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AUSTRALIAN AND NEW ZEALAND COLLEGE OF ANAESTHETISTS

ABN 82 055 042 852

EQUIPMENT TO MANAGE A DIFFICULT AIRWAY DURING ANAESTHESIA

1. INTRODUCTION

Airway complications are a leading cause of morbidity and mortality in anaesthesia. Effective management of a difficult airway is a core skill for anaesthetists, and depends on the timely availability of suitable airway equipment. This document provides recommendations for the equipment needed to manage a difficult airway, the location in which it should be kept, and the quality assurance measures required to ensure that it is always available and in good working order.

2. BASIC REQUIREMENTS FOR MANAGING THE AIRWAY WHEN PROVIDING ANAESTHESIA

- 2.1 Anaesthesia should be administered only by medical practitioners with appropriate training in anaesthesia, or by supervised trainees, in accordance with the College Professional Documents listed at the end of this document.
- 2.2 Many difficult airways are unpredicted, and therefore adequate emergency airway equipment should be immediately available wherever airways are managed. Whenever intubation is required as part of the management of a difficult airway, advance planning is needed for extubation which should be supported by the equipment listed below in case re-intubation is necessary.
- 2.3 Priorities while managing the difficult airway include maintaining oxygenation and ventilation and avoiding trauma. Equipment selection should reflect these priorities.

3. ESSENTIAL EQUIPMENT TO MANAGE A DIFFICULT AIRWAY

Equipment selected for the difficult airway container should be of high quality. Items should be chosen on the basis of favourable evidence. Guidance concerning product selection is available from TG4 BP *Equipment to Manage a Difficult Airway Background Paper* and the Airway Management Special Interest Group (Australian and New Zealand College of Anaesthetists, Australian Society of Anaesthetists and New Zealand Society of Anaesthetists). The list of equipment specified under this section is the minimum requirement; additional items may be added at the discretion of each individual department.

In addition to the basic equipment outlined in T1 *Recommendations on Minimum Facilities for Safe Administration of Anaesthesia in Operating Suites and Other Anaesthetising Locations*, the following equipment should be available to manage a difficult airway:

ADULT

- 3.1 Oropharyngeal airways size 3, 4, 5 and 6.
- 3.2 Nasopharyngeal airways size 6, 7 and 8.
- 3.3 Macintosh laryngoscope blades size 3 and 4.
- 3.4 Alternative laryngoscope blades such as a size 3 straight blade.
- 3.5 Two compatible laryngoscope handles including a short handle.

- 3.6 An endotracheal tube introducer with a Coudé tip of 35° such as the Eschmann endotracheal tube introducer, or the Frova introducer.
- 3.7 A malleable blunt atraumatic stylet.
- 3.8 Intubating laryngeal mask airways size #3, 4, and 5, with dedicated tubes and stabilising rod such as the LMA Fastrach™.
- 3.9 A selection of specialised endotracheal tubes (ETTs) such as microlaryngeal tubes size 5.0 mm and 6.0 mm ID, Parker Flexi-Tip™, long flexometallic, nasal RAE™, and the flexible ETT from the ILMA™.
- 3.10 A long airway exchange catheter.
- 3.11 Laryngeal mask airways size #3, 4 and 5 able to admit a catheter such as an Aintree catheter.
- 3.12 Equipment for emergency cricothyroidotomy:
 - 3.12.1 A surgical cricothyroidotomy kit (scalpel with #10 to #20 blade, tracheal hook, Trousseau dilator, 6 mm and 7 mm tracheal and tracheostomy tubes).
 - 3.12.2 A kink resistant cricothyroidotomy cannula of greater than 18 g diameter with a compatible high pressure volume ventilation system which is pressure or flow regulated.
 - 3.12.3 A large bore cuffed cricothyroidotomy set.
- 3.13 An oesophageal intubation detector device such as an oesophageal bulb or syringe.
- 3.14 A means of immediate CO₂ detection such as a capnograph, capnometer or colorimetric end-tidal CO₂ detector.

PAEDIATRIC

A basic set of paediatric airway equipment should be immediately available wherever paediatric airways are managed. The equipment for adults listed above is required for larger paediatric patients, and in addition, the following is required:

- 3.15 Paediatric sizes of:
 - 3.15.1 Guedel airways 000, 00, 0, 1, 2, 3, 4, 5.
 - 3.15.2 Nasopharyngeal airways 3.0, 3.5, 4.0, 4.5, 5.0.
 - 3.15.3 Laryngeal mask airways #1, 1.5, 2, 2.5.
 - 3.15.4 Macintosh blades, i.e. size 1.
 - 3.15.5 Straight blades, such as Miller blades size 0, 1, 2.
 - 3.15.6 Laryngoscope handles of suitable illumination and compatible with blades.
 - 3.15.7 Paediatric endotracheal tube introducer such as the Eschmann® endotracheal tube introducer and/or the Frova® endotracheal tube introducer size 8 Fr.
 - 3.15.8 Malleable blunt atraumatic stylets.
 - 3.15.9 Endotracheal tubes (cuffed and uncuffed) size 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 mm.
 - 3.15.10 Paediatric cricothyroidotomy sets size 3.5 mm.
 - 3.15.11 Kink resistant transtracheal catheters such as the Ravussen® needle 16 g 60 cm or Patil 15 g 50 cm emergency transtracheal catheter.
 - 3.15.12 Airway exchange catheters 8.0 Fr, 11.0 Fr, and 14.0 Fr.
- 3.16 Additional equipment:
 - 3.16.1 A high pressure volume ventilation system which is pressure or flow regulated, and which is compatible with emergency transtracheal or cricothyroidotomy cannulae.
 - 3.16.2 An oesophageal intubation detector device such as an oesophageal bulb.
 - 3.16.3 An immediate CO₂ detector such as a capnograph, capnometer or calorimetric end-tidal CO₂ detector.

4. FLEXIBLE INTUBATING BRONCHOSCOPES

ADULT

A flexible intubating bronchoscope with a portable light source with ancillary equipment should ideally be available within 5 minutes to supplement the equipment listed above. Ancillary equipment for the flexible intubating bronchoscope should include the following:

- 4.1 An intubating catheter such as an Aintree®.
- 4.2 A spare battery or light source.
- 4.3 Intubating airways in a range of sizes such as the Berman airway.
- 4.4 Endoscopy masks (three sizes).
- 4.5 Appropriate size bronchoscopy swivel connectors.
- 4.6 Wire (0.965 mm diameter and 145 cm length).
- 4.7 Anti-fog solution.
- 4.8 Local anaesthetic (sprays, jelly, atomisers with applicators).
- 4.9 Nasal vasoconstrictor.
- 4.10 A bite block.

5. SUPPLEMENTARY EQUIPMENT TO MANAGE A DIFFICULT AIRWAY

An array of airway devices is available which fulfil different roles in the management of difficult airways. Selection will depend on experience of clinical benefit and departmental preference. None of these devices will meet all clinical needs, but a range of these devices may be of value provided potential users are familiar with their use.

ADULT

- 5.1 An oesophageal-tracheal double-lumen airway such as the Combitube™ SA.
- 5.2 Non-standard laryngoscopes and rigid fibreoptic intubation aids.
 - 5.2.1 Devices which are designed to improve the line of sight by direct laryngoscopy such as the McCoy, Flexiblade and McMorroW blades.
 - 5.2.2 Devices which provide indirect laryngoscopy such as the Bullard®, WuScope, Upsherscope, Viewmax®, Truview® and, more recently, the Glidescope®, McGrath® Berci-Kaplan® and C-Mac® videolaryngoscopes.
 - 5.2.3 Optical stylets such as the Levitan®, Bonfil®, Shikani® and the Foley Airway Stylet® which provide vision through the endotracheal tube.
 - 5.2.4 Devices which include an optical blade with an endotracheal tube conduit such as the LMA CTrach™, Pentax®-AWS and the Airtraq®.
- 5.3 A light wand.
- 5.4 Equipment for retrograde intubation including a needle and saline filled syringe for cricothyroid puncture, a retrograde guide wire of 0.889-0.965 mm diameter which is at least 70 cm in length and a long anterograde airway exchange catheter. Smaller catheters and wires are used for paediatrics.
- 5.5 A rigid ventilating bronchoscope and light source.

PAEDIATRIC

- 5.6 Additional paediatric airway equipment of potential value includes:
 - 5.6.1 A variety of sizes and designs of paediatric laryngoscope blades: selection will depend on experience and personal preference.
 - 5.6.2 An indirect laryngoscopy device such as the paediatric Bullard laryngoscope or the paediatric Airtraq®.
 - 5.6.3 Paediatric video laryngoscopy is available for infants and neonates such as the paediatric video laryngoscope (Storz®) and the Glidescope (Verathon, Bothwell, WA, USA.).
 - 5.6.4 Paediatric optical stylets such as the Bonfil and Brambrink Intubation Endoscopes™ (Storz®) and the Paediatric Shikani™ (Clarus®).
 - 5.6.5 A paediatric light wand.

- 5.6.6 Retrograde intubation equipment including a needle and saline filled syringe for cricothyroid puncture, a retrograde guide wire of 0.889-0.965 mm diameter which is at least 70 cm in length and a long anterograde airway exchange catheter. Smaller catheters and wires are used for paediatrics.
- 5.6.7 A rigid ventilating bronchoscope and light source.
- 5.7 An ultra thin flexible intubating bronchoscope (e.g. outside diameter 2.2–2.4 mm) with light source and ancillary equipment (see 4.) suitable for ETTs down to 3.0 mm ID should be available in specialist paediatric units. Ancillary equipment for the paediatric flexible intubating bronchoscope in paediatric sizes include intubating airways, endoscopy masks and bronchoscopy swivel connectors. In the absence of an ultra thin flexible intubating bronchoscope, a larger adult size flexible bronchoscope may be used, as a staged procedure, with a suitable guidewire and catheter assembly.

6. STORAGE OF DIFFICULT AIRWAY EQUIPMENT

Equipment to manage a difficult airway should be stored in an appropriate container(s), which should comply with the following principles:

- 6.1 The container(s) should be dedicated to airway equipment and clearly labelled.
- 6.2 Essential equipment should be portable and rapidly available within the operating room, operating room suite or off-the-floor site ideally within 60 seconds. Supplementary equipment should be available within 5 minutes.
- 6.3 Appropriate methods should be used to ensure that essential equipment is available when required: such methods could include breakable seal(s) to prevent scavenging.
- 6.4 Contents should be clearly identifiable and listed on an external label.
- 6.5 Contents should comply with sterility standards, specified in ANZCA Professional Documents PS28 *Guidelines on Infection Control in Anaesthesia* and T1 *Recommendations on Minimum Facilities for Safe Administration of Anaesthesia in Operating Suites and Other Anaesthetising Locations*.
- 6.6 Equipment should be checked daily and contents replenished when required; this process should be documented by signature and date on an external label.
- 6.7 Contents should be checked every three months for battery function and expiry dates. This check should be documented by signature and date on an external label.
- 6.8 Contents should be re-stocked in accordance with the checklist and resealed, promptly after each use.
- 6.9 A relocation tracking mechanism should be implemented, such as a whiteboard adjacent to the container. A tracking log should be maintained, and audited every three months.
- 6.10 All staff should be oriented to the location of the container(s) and contents; a process for ensuring that this orientation occurs with new staff members should be implemented.
- 6.11 A designated staff member should be responsible for the container(s), and for the processes outlined above.
- 6.12 Expert advice should be obtained on any changes in the content of the container, including the introduction of new equipment (note: it is potentially hazardous to overstock containers of this type, and the lists below have been carefully limited to essential items).
- 6.13 Flexible bronchoscopy equipment should be stored clean, in a dry, well ventilated area, with the insertion tube as straight as possible. Use of the carrying case for storage increases the risk of bacterial contamination and is not advised.
- 6.14 Paediatric equipment should be contained separately (in a dedicated container) from adult equipment, and be ideally available within 60 seconds wherever paediatric airway management occurs.

7. A PRACTICAL EMERGENCY AIRWAY MANAGEMENT KIT (GRAB-BAG)

A grab-bag is a bag which contains essential equipment which can be taken to emergencies, or to remote anaesthetising locations. Quality control requirements are those listed in section 6 above. This bag would be suitable for adults and adolescents. Additional paediatric equipment should be added to a paediatric grab-bag. Recommended content includes:

- 7.1 Intubating laryngeal mask airways size #3, 4, and 5, with dedicated tubes and stabilising rod such as the LMA Fastrach™.
- 7.2 Oropharyngeal airways size 3, 4, 5 and 6.
- 7.3 Nasopharyngeal airways size 6, 7 and 8.
- 7.4 An endotracheal tube introducer with a Coudé tip of 35° such as the Eschmann endotracheal tube introducer, or the Frova introducer.
- 7.5 Intubating stylets.
- 7.6 Endotracheal tubes, size 5.0 mm and 6.0 mm.
- 7.7 Reusable Macintosh laryngoscope blades size 2, 3 and 4.
- 7.8 Reusable straight laryngoscope blade size 3.
- 7.9 Two compatible laryngoscope handles.
- 7.10 A suitable size bronchoscopy swivel connector.
- 7.11 An oesophageal intubation detector device such as an oesophageal syringe or an oesophageal bulb.
- 7.12 Immediate CO₂ detector device (e.g. capnograph, capnometer or colorimetric end-tidal CO₂ detector).
- 7.13 A scalpel with #10-20 blade, and a cuffed percutaneous cricothyroidotomy set, and a compatible high pressure volume ventilation system which is pressure or flow regulated with a kink resistant transtracheal needle.

Design for quality control includes breakable seals, checklist, moulded compartments and compliance with sterility requirements (refer to PS28 *Policy on Infection Control in Anaesthesia* and T1 *Recommendations on Minimum Facilities for Safe Administration of Anaesthesia in Operating Suites and Other Anaesthetising Locations*).

8. RELATED DOCUMENTS

- [PS1](#) *Recommendations on Essential Training for Rural General Practitioners in Australia Proposing to Administer Anaesthesia*
- [PS2](#) *Statement on Credentialling in Anaesthesia*
- [PS4](#) *Recommendations for the Post-Anaesthesia Recovery Room*
- [PS7](#) *Recommendations on the Pre-Anaesthesia Consultation*
- [PS8](#) *Guidelines on the Assistant for the Anaesthetist*
- [PS18](#) *Recommendations on Monitoring During Anaesthesia*
- [PS28](#) *Policy on Infection Control in Anaesthesia*
- [PS31](#) *Recommendations on Checking Anaesthesia Delivery Systems*
- [T1](#) *Recommendations on Minimum Facilities for Safe Administration of Anaesthesia in Operating Suites and Other Anaesthetising Locations*
- [T3](#) *Minimum Safety Requirements for Anaesthesia Machines for Clinical Practice*
- [TE3](#) *Policy on Supervision of Clinical Experience for Vocational Trainees in Anaesthesia*
- [TG4 BP](#) *Equipment to Manage a Difficult Airway Background Paper*

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PRODUCT REFERENCES AND SPECIFIC EQUIPMENT REFERENCES

The references to particular products or equipment are illustrative, and the critical part of this guideline is the reference to the feature or unique capacity of the equipment to be considered when selecting essential equipment to manage a difficult airway. Accordingly, reference to particular brands, products or equipment are not a recommendation, do not imply any general assessment by the College of that product or equipment, and practitioners should make their own judgement when selecting any particular product or equipment for their own use. Where trade names or trademarks are used, the College disclaims any ownership or rights to those names or marks. The College has not received any benefit from any manufacturer or supplier in connection with a reference to any particular product or equipment in this guideline.

THE COLLEGE'S PROFESSIONAL DOCUMENTS

The College's Professional Documents are coded, as follows:

Before 1 December 2010:

TE	Training and Educational
EX	Examinations
PS	Professional Standards
T	Technical

After 1 December 2010:

POLICIES

TEP	Training and Educational (including documents relating to examinations)
ADP	Administrative

GUIDELINES

PG	Practice Guideline
TG	Technical Guideline

STATEMENTS and OTHER DOCUMENTS

SP	Statement of Position
BP	Background Paper

For the purpose of the College's Professional Documents the following terminology applies:

GUIDELINES offer advice on clinical and non-clinical aspects of the practice of perioperative medicine; they reflect expert consensus and are supported by evidence when available. Those developed or revised after April 2009 may be supported by Background Papers which enlarge on and explain the guidelines.

POLICIES deal with matters coming within the authority and control of the College.

STATEMENTS define the position of the College on certain matters.

Professional Documents of the Australian and New Zealand College of Anaesthetists (ANZCA) are intended to apply wherever anaesthesia is administered and perioperative medicine practised within Australia and New Zealand. It is the responsibility of each practitioner to have express regard to the particular circumstances of each case, and the application of these ANZCA documents in each case. It is recognised that there may be exceptional situations (e.g. some emergencies) in which the interests of patients over-ride the requirement for compliance with some or all of these ANZCA documents.

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