enables 'crowdsourcing' of observational data about infrequent eFONA events. The Airway App collects anonymised first-hand details regarding eFONA procedures via a free, smartphone, or desktop application. Further details of the Airway App methodology and ethical considerations of anonymous data-gathering are previously published.[1] The data is necessarily non-verifiable, but this is a limitation of many databases of rare events.

Over a 37-month period (June 16, 2016–July 16, 2019) the Airway App was accessed > 6000 times. Of these, 303 recorded 'report a real case'; 259 from 37 countries were judged internally consistent. The three most common themes were male patients (76%), CICO events (67%), and obstructing airway pathology (44%). In the 174 CICO emergencies, non-surgeons undertook 88% of eFONA procedures, a supraglottic airway (SGA) was attempted in 39%, and neuromuscular block was used in 44%. eFONA FPS in non-CICO *vs* CICO reports were 87% and 74%, respectively (P=0.02). Table 7 shows FPS by procedure type in both non-CICO and CICO reports. Despite eventual eFONA success in 229 reports, 15% of these patients died.

In conclusion, our data suggest SGA use and patient paralysis are underutilised in CICO management despite recommendations.[2] eFONA FPS is significantly lower during CICO compared with non-CICO settings. Of all techniques used during CICO, only bougie-assisted cricothyroidotomy approached a FPS 95% lower-limit confidence interval of 80%, which the authors believe to be an acceptable eFONA FPS rate.

References

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High-flow nasal oxygen reduces the incidence of hypoxaemia and intra-procedural interruptions during gastrointestinal endoscopy

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Safe and effective delivery of procedural sedation for gastrointestinal endoscopy requires a balance between good analgesia and sedation whilst preventing airway obstruction and hypoxia from over-sedation. We report a prospective, two-cycle service improvement audit to evaluate the use of high-flow nasal oxygen (HFNO) to prevent desaturation during procedural sedation in our endoscopy unit.

We collected information on patient characteristics, ASA physical status and Body Mass Index (BMI). We recorded incidences of intra-procedural apnoea (on clinical assessment and capnography trend), hypoxaemia (SpO_2 <94%), and any airway rescue manoeuvres performed. The first audit cycle was conducted (March–June 2016) using standard nasal cannula, delivering oxygen at a rate of 2–6 L min^{-1}, in keeping with our standard practice at that time. In the second audit cycle (July–October 2016) we delivered HFNO via Optiflow™ (Fisher & Paykel Healthcare) nasal cannulae, which had just been introduced into routine practice in our anaesthetic department. HFNO was started at 20 L min^{-1}, over 2 min increased to 60 L min^{-1}, as tolerated by the patient. In both cycles, the mouth was kept open with an I-Guard bite block, with a jaw thrust manually applied throughout the procedure. Formal ethics committee approval was sought but was deemed unnecessary.

Each audit cycle involved 82 patients; mean age at treatment was 58 (standard deviation: 17.2) yr. Twenty-one patients had recorded BMI >30 kg m^{-2}. There were nine and eight episodes of intra-procedural apnoea lasting >30 s during the first and second audit cycles, respectively. In the first cycle, 13 patients experienced desaturation (SpO_2<90%) for >30 s), compared with none in the second cycle. Fifteen intra-procedural interruptions for rescue oxygenation were recorded in the first cycle, compared with none in the second cycle. The independent risk factor for desaturation (SpO_2<94%, any duration) was intra-procedural apnoea (OR 31.7, 95% CI 3.9–260) and the use of HFNO was strongly protective (OR 0.012, 95% CI 0.002–0.071).

There are published reports indicating the pooled incidence of intra-procedural hypoxaemia as 5% during colonoscopy, 8% in upper gastrointestinal endoscopy and 20% in endoscopic retrograde cholangiopancreatography. HFNO was more protective against desaturation during procedural sedation than standard nasal cannula oxygen therapy.

Complications of cricothyrotomy and tracheostomy in emergency surgical airway management: a systematic review

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Table 8 Complication data summary

Complications	Cricothyroidotomy (n=725 pts)% (total events)	Tracheostomy (n=282 patients)% (total events)	P-value 1	Cricothyroidotomy *vs* Tracheostomy OR (95%CI)	P-value 2
Minor	8.97 (65)	12.41 (35)	0.1	0.60 (0.08, 4.25)	0.61
Major	16.41(119)	17.38(49)	0.71	0.77 (0.16, 3.64)	0.74
Early	23.86 (173)	18.79(53)	0.08	0.72 (0.14, 3.63)	0.69
Late*	7.97 (11)	28.97 (31)	<0.0001	0.21 (0.20, 0.22)	<0.0001

*n for late complications: cricothyrotomy (138 patients), tracheostomy (107 patients).

Airway societies guidelines recommend an emergency surgical airway as the life-saving treatment in a 'cannot intubate, cannot oxygenate' (CICO) situation.[1] Surgical airways can be achieved either through a *cricothyrotomy* or *tracheostomy*[2]. Currently, there are limited data in the literature comparing complications between these two techniques. The objective of this systematic review is to analyse complications after cricothyrotomy and tracheostomy in emergency surgical airways.

This synthesis of literature was exempt from ethics approval. Two reviewers independently assessed titles, abstracts, and full-text English articles through the Ovid Medline, EMBASE, and other seven databases for studies describing complications after cricothyrotomy and tracheostomy performed in emergency situation. Complications were classified as minor (evolving to spontaneous remission and/or not requiring intervention and/or not persisting chronically), major (requiring intervention and/or persisting chronically), early (from the start of the procedure up to 7 days), and late (beyond 7 days of the procedure). We retrieved 2452 references from our search criteria. After title and abstract review, 33 articles were selected for full-text reading. Twelve articles did not meet the inclusion criteria. Therefore, 21 articles were included in the systematic review.

No difference was observed in minor, major, or early complications. Late complications were significantly more in the tracheostomy group (Table 8).

The reported *P*-value 1 was based on the comparisons of outcomes between two groups using χ^2, where the number of events and total sample size were obtained by pooling all the studies. The reported *P*-value 2 was based on the weighted logistic regression, where the weight was defined based on the sample size of each study

In conclusion, our results demonstrate that *late complications are more frequent when a tracheostomy is performed as an emergency surgical airway*. This information might be considered to re-evaluate the recommendation of converting a cricothyrotomy into a tracheostomy after the airway is established.

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Supraglottic jet ventilation for elective laryngotracheal surgery: 1300 patient experience in a tertiary referral hospital

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Supraglottic high-frequency jet ventilation (HFJV) is used routinely in elective laryngotracheal surgery at our institution. It provides a tubeless surgical field with minimal vocal cord movement and improves surgical access[1]. Complications associated with jet ventilation include barotrauma and ventilatory insufficiency causing hypoxia and hypercapnoea[2]. The ability to predict patients likely to de-saturate is useful to both anaesthetist and surgeon. A database was constructed to record and monitor our institution's experience and we present a 1300 patient dataset.

Prospective continuous anonymised data were collected in a secure database from 2014 including all elective laryngotracheal surgery patients requiring HFJV. Collected parameters included demographic data, body mass index (BMI), duration, driving pressure, desaturation < 90%, and pre- and post-HFJV $ETCO_2$. Excel (Microsoft Corporation, Redmond, WA, USA) and Stata-15 (StataCorp, College Station, TX, USA) software were used for analysis. Intraoperatively, HFJV was delivered by Mistral or Monsoon (Acutronic) or Twinstream™ (Carl Reiner) ventilators via injector needle secured to a rigid surgical laryngoscope. Anaesthesia was maintained with propofol and remifentanil infusions. The local ethics committee was consulted but no formal approval was required.

Demographic data demonstrated a 38%:62% male to female ratio, with a mean age of 50 (range 17–90) yr. There was a desaturation incidence of 16%. The length of procedure ranged from 2 to 80 min, with a mean of 18 min. Probability of desaturation increased with procedure length, with logistic regression showing males having a higher probability of desaturating than females for any given procedure length. The mean BMI was 26.4 (range 14–59.5) kg m^{-2}. Increased BMI increased the probability of desaturation, again with males more likely to desaturate at any given BMI than females. A BMI increase from 25 to 35 kg m^{-2} doubled the probability of desaturation in females, and tripled it in males. $ETCO_2$ was stable in the patient group as a whole (mean