

EDITORIAL

Team working in airway crisis: role of operating department practitioner in management of failed intubations

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The anaesthesia team has been defined by the Association of Anaesthetists of Great Britain and Ireland and mandates the need for a trained anaesthetic assistant,¹ who may be either a nurse or an operating department practitioner (ODP). It has also been acknowledged that teamwork is crucial to obtain the best results in a crisis.^{2–6} I would like to present a protocol originally developed for ODPs⁷ that dovetails with the Difficult Airway Guidelines, named Co-PILOT (Co, Confirm failure; P, Propose other equipment; I, Immediate senior anaesthetic assistance to be called; L, Laryngeal mask airway (second generation); O, Oxygenate; and T, Tracheal access; Fig. 1). It has since been expanded to the role of the anaesthetic assistant during unanticipated difficulty whatever their training, nursing or ODP, with the aim to improve teamwork.⁸

It was based on the 2004 Difficult Airway Society (DAS) guidelines for anaesthetists⁹ after a ‘road to Damascus’ moment when I attended a Structured Management Airway Response Team² (SMART) course in Coventry. Although the course recognized the potential of the wider team to aid and support the anaesthetist during an airway crisis, the expected role of the ODP or anaesthetic assistant was not, in my opinion, explicit enough. The Co-PILOT algorithm has been updated here to reflect the changes in the recent publication of the 2015 DAS guidelines.¹⁰

Teamwork in airway management

Dynamic team working is a crucial aspect of any speciality, especially in situations that are time pressured and high risk. The foundation for successful teamwork is in implicit communication and shared expectations of responsibilities, and a good example of this is the Formula 1 pit crew, who demonstrate synchronized teamwork at its best. They exhibit key traits that foster the type of teamwork that is required to win races. Team members have mutual respect and trust in each other’s abilities. They share a clear common goal and are willing to learn and

collaborate. They communicate openly within a no-blame culture that has been established by the senior leadership of the organization.

Without clear definition of roles during airway emergencies, team working can break down, which increases the risk of adverse outcomes for the patient. It is equally important that all assistants should be appropriately skilled and adequately trained in competencies that complement national guidelines. Without appropriate and specific guidelines for ODPs, the acquisition of new skills is entirely reliant on *ad hoc* learning in the workplace, and regular training provides an opportunity to minimize the influence of human errors on the anaesthetic emergency by encouraging collaborative working.

Decision-making

The importance of human factors in the health-care profession cannot be overstated,^{11 12} and increasing evidence comes from incidents and lessons learned from other highly reliable organizations, such as the aviation industry, where steep authority gradients were one of the major contributors to aircraft disasters. The term ‘authority or cockpit gradient’ was first defined in aviation when it was noted that pilots and co-pilots did not communicate effectively in stressful situations when there was a significant difference in their seniority.

Anaesthetic practice is not immune to this authority gradient issue.¹³ High-profile cases, such as those of Elaine Bromiley¹⁴ and Gordon Ewing,¹⁵ demonstrated this human factor, and loss of situational awareness within the team. The Co-PILOT protocol was designed to flatten this cockpit gradient by empowering the anaesthetic assistant to make suggestions to the anaesthetists when faced with difficult airways. It is a flow chart and aide memoire with the hope of improving safety by keeping track of time, in particular, and not becoming fixated on tasks such as intubation.

The essence of Co-PILOT is to aid decision-making, not to provoke conflict. It is therefore essential that the anaesthetic assistants be versed in decision-making tools to allow a structured dialogue during a crisis.¹⁶ We need to be able to remind the anaesthetist, if necessary, and confirm a course of action, but also

on occasion be allowed to challenge inappropriate behaviour. Examples of such decision-making tools include SBAR⁶ (Situation, Background, Assessment, Recommendation), DODAR¹¹ (Diagnose, Options, Decide, Assign, Review), and PACE^{6 12} (Probe, Alert, Challenge, Emergency). The SBAR tool is possibly more

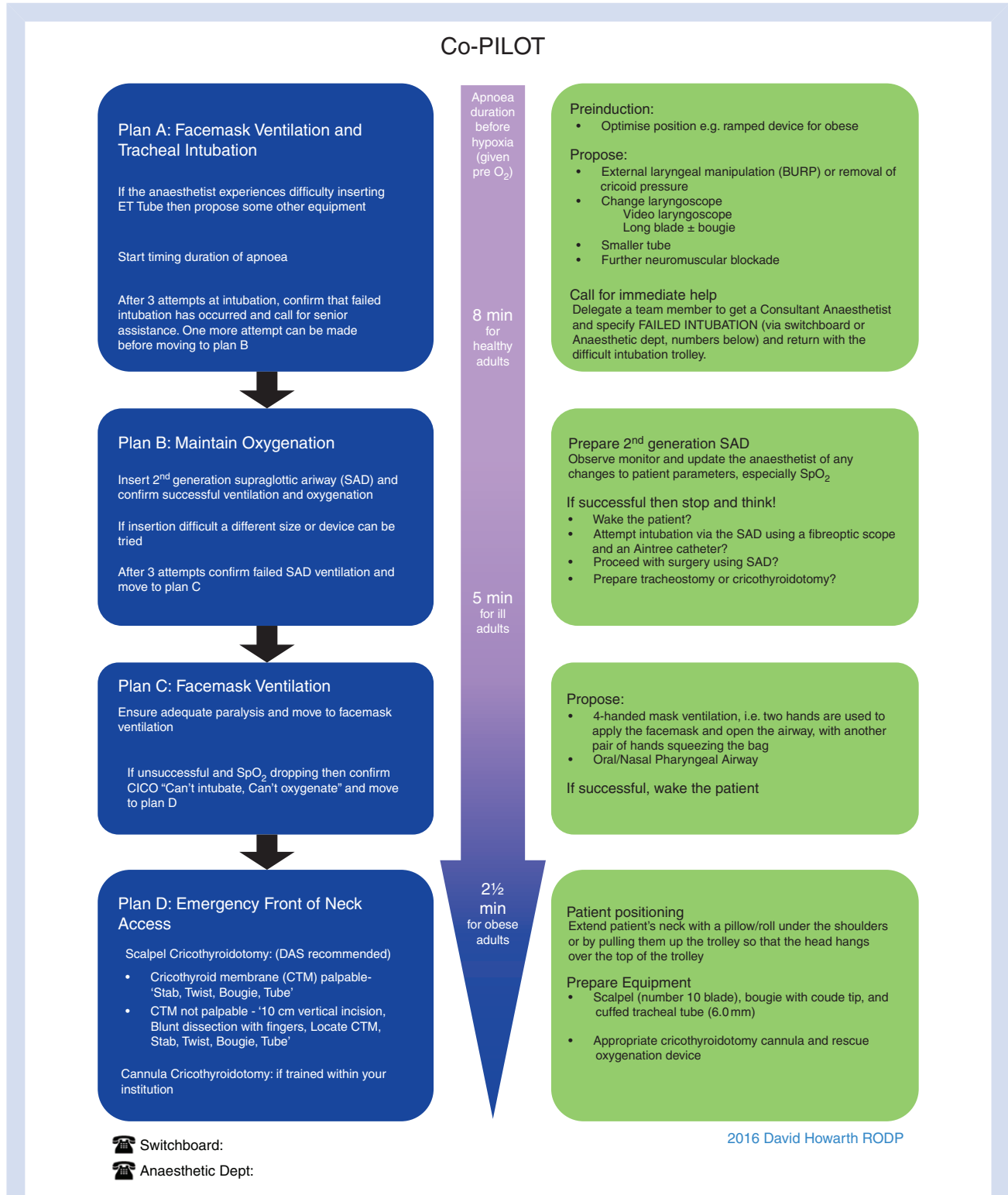


Fig 1 Co-PILOT.

useful for handover, whereas DODAR, developed by British Airways, does require time and mental effort; the last tool, 'PACE', is a four-step tool that involves increasing levels of urgency or 'graded assertiveness'. It has the least potential for conflict, which during a crisis could re-energize the cockpit gradient within the anaesthetic team.

An example of PACE within Co-PILOT would be as follows.

- Probe: 'Are you having difficulty with intubation?'
- Alert: 'The saturation dropped during that third attempt, so we should get help.'
- Challenge: 'We should stop trying to intubate, make the airway safe, and get help.'
- Emergency: 'I'm going to call for help.' Call for senior assistance if anaesthetist does not respond to the situation and appears fixated on intubation.

Ultimately, the only way to make these decision-making processes intuitive and second nature would be through regular team practice and drill using simulation.⁴

Co-PILOT protocol

The protocol is divided into two columns; the left-hand side, shown in blue in Fig. 1, is an abbreviated form of the DAS guidelines separated into four boxes. Complementing this blue column is the green column, with suggestions that empower the ODP to suggest alternative techniques and prompt the anaesthetist to move forward. There is also a central arrow, with a two-tone colour of pink changing to blue as a visual representation of the effect of apnoea on saturations. The anaesthetic assistant is well positioned to keep the anaesthetist reminded of the passage of time and to prevent task fixation and loss of situational awareness, as happened with the case of Elaine Bromiley.¹⁴ Benumof predicted, using a theoretical model,¹⁷ that the duration of apnoea without desaturation after preoxygenation ranges from 8 min in healthy adults to <3 min in the morbidly obese.¹⁸ These times are best case at present in an unanticipated difficult airway as it assumes >90% denitrogenation and methods of prolonging the duration of safe apnoea^{19 20} may not be in place. I feel that the DAS wishes it were not so. These methods of delivering high-flow nasal apnoeic oxygenation have yet to be established in routine anaesthesia practice. The evidence is compelling, however, and nasal oxygen during efforts securing a tube (NODESAT), in particular, does not require any special equipment, although transnasal humidified rapid-insufflation ventilatory exchange (THRIVE) has the edge during preoxygenation and comfort. I think that the anaesthetic assistant should help to identify high-risk patients and offer to provide these methods to increase the duration of apnoea already laid out in the guidelines.¹⁰ Thus, when faced with obese patients and those with a difficult airway or patients who arrive with decreased O₂ saturation (Sp_{O₂}), we should offer to put them in the ramped position, prepare nasal cannulae to facilitate NODESAT as a minimum, or source the Optiflow™ to allow THRIVE. The anaesthetist will hopefully be leading this, having requested these at the team briefing, but otherwise this would be another occasion to use PACE. For example, when faced with a patient with low Sp_{O₂}:

- Probe: 'Would you like me to prepare nasal cannulae and/or Optiflow™?'
- Alert: 'The Sp_{O₂} is only 93%, so we at least need to preoxygenate.'

- Challenge: 'I feel it is too risky to put the patient to sleep without an adequate means of prolonging the safe duration of apnoea.'
- Emergency: 'I'm calling for consultant advice unless we increase this patient's Sp_{O₂}.'

Plan A: face-mask ventilation and tracheal intubation

If, during the primary intubation plan, the anaesthetist experiences any difficulty inserting the tracheal tube, the ODP should propose some other equipment and start timing the duration of apnoea. The best way of doing this would be a stopwatch or clock that could be operated by pressing a button with one finger. Until then, the assistant should adopt the most pragmatic method where they work.

Suggestions should include the following:

- Optimize laryngoscopy position? This should be done before induction and includes methods such as the different commercially available ramps and semi-sitting for obese patients and those with critical oxygenation.
- External laryngeal manipulation (BURP: backwards, upwards, rightwards pressure) or removal of cricoid pressure?
- Change of laryngoscope:
 - Videolaryngoscope?
 - Long blade with or without bougie?
- Use of a smaller diameter tracheal tube?
- Further neuromuscular block?

It is also important to keep an eye on the monitors and keep the anaesthetist aware of any changes in the patient's parameters; and after three attempts at intubation, confirm that failed intubation has occurred and call for senior assistance so that one further attempt can be made before proceeding to plan B. A team member should be delegated the task of summoning senior help and return with the difficult intubation trolley.

Plan B: maintaining oxygenation

Insert a second-generation supraglottic airway (SAD) and confirm successful oxygenation and ventilation. If this is achieved, this is the opportunity to stop and think and to consider the risks and benefits of the following:

- Waking up the patient? (this should be the most common option)
- Attempting intubation via the SAD? (if appropriately skilled)
- Proceeding with the SAD?
- Tracheostomy or cricothyroidotomy?

After three unsuccessful attempts at changing the SAD device or size, proceed to plan C.

Plan C: face-mask ventilation

It is worth one last attempt at face-mask ventilation. Confirm that the anaesthetist is satisfied the patient is fully paralysed and prepare to help with the four-handed mask ventilation technique (in which two hands are used to apply the face mask and open the airway, and another pair of hands to squeeze the bag) using oral or nasopharyngeal airways. If saturations improve, then suggest postponing surgery and awakening the patient. But if face-mask ventilation proves difficult and O₂ saturation is <90% with 100% O₂, then this is a situation of failed oxygenation,

so highlight that you may need to move to plan D if things do not improve.

Plan D: emergency front-of-neck access

This is a 'can't intubate, can't oxygenate' situation, so front-of-neck access will be necessary. The position for all front-of-neck access is to extend the patient's neck either with a pillow or roll under the shoulders or by pulling them up the trolley so that the head hangs over the top of the trolley. Equipment for this emergency should be readily available in the difficult airway trolley, and the DAS recommends a scalpel cricothyroidotomy, so the anaesthetic assistant will prepare a scalpel, number 10 blade, bougie, and a size 6.0 mm cuffed tracheal tube for the anaesthetist. Cannula cricothyroidotomy has yet to be adopted widely and so should be done only in an institution with regular training in the method.¹⁰ It would be wise to prepare a kidney dish to keep control of equipment, prevent sharps injuries, and prevent the equipment from dropping on the floor.

The evidence base for the protocol is currently limited,^{7,8} but an observational study at Ysbyty Gwynedd Hospital demonstrated that while using the protocol, the overall performance of ODPs improved by an average of 17% as measured against a standardized scoring sheet during low-fidelity simulations when able to refer to Co-PILOT. A wider range of alternative techniques and equipment was implemented, and the time to completion of the scenario also decreased. The Co-PILOT protocol, entitled 'An effective way of levelling the cockpit gradient', has been presented at national conferences. The Royal Air Force's critical care air support team (C-CAST) has adapted the Co-PILOT protocol to be used within their training environment on the Chinooks and Super Stallion aircraft and incorporated it into their standard operating protocols.

Thus, in my opinion, a standardized protocol for the anaesthetic assistant during an unanticipated difficult intubation scenario, which dovetails the DAS guidelines, has the potential to enhance team working, improve situational awareness, and possibly, reduce risk to patients. Some anaesthetists will feel this goes too far, but others will agree with me that it could go further. As discussed earlier, it would be better to avoid some of the issues by a more robust discussion at the team briefing, for example clarifying the need for optimal positioning before induction or the need for preoxygenation. Like other industries, we should work on the marginal gains,²¹ such as having a standard intubation trolley compliant with the new DAS guidelines [i.e. having a videoscope, second-generation SAD, scalpel (number 10), bougie with coude tip, and tracheal tube (6.0 mm) all to hand] to be able to work through most of the protocol while the main difficult airway trolley is en route. Another simple but significant benefit would be having a reliable way to measure the duration of apnoea, such as a stopwatch. Our greatest gains, however, would be to use high-flow nasal apnoeic oxygenation techniques de rigueur, adopt the optimal position for laryngoscopy, and ensure that the patient is adequately paralysed from the outset by applying quantitative neuromuscular monitoring in the anaesthetic room before induction.²² The ultimate challenge will be to train together regularly in these protocols so that they are ingrained and intuitive in a crisis.⁴

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Declaration of interest

None declared.

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