and type of surgery; and (ii) the first meta-regression evaluating the effect of checklist compliance of mortality and postoperative complications. Interestingly, we found that the use of WHO checklist may affect the mortality in selected types of surgical procedures and study designs. Furthermore, the reduced risk of postoperative complications was statically significant only in general surgery. According to our meta-regression, these results were not affected by the WHO checklist compliance, but were mainly influenced by the heterogeneity of study designs and included populations.

This meta-analysis had different limitations. The categorisations according to the type of surgical procedures and to the study design resulted in a small number of studies included for each planned subgroup analyses. The great heterogeneity of the results was a limitation even in this analysis; however, our results of mortality in non-cardiac surgery and in the postoperative complications in any surgeries showed an I^2<25%.

In conclusion, the WHO checklist may improve the postoperative outcomes, but further prospective studies in selected types of surgical procedures are needed to better clarify its effectiveness.

Declaration of interest

None declared.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.bja.2018.02.003.

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Surgical cricothyrotomy: the tracheal-tube dilemma

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Editor—In a recent issue of the *British Journal of Anaesthesia*, Higgs and colleagues[1] published guidelines for the management of tracheal intubation in critically ill adults. I appreciate the authors' successful efforts for implementation of comprehensive guidelines to improve airway management and patient safety in the intensive-care-unit environment. In accordance with current evidence and expert opinion, the authors recommend an open surgical approach (surgical cricothyrotomy) for emergency front-of-neck access in adult patients. They highlight the benefits of this technique: it is fast, reliable, has a high success rate, and provides definitive access to the airway.[2,3] After incision of the cricothyroid membrane,

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insertion of a tracheal tube via a bougie stylet is advocated. The use of tracheal tubes with an inner diameter (ID) of 5.0 or 6.0 mm is advised, presumably because of the dimensions of the cricothyroid membrane.[1]

Insertion of 'standard' tracheal tubes with an ID of 5.0 or 6.0 mm generates a dilemma of potentially limiting the benefits of the surgical technique. The cuff diameter of a tracheal tube of ID 6.0 mm with a high-volume low-pressure cuff is 18–19 mm, or about 13 mm in a tracheal tube of ID 5.0 mm. The upper limits of normal for coronal and sagittal diameters of the trachea in men of 20–79 yr average 25–27 mm, and in women 21–23 mm.[4] The disparity between the diameters of the inflated cuff and the trachea potentially generates a leak.

Insufflation of oxygen via a standard tracheal tube should provide sufficient oxygenation. But, further gains of a surgical approach with tracheal-tube insertion, such as confirmation of success by waveform capnography, protection against aspiration, and application of PEEP, are possibly impeded because of insufficient cuff seal. Thus, are standard tracheal tubes superior for this challenging scenario?

Given its advantages, surgical cricothyrotomy is the recommended technique in the 'cannot intubate, cannot oxygenate' scenario. To overcome the problem of leakage caused by the mismatch of small tracheal-tube cuff and tracheal diameters, we equip all cricothyrotomy kits for adults with micro-laryngeal tubes (MLTs) ID 5.0 and 6.0 mm (Rüsch® micro-laryngeal endotracheal tube; Teleflex Medical GmbH, Belp, Switzerland). Designed for laryngeal or tracheal surgery and patients with tracheal stenosis, these tubes offer smaller inner (5.0 or 6.0 mm) and outer (7.3 and 8.7 mm) diameters to provide better visualisation and access to the surgical site. But, the cuff diameter averages 31 mm, about the cuff diameter of a standard ID 8.0 mm tube. It is possible to place an ID 5.0 or 6.0 mm tube through the incision in the cricoid membrane, whilst simultaneously achieving a sufficient seal in adults, enabling positive pressure ventilation, sufficient expiration, capnography, etc. We have used this successfully in mannequin tests and in emergencies. I recommend routine use of MLTs instead of standard tracheal tubes for surgical cricothyrotomy procedures in adults, and encourage the authors to take these considerations into account for future updates of their excellent guidelines.

Declaration of interest

None declared.

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Response to 'Surgical cricothyroidotomy—the tracheal tube dilemma'

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Editor—We thank Schaeuble[1] for his comments on the Plan D, Front-of-Neck-Airway strategy for failed intubation in critically ill adults described in our recent guidelines.[2] In essence, Schaeuble contends that when the cuff of 5.0–6.0 mm internal diameter tracheal tubes are inflated in a standard fashion, the diameter of the airway device is insufficient to produce a seal in the adult trachea. He goes on to suggest that larger tubes are too big to pass through the cricothyroid membrane, creating something of a dilemma.

To assess this, we have performed some simple benchtop tests with readily available tracheal tubes. Schaeuble quite reasonably states that adult tracheal diameters are 25–27 mm (male) and 21–23 mm (female).[3] Our measurement demonstrates that 5.0 and 6.0 mm tracheal tubes can readily occlude the internal diameter of the trachea (Table 1). It will be seen that the diameter achieved meets the dimensions required. We have also examined the ability of the cuff of a 5.0 mm

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Response to 'Surgical cricothyroidotomy—the tracheal tube dilemma'

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Table 1 Tracheal tube Cuff diameters inflated using different volumes of air, (mm)-including diameter stated on packaging

Tube inner diameter (mm)	Stated cuff diameter (mm)	12 ml inflated (mm)	15 ml inflated (mm)	20 ml inflated (mm)
5.0	18	25	26	27
5.5	21	25	27	30
6.0	22	26	28	30

internal diameter tube to seal the barrel of a 50 ml syringe (as a model for an adult trachea), which it does with some ease. Cuff pressure in this situation is unimportant.

We suspect that in the heat of performing an emergency front of neck access, there is a natural tendency to just inflate the cuff till the leak disappears (over-inflate). We suspect there will be little problem creating a seal. We hope this is reassuring to Schaeuble and the *Journal's* readers.

Declaration of interest

A.H.: has received expenses for speaking at educational events for which he has declined payment and has received one payment for an advisory meeting (Cook Medical) and received expenses to attend one event (Fisher & Paykel); he is a Specialist Advisor for the National Institute of Clinical Excellence. B.A.M.: has received expenses from Smiths-Medical and Ambu for attending company educational and product evaluation events, for which he has declined personal payments. C.G.: His department has been loaned equipment by Verathon Medical for training purposes and received free equipment (Karl Storz) for evaluation. T.M.C.: is an associate editor of the *British Journal of Anaesthesia*. His department has received free or at-cost airway equipment for evaluation or research. He has attended company educational (Storz GMbH, Fisher Paykel) or advisory (Covidien) meetings for which he has declined payment. He is not aware of any financial conflicts. J.R., G.S.S., R.G.: none declared.

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Uvula necrosis after fibreoptic intubation

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Editor—Uvula necrosis can occur as a rare complication of tracheal intubation. We highlight this troublesome complication by presenting a case of uvula necrosis after fibreoptic intubation.

A 28-yr-old patient with abdominal pain and no other significant medical history presented for laparoscopic appendectomy. After an uneventful induction with propofol, fentanyl, and suxamethonium, we proceeded with an asleep fibreoptic intubation, which we consider an important alternative, standard technique to direct laryngoscopy that needs to be mastered by all anaesthesia providers. Initially, a 7.5 mm inner diameter tracheal tube was loaded onto a 4.4 mm outer diameter bronchoscope, which was easily inserted into the trachea. We then encountered significant resistance attempting to pass the tracheal tube over the bronchoscope despite rotating the tracheal tube around its axis and attempting multiple repositioning manoeuvres. After this unsuccessful attempt, the patient was mask ventilated and a 5.5 mm bronchoscope was loaded with a 7.0 mm tracheal tube to improve ease of passing the tube over the bronchoscope. After successful intubation, laparoscopic appendectomy was performed.

About 90 min after the start of the procedure, the trachea was extubated without complication and the patient discharged home directly from the recovery room. He did not complain of sore throat or have signs of pharyngeal discomfort before discharge. On postoperative day 1, the patient called the surgeon's office to report pain and a sensation at the back of his throat that he described as a 'tickle'. On a follow-up conversation on postoperative day 2, the tickling foreign