



The Royal College
of Anaesthetists



The Difficult
Airway Society

NAP4

4th National Audit Project of
The Royal College of Anaesthetists and The Difficult Airway Society

Major complications of airway management in the United Kingdom

Report and findings
March 2011

Editors

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National Patient Safety Agency
Patient Safety Division

The National Patient Safety Agency
Patient Safety Division



The Intensive Care
Society



The College of Emergency
Medicine

1 Events at induction and during maintenance of anaesthesia (excluding head and neck) (Chapter 7)

Recommendation: All anaesthetic departments should have an explicit policy for management of difficult or failed intubation (e.g. formal adoption of the Difficult Airway Society guidelines as departmental policy). The strategy should limit the number of intubation attempts.

Recommendation: Where *difficulty* with airway management is anticipated or has occurred previously a comprehensive airway strategy must be planned before induction of anaesthesia. Plans B and C should be discussed and the equipment and skills to carry them out must be available.

Recommendation: Anaesthetic departments should provide a service where the skills and equipment are available to deliver awake fiberoptic intubation whenever necessary.

Recommendation: If a flat capnograph is seen after attempted tracheal intubation the anaesthetist should actively exclude oesophageal intubation (and absolute airway obstruction).

Recommendation: Anaesthetists must assess all patients for risk of aspiration prior to anaesthesia. This applies particularly to urgent and emergency surgery.

Recommendation: Once placed a tracheal tube offers the highest protection against aspiration.

Recommendation: Second generation SADs may offer better protection than first generation devices but further research is needed to confirm and quantify this.

Recommendation: Where facemask or laryngeal mask anaesthesia is complicated by failed ventilation and increasing hypoxia the anaesthetist should consider early administration of further anaesthetic agent and or a muscle relaxant to exclude and treat laryngospasm.

Recommendation: No anaesthetist should allow airway obstruction and hypoxia to develop to the stage where an emergency surgical airway is necessary without having administered a muscle relaxant.

2 Events at the end of anaesthesia and during recovery from anaesthesia (Chapter 8)

Recommendation: Patients should be assessed and optimised before tracheal extubation to ensure they are extubated with effective neuromuscular function, after pre-oxygenation and appropriate airway toilet.

Recommendation: Patients at high-risk of airway problems at emergence require a specific extubation and re-intubation plan. Extubation should usually take place in theatre with the team assembled and may include the use of specific techniques to facilitate re-intubation.

Recommendation: Supplementary oxygen is needed for transport after general anaesthesia and supplementary monitoring should be considered as recommended by the AAGBI.

Recommendation: In patients at risk of airway problems, an airway management plan should be conveyed to recovery staff which should include: (1) potential problems, (2) signs indicating concern, (3) planned management, (4) equipment required, and (5) location of appropriate medical help if needed.

Recommendation: Recovery room staff should be trained to an agreed standard in all hospital sites, this must include the prevention, early recognition and management of airway obstruction.

Recommendation: Capnography has the potential to aid early detection of airway obstruction. It should be available and used in high-risk cases.

Recommendation: Tracheal tube and SAD obstruction by the patient biting should be prevented by the insertion of a bite block, an oropharyngeal airway, or the use of SADs with an integral bite block.

Recommendation: A full range of difficult airway equipment and experienced staff should be readily accessible in recovery.

Recommendation: Patients who have potential airway problems or have had complications should be reassessed by the responsible anaesthetist before discharge.

3 Intensive Care (Chapter 9)

Recommendation: Capnography should be used for intubation of all critically ill patients irrespective of location.

Recommendation: Continuous capnography should be used in all ICU patients with tracheal tubes (including tracheostomy) who are intubated and ventilator-dependent. Cost and technical difficulties may be practical impediments to the rapid introduction of routine capnography. However these problems need not prevent its implementation. Where this is not done the clinical reason for not using it should be documented and reviewed regularly.

Recommendation: Training of all clinical staff who work in ICU should include interpretation of capnography. Teaching should focus on identification of airway obstruction or displacement. In addition recognition of the abnormal (but not flat) capnography trace during CPR should be emphasised.



Recommendation: An intubation checklist should be developed and used for all intubations of critically ill patients. A checklist might usefully identify preparation of patient, equipment, drugs and team. A checklist should include identification of back-up plans.

Recommendation: Every ICU should have algorithms for management of intubation, extubation and re-intubation. National efforts should be made to develop evidence-based algorithms. There should also be plans for management of inadvertent tracheal tube or tracheostomy displacement or obstruction. (Examples of such plans are in Appendix 2 and 3 and further examples are available at www.tracheostomy.org).

Recommendation: Patients at risk of airway events (i.e. those patients at increased risk of problems or for whom the standard algorithms are not appropriate) should be identified and clearly identifiable to those caring for them.

Recommendation: A plan for such patients should be made and documented. The planning should identify primary and back-up plans. The plan should also identify any additional equipment and skills necessary to carry out the plan. The plan should be communicated to on-coming staff at each staff handover, including confirmation that the plans can still be carried out. (An example of a proforma to assist this process is in Appendix 4).

Recommendation: Staff education should recognise and emphasise these risks of tracheal tube displacement in the obese, on turning and during sedation holds.

Recommendation: Obese patients on ICU should be recognised as being at increased risk of airway complications and at increased risk of harm from such events. Plans to manage the airway should be particularly meticulous in this group.

Recommendation: Responsible bodies (e.g. Intensive Care Society, Royal College of Anaesthetists) should work with other stakeholders and manufacturers to explore two aspects of tracheostomies for obese patients. (1) Can tracheostomy design be improved to reduce risk of displacement? (2) Can the optimal mode of fixation be determined?

Recommendation: Every ICU should have immediate access to a difficult airway trolley. This should have the same content and layout as the one used in that hospital's theatre department. The airway trolley needs regular checking, maintenance and replacement of equipment after use which should be appropriately documented.

Recommendation: A fibroscope should be immediately available for use on ICU.

Recommendation: Training of staff who might be engaged in advanced airway management of these potentially difficult patients should include regular, manikin-based practice in the performance of cricothyroidotomy. Trainers should regularly encourage their trainees to identify the correct landmarks, especially on obese patients.

Recommendation: Research is actively needed to identify the equipment and techniques most likely to be successful for direct tracheal access in critically ill patients. This research should specifically address whether the same solutions are effective in obese patients. The role of ultrasound in this area could be explored.

Recommendation: An airway assessment that includes patient, equipment, back-up and staff skills should be made prior to patient transfers.

Recommendation: Trainee medical staff who are immediately responsible for management of patients on ICU need to be proficient in simple emergency airway management. They need to have access to senior medical staff with advanced airway skills at all hours.

Recommendation: Where senior intensivists do not have an anaesthetic background with advanced airway management skills, it is recommended that specific protocols are in place to ensure experienced anaesthetic cover can be called on to assist in the management of difficult cases. Training and rehearsal of airway management techniques could usefully take place in conjunction with the anaesthetic department. Trust management should support the financial implications.

Recommendation: Junior medical staff who are to be immediately responsible for management of patients on ICU need airway training. This should include basic airway management, familiarisation with algorithms for management of predictable airway complications and use and interpretation of capnography. Training should identify the point at which trainees reach the limit of their expertise, and the mechanisms for summoning more experienced clinicians. Such training is likely to include simulation and team training.

Recommendation: Regular audit should take place of airway management problems or critical events in the ICU. Many airway management deaths are avoidable and should warrant special attention at morbidity and mortality meetings. Problems identified with skills, recognition, equipment and support should be rectified.

4 Emergency Department (Chapter 10)

Recommendation: Emergency department airway management should be based on the concept of the right person, right place, right equipment and right preparation.

Recommendation: Good and ongoing communication between senior clinicians in the emergency department, anaesthesia, critical care, ENT and other relevant specialties is essential in planning for, and managing, the emergency airway problems that present to the emergency department. Consideration should be given to designating consultant leads from each involved specialty to agree and oversee the management of emergency airway problems presenting to the emergency department.

Recommendation: Agreed plans should be in place for the management of all common and predictable emergency department airway emergencies.

Recommendation: Robust processes should be established to ensure the prompt availability of appropriately skilled and senior staff at any time of the day or night to manage the airway within a reasonable timeframe.

Recommendation: All practitioners who may be called upon to manage airway emergencies in the emergency department must have the required skills and experience, with immediate access to senior supervision. This is particularly important for trainees in emergency medicine and critical care.

Recommendation: In cases of airway compromise it is generally preferable to secure the airway before moving the patient out of the emergency department, but local considerations apply. Any decision to move a patient with a threatened airway should be made by a senior clinician.

Recommendation: All of the equipment and monitoring that may be required, along with a properly trained and skilled assistant, should be immediately available in the emergency department. There is a strong argument for the standardisation of all airway equipment, including difficult airway and rescue devices, across a hospital or group of hospitals.

Recommendation: Staff who may be required to manage airway emergencies in the emergency department should be familiar with the environment and available equipment.

Recommendation: Joint training of Emergency Physician and Anaesthesia/ICU staff is recommended, focusing on the anticipated clinical presentations. Training should include use of the airway equipment available in the emergency department, failed intubation and emergency surgical airway techniques. It should also identify the point at which trainees reach the limit of their expertise and mechanisms for summoning more experienced clinicians. Such training is likely to include simulation and team training.

Recommendation: A checklist should be used for all emergency department intubations. Such a checklist might usefully identify preparation of the patient, equipment/drugs and team, and preparation for difficulty.

Recommendation: Capnography should be used routinely in every emergency department intubation and every emergency department anaesthetic. A somewhat attenuated, but typical, capnograph trace will be present during cardiac arrest if the tracheal tube is correctly placed and cardiopulmonary resuscitation (CPR) is ongoing.

Recommendation: There should be regular audit of emergency department airway management, examining any problems or adverse events that occur.

5 SAD-related cases (these recommendations address only non-aspiration events. They should be read in conjunction with the aspiration chapter recommendations) (Chapters 11 and 19)

Recommendation: Laryngeal mask anaesthesia is a fundamental skill, required by all anaesthetists. The subject should be taught with the same attention to detail as tracheal intubation. This involves patient selection, indications and contra-indications for use and practicalities such as insertion, confirmation of correct positioning, management during maintenance and removal.

Recommendation: Awake fibreoptic intubation or fibreoptic intubation through a SAD before surgery may offer a lower risk alternative to SAD use in cases of known difficulty with tracheal intubation.

Recommendation: A difficult or failed SAD placement should raise the possibility of complications during maintenance or emergency/recovery. A heightened level of awareness is required and this information should be passed on to those to whom care is handed over or delegated.

Recommendation: Continuing anaesthesia with a sub-optimal airway after SAD insertion is not acceptable. As with a tracheal tube the airway should be clear and manual ventilation possible. If this is not the case the device needs repositioning or replacing with an alternative airway, before proceeding to surgery.

Recommendation: Recovery staff need to be competent in the correct procedures and timing of SAD removal. They also need to be trained to recognise and manage airway obstruction and post-obstructive pulmonary oedema.

Recommendation: If tracheal intubation is not considered to be indicated but there is some (small) increased concern about regurgitation risk a second generation supraglottic airway is a more logical choice than a first generation one.



Recommendation: In patients considered to be at low-risk of aspiration who have other factors that mean that use of a SAD is at the limits of normality (e.g. patient position, access to the airway, patient size) consideration should be given to use of a second generation SAD.

Recommendation: In view of the above recommendations, and the frequency of these circumstances, it is recommended that all hospitals have second generation SADs available for both routine use and rescue airway management.

6 Tracheal tube-related cases (Chapter 12)

Recommendation: Airway assessment should be performed and documented prior to anaesthetising a patient.

Recommendation: Plans for difficult or failed intubation should be made before induction of anaesthesia and should include the use of different devices both for direct laryngoscopy (e.g. alternative blades) and airway rescue (e.g. supraglottic airway devices).

Recommendation: All anaesthetic departments should have an explicit policy for management of difficult or failed intubation (e.g. formal adoption of the Difficult Airway Society guidelines as departmental policy).

Recommendation: Rescue techniques that involve direct access to the trachea should be included in the policy for management of difficult or failed intubation. These techniques should be taught and practised with equipment that is available at that hospital.

Recommendation: Capnography should be used during all intubations, irrespective of the location.

Recommendation: Training of all clinical staff who may intubate patients should include interpretation of capnography. Teaching should include recognition of the abnormal (but not flat) capnograph trace during low cardiac output states and during cardiopulmonary resuscitation.

Recommendation: All cases, but particularly those undergoing emergency surgery, should be assessed for risk of regurgitation and aspiration.

Recommendation: On balance, rapid sequence induction should continue to be taught as a standard technique for protection of the airway. Further focused research might usefully be performed to explore its efficacy, limitations and also explore the consequences of its omission.

Recommendation: Techniques that reduce the need for intubation involving blind placement of a bougie or introducer probably lessen the risk of trauma. Fiberoptic intubation and indirect laryngoscopy (e.g. videolaryngoscopes) may have a role. Further research is required.

Recommendation: Airway exchange catheters should be used only according to their manufacturers' instructions. This includes limiting the depth of insertion (<26cm). Their use with a high pressure source for ventilation should be reserved for circumstances of necessity and requires the highest standards.

Recommendation: Training in airway management should acknowledge the particular problems that overweight and obese patients present. A high index of suspicion is appropriate.

7 CICV, emergency surgical airways and cricothyroidotomies (Chapter 13)

Recommendation: Patients with airway tumours are at high-risk of CICV. In patients with symptoms of airway obstruction, airway imaging and nasendoscopy should be considered a minimum level of investigation in helping assess the options for anaesthetic airway management. Only in exceptional cases should anaesthesia proceed without this level of airway assessment.

Recommendation: Securing the airway before induction of anaesthesia (by awake intubation or awake tracheostomy) should be considered in all cases where the airway is at risk from the presenting condition or where difficulty has been experienced previously.

Recommendation: Where difficulty with airway management is anticipated or has occurred previously a comprehensive airway strategy must be in place before induction of anaesthesia. Plans B, C and D should be discussed with the team and the equipment and skills to carry them out must be available.

Recommendation: All anaesthetic departments should provide a service where the skills and equipment are available to deliver awake fiberoptic intubation when it is indicated.

Recommendation: Where there is a high suspicion that a cricothyroidotomy might be needed to rescue the airway, consideration should be given to placing this (as a needle or surgical procedure) prior to anaesthesia.

Recommendation: All anaesthetists should be made aware of published guidelines and trained in their use. Unlimited attempts at intubation are not indicated.

Recommendation: Even if it was not part of the initial airway management strategy, if CICV occurs and waking the patient up is not an option, a muscle relaxant should be given before determining the need to proceed to a surgical airway.

Recommendation: An attempt should be made to rescue the airway with a supraglottic airway device early in the management of CICV, before proceeding to an emergency surgical airway. The supraglottic airway device used should be that most likely to be readily inserted and most likely to enable ventilation of the patient.

Recommendation: All anaesthetists must be trained in emergency cricothyroidotomy and keep their skills up to date.

Recommendation: Surgical cricothyroidotomy should be taught alongside cannula cricothyroidotomy, including to anaesthetists.

Recommendation: Further research focused at identifying the success rates and optimal techniques of cannula cricothyroidotomy is required.

Recommendation: Anaesthetists should understand that the decision to perform an emergency surgical airway is commonly inappropriately delayed. The importance of early, clear decision-making should be highlighted during training in cricothyroidotomy.

8 Fiberoptic intubation (Chapter 14)

Recommendation: All anaesthetic departments should provide a service where the skills and equipment are available to deliver awake fiberoptic intubation whenever it is indicated.

Recommendation: Where FOI is considered the optimal method of securing the airway, an awake technique should be considered unless contraindicated.

Recommendation: Fiberoptic intubation is most effective in co-operative patients. Airway patency and co-operation may be lost by over-sedation. Where complex sedation techniques are to be used strong consideration should be given to delegating the provision of sedation to an anaesthetist not performing the tracheal intubation.

Recommendation: Following awake fiberoptic intubation, general anaesthesia should only be induced after the tracheal tube has been railroaded, its position checked and the cuff inflated to seal the airway.

Recommendation: AFOI may fail. A back-up plan should always be worked out in advance

Recommendation: Oral fiberoptic intubation should be taught and practised alongside nasal fiberoptic intubation so that it can be considered in patients in whom nasotracheal intubation is not specifically indicated.

Recommendation: All anaesthetists should be trained in low-skill rescue intubation through a supraglottic airway. A technique using the Aintree Intubation Catheter is recommended.

Recommendation: Fiberoptic endoscopy should be immediately available to confirm airway device placement in situations where capnography may be misinterpreted.

9 Tracheostomy (Chapter 15)

Recommendation: Training in tracheostomy, including as an emergency, should be prominent in both ENT and intensivist training.

Recommendation: Capnography must be available at each bed space in the ICU and should be used continuously while patients are being mechanically ventilated.

Recommendation: Multidisciplinary staff training should focus on the recognition and interpretation of capnography.

Recommendation: Continuous capnography should be used during the performance of percutaneous tracheostomy.

Recommendation: Algorithms must be available for all staff for management of accidental decannulation of the trachea and a step-wise approach to management of the compromised airway. An example of such is included in Appendix 2.

Recommendation: There must be clear lines of communication for escalation of airway events to individuals with advanced airway skills. If individuals covering ICUs do not have advanced airway skills, they must know who to contact for help.

Recommendation: All staff involved in the care of patients with tracheostomies should be alert to and receive training in maintaining the airway and in safe movement of the patient.

Recommendation: Extra long or adjustable-flange tracheostomy tubes should be available for obese patients who have tracheostomies.

Recommendation: Appropriate bodies such as the Intensive Care Society should engage with manufacturers to redesign tracheostomies, recognising especially the general increase in body mass index in the patient population.

Recommendation: Difficult airway trolleys must be available to ICUs and their contents familiar to staff.

Recommendation: The difficult airway trolley should have the same contents and organisation as the difficult airway trolley used in the theatre suite of the same hospital.



Recommendation: A flexible fibroscope should be immediately available on the ICU to check position of tracheal/tracheostomy tubes and assist with fibreoptic intubation or percutaneous tracheostomy placement.

Recommendation: Clear lines of communication are required between the various teams that manage airway problems related to tracheostomy (ICU, anaesthetic and ENT clinicians) in order to best manage such patients with potentially difficult airways. Mechanisms are also required within teams so senior staff are appropriately available and involved when adverse airway incidents occur.

10 Airway assessment and planning (Chapter 17)

Recommendation: All patients should have an airway assessment performed and recorded before anaesthesia. This involves bedside interactive tests.

Recommendation: All patients should have their risk of aspiration assessed and recorded before anaesthesia. The airway management strategy should be consistent with the identified risk of aspiration.

Recommendation: Awake intubation should be used when it is indicated. This requires that anaesthetic departments and individual anaesthetists ensure such a service is readily available.

Recommendation: All anaesthetic departments should have an explicit policy for management of difficult or failed intubation (e.g. formal adoption of the Difficult Airway Society guidelines as departmental policy) and for other airway emergencies. Individual anaesthetists should use such strategies in their daily practice.

11 Management of neck masses and stridor including thyroid masses, airway malignancy and haematomata (Chapter 18)

Recommendation: Anaesthetists who attend patients with head and neck pathology should be familiar with CT, MR and nasendoscopy of the airway and should use it when available to add useful information in planning anaesthetic airway strategy.

Recommendation: In patients with increased risk available airway investigations should be reviewed jointly by the surgeon and anaesthetist.

Recommendation: To assist planning the airway strategy the level of airway obstruction should be determined whenever possible: at least whether it is tongue-base, perilaryngeal or subglottic and whether the laryngeal inlet is affected.

Recommendation: If no additional investigations have been performed (or performed recently) consideration should be given to awake flexible nasendoscopy in the operating theatre to reassess the situation prior to starting anaesthesia.

Recommendation: Successful management of these cases requires not one plan but a series of plans pre-formulated into an 'airway management strategy'. This strategy should be agreed by the anaesthetist and surgeon prior to starting. The theatre team should be briefed on the strategy and the necessary equipment and personnel assembled.

Recommendation: The anaesthetic management of any case which may involve surgical tracheostomy as a rescue technique should start in the operating theatre. Consideration should be given to anaesthetising all complex head and neck cases in the operating theatre.

Recommendation: Multiple attempts at direct laryngoscopy in patients with head and neck pathology should be avoided.

Recommendation: When patient factors make fibreoptic intubation the preferred option in patients with head and neck pathology, consideration should first be made to performing it awake. The airway strategy should accept it may fail, particularly when performed in an unconscious patient.

Recommendation: When inhalational induction is the primary plan for cases involving head and neck pathology the airway strategy should accept it may fail with loss of the airway. A clear rescue plan, that does not assume the patient will wake, should be in place before anaesthesia starts.

Recommendation: When emergency cricothyroidotomy is included as part of the airway strategy for cases involving head and neck pathology success should not be assumed. The airway strategy should accept it may fail.

Recommendation: Anaesthetic management of these patients is predictably difficult and difficulty may affect all approaches to the airway. Senior anaesthetists and surgeons must be involved. While opening wounds to relieve haematoma may reduce airway compression it will not resolve resultant airway oedema and the airway is likely to remain difficult to manage.

Recommendation: For cases with head and neck pathology the team managing the patient should not disperse until the patient is clearly managing their own airway and is safe.

Recommendation: The maintenance of a clear airway in patients admitted to ICU requires continuous preparedness for insertion of a tracheal tube or tracheostomy in difficult circumstances. As in theatre this requires an airway strategy (ability to recognise and diagnose the problem, the right equipment and personnel to respond with a series of pre-formulated, logical and sequential plans).

12 Aspiration of gastric contents (Chapter 19)

Recommendation: Anaesthetists must assess all patients for risk of aspiration prior to anaesthesia. This applies particularly to urgent and emergency surgery. Where significant doubt exists, the higher risk should be assumed.

Recommendation: The airway management strategy should be consistent with the identified risk of aspiration. Where reasonable doubt exists it is likely to be safer to assume increased risk and plan accordingly.

Recommendation: No matter how low the perceived risk of aspiration, when anaesthesia is induced, the equipment and skills should exist to detect, and promptly manage, regurgitation and aspiration.

Recommendation: On balance, rapid sequence induction should continue to be taught as a standard technique for protection of the airway. Further focused research might usefully be performed to explore its efficacy, limitations and also explore the consequences of its omission.

Recommendation: To maximise the likelihood of good quality cricoid force being applied, those who perform cricoid force should be trained in its methodology, should practise at regular intervals and should consider the use of simple methods of simulation.

Recommendation: If tracheal intubation is not considered to be indicated but there is some (small) increase or concerns about regurgitation risk a second generation supraglottic airway is a more logical choice than a first generation one.

Recommendation: Where aspiration has been recognised as a risk at induction, steps should be taken to reduce the risk of aspiration at emergence.

Recommendation: Anaesthetists caring for patients undergoing intra-oral surgery should be educated in the prevention, detection and management of blood clot aspiration.

Recommendation: Where a capnograph trace is flat (indicating absence of ventilation: the tube therefore displaced or obstructed) and there has been blood near the airway, active measures should be taken to exclude inhaled blood clot. These may include bronchial suction, changing the tracheal tube, fiberoptic inspection of rigid bronchoscopy.

13 Obesity (Chapter 20)

Recommendation: Hospital management need to be aware of the additional time and resources required to safely anaesthetise obese patients.

Recommendation: Provision must be made for anaesthetists to evaluate obese patients before surgery. Morbidly obese patients and obese patients with significant morbidity should be formally assessed by an anaesthetist in a setting without time limitations.

Recommendation: Obese patients require thorough preoperative evaluation of co-morbidities. Evidence of OSA should be sought routinely.

Recommendation: Airway assessment should form part of the evaluation of all obese patients and should include an evaluation of possible rescue techniques.

Recommendation: Awake intubation should be considered in those patients in whom it would be difficult to establish rescue oxygenation or emergency surgical airway (e.g. those obese patients in whom the cricothyroid membrane or trachea cannot be identified).

Recommendation: If AFOI is chosen, extreme care is required in titration of sedatives and monitoring, in order to avoid airway obstruction and periods of apnoea.

Recommendation: Failure of regional anaesthesia may necessitate general anaesthesia. Obese patients undergoing regional anaesthesia still require a strategy for airway management. Regional anaesthetic blocks should be thoroughly checked before surgery. All theatre staff must be aware of the hazards posed by intra-operative conversion from regional to general anaesthesia.

Recommendation: Pre-oxygenation, performed to high standards, should be used for all obese patients prior to general anaesthesia.

Recommendation: Organisations and individual anaesthetists should procure and use airway devices and techniques that meet the specific needs of obese patients. Safety should take priority in the decisions made.



APPENDIX 5

Recommendations at a glance

Recommendation: The end of an anaesthetic in an obese patient should be planned. This includes pre-oxygenation before extubation and transfer to recovery. The possible need for re-intubation should be anticipated and planned for.

Recommendation: Anaesthetic training should emphasise the importance of obesity as a risk factor for complications of airway management.

14 Children (Chapter 21)

Recommendation: Full monitoring at intubation is essential in paediatric patients. The observation of satisfactory chest expansion, auscultation and observation of the tracheal tube passing the cords, whilst useful clinical signs, must be supplemented with the correct use and interpretation of capnography whenever an artificial airway device is inserted. This applies outside the operating theatre as well as in it.

Recommendation: All staff managing the paediatric airway, in whatever clinical area, require training in practical airway skills and in the use of relevant equipment including capnography and other monitoring.

Recommendation: Theatres, ICU and emergency department areas where children are cared for should have advanced airway equipment rapidly available to manage airway difficulty in children. There should be a clear chain of responsibility so that anaesthetic input is requested early if any child is anticipated to have an airway that is difficult to manage.

Recommendation: All those performing advanced airway management for children should be competent in managing cardiac arrest in children.

Recommendation: During airway difficulty, especially in young children, there should be consideration of involving ENT specialists early.

Recommendation: Senior help must be asked for early if difficulties with management of a child's airway are identified.

Recommendation: Good practice guidelines should be available for management of children in post-anaesthetic recovery areas.

Recommendation: Transfers both within and between hospitals should be recognised as periods of increased risk for airway dislodgement and complications. Planning, equipment and staffing should be appropriate to manage such complications.

15 Obstetrics (Chapter 22)

Recommendation: Despite the relative infrequency of general anaesthesia for caesarean section, obstetric anaesthetists need to maintain their airway skills including strategies to manage difficult intubation, failed intubation and CICV.

Recommendation: Obstetric anaesthetists should be familiar and skilled with supraglottic airway devices for rescuing the airway: particularly those designed to protect from aspiration and to facilitate ventilation and or intubation.

Recommendation: A flexible fibrescope may have several roles in the obstetric setting. Anaesthetic departments should provide a service where the skills and equipment are available to deliver awake fiberoptic intubation whenever it is indicated.

Recommendation: All staff working in the recovery area of a delivery suite including midwifery staff must be competency trained. Skills must be regularly updated.

16 Equipment and organisational issues (Chapter 23)

Recommendation: Because airway management is a fundamental anaesthetic responsibility and skill, anaesthetic departments should provide leadership in developing strategies to deal with difficult airways throughout the entire organisation.

Recommendation: The anaesthetic department should have an anaesthetist responsible for difficult airway management. The responsible person along with departmental colleagues should develop or adopt protocols for dealing with difficult airways in all areas of the organisation, ensure the purchase of suitable equipment to manage difficult airways and that regular multidisciplinary training for difficult airway management takes place.

Recommendation: As previously recommended by other organisations, a Medical Devices Management Committee should set, monitor and control the strategy, policies and procedures for Trust-wide management of medical devices. This will include risk assessment, evaluation and procurement, user training, maintenance, disposal and replacement. This committee should report directly to the Trust Board, where a named director should have overall responsibility for medical equipment.

Recommendation: Organisations should consider the minimal safe staffing and equipment levels required for establishing an airway and all associated complications in areas where airway management occurs. This should also involve development of training sessions and maintaining a record of staff training that allows for any deficiencies to be addressed via the appraisal process. This training should be recorded, and individuals should keep their own record of training for appraisal and continual personal development (CPD) purposes. An appropriate mix of staff should participate in selection of new equipment, training in the use of equipment, and reporting equipment associated incidents.

Recommendation: The availability of high quality guidelines from specialist organisations in the workplace near specially designated equipment may enhance safe management of these situations.

Recommendation: Relevant specialist organisations should consider national standardisation of difficult airway trolley contents for relevant areas. As a starting point a list of minimum advanced airway equipment that should be available in theatres, ICU and the emergency department would be welcome.

Recommendation: Those who work together should train together. Airway management involves a multidisciplinary team and there is evidence demonstrating that team training may improve outcomes in difficult situations. Research has shown that teamwork training may reduce technical errors by 30–50%.

Recommendation: Wherever possible, action plans for airway management should be developed between relevant staff involved. When airway incidents occur they should be followed by a debriefing session to allow all team members to feedback and allow future action plans and learning to occur.

17 Human Factors (Chapter 24)

Recommendation: Introduction of safety training into all anaesthetic, intensive care and emergency department curricula at the earliest possible stage.

Recommendation: Provision of HF training as part of corporate mandatory training for all members of staff who work with patients with difficult airways.

Recommendation: Opportunity for multidisciplinary teams working with the difficult airway to train together within simulated scenarios to practise technical and non-technical skills.

Recommendation: Guidelines and emergency algorithms should be immediately available in all clinical areas where airway emergencies may arise.

Recommendation: Team training scenarios should reinforce the use of guidelines within the clinical arena.

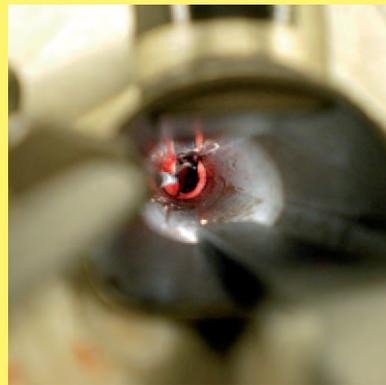
Recommendation: Airway incidents, including near misses, should be routinely reported and regularly audited.

Recommendation: Investigations into adverse events should be performed according to best practice to determine if changes need to be made that will make the systems safer for future patients.

Recommendation: Organisations should encourage the use of routine briefing and debriefing as recommended by the NPSA. In particular this should occur before management of an anticipated difficult airway and after such management or a critical airway incident.

Recommendation: Consultants and senior staff should lead by example and use briefing and debriefing techniques in these clinical situations.





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