

Section 6: Anaesthesia and sedation outside theatres

Edited by Dr Ian Jackson

- 6.1 Anaesthesia in the emergency department**
- 6.2 Anaesthesia in the radiology department (imaging)**
- 6.3 Anaesthesia for radiotherapy**
- 6.4 Anaesthesia for electroconvulsive therapy (ECT) in ECT clinics**
- 6.5 Anaesthesia for cardioversion**
- 6.6 Endoscopy under sedation**
- 6.7 Use of continuous capnography monitoring outside theatres**

6.1

Anaesthesia in the emergency department

Dr P Oakley

Why do this audit?

In the emergency department (ED), rapid sequence induction of anaesthesia with intubation (RSI) is often required immediately in severely ill or injured patients. Major trauma patients may have uncontrolled bleeding, depressed consciousness and spinal injury. The best choice of drugs and doses for the induction of anaesthesia in this setting is controversial. Further challenges result from the time pressure to achieve rapid definitive diagnosis and emergency intervention.

The 4th National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society (NAP4) highlighted several concerns.¹ Most of the events reported in the ED were complications of RSI. The commonest cause appeared to be poor judgement, but poor planning, inadequate provision of skilled staff and equipment, delayed recognition of events, and lack of or misinterpretation of capnography were all considered to be important.

Best practice: research evidence or authoritative opinion

Previous NCEPOD reports have considered that too many decisions in emergency situations are being made by junior trainees. The need for accountability in providing direct or indirect supervision has been recognised.

A trained assistant should be present whenever anaesthesia is administered in the ED. The equipment immediately available for difficult intubation should be the same as that in the operating theatre. Observations around the time of intubation should be recorded in the same detail as in the operating theatre or ICU.

The safety of etomidate has been questioned in critically ill and injured patients. Ketamine is increasingly recommended in the emergency setting and many clinicians no longer consider it to be contraindicated in head injury. Propofol even in a small, tailored dose for intubation may cause delayed hypotension. Thiopentone in carefully judged doses is still well respected.

The need for RSI in major trauma patients should not be allowed to cause significant delay in achieving rapid diagnostic imaging and emergency control of bleeding. CT scanning is the primary imaging modality, even in many cases with a degree of cardio-respiratory instability. Increasingly, CT scans are carried out immediately or within 30 minutes. Patients requiring emergency haemorrhage control should be in a definitive management area (operating theatre or intervention suite) within 60 minutes of arrival.

Suggested indicators**Governance infrastructure and preparedness**

There should be a nominated consultant anaesthetist responsible for anaesthetic services in the ED with links to the trust's governance programme. There should be regular team practice for RSI and major trauma management, using case scenarios and simulation with debriefing and discussion, at least every 2 months.

Availability of personnel, anaesthetic drugs and equipment

Personnel with competence in RSI, together with trained assistants, should be available 24/7. This may be tested using 'dummy call-in' practices to provide an 'availability snapshot', similar to the testing carried out as major incident practice.

There should be an agreed range of analgesic, sedative and induction drugs, relaxants, reversal agents and resuscitation drugs. There should be checklists of what should be available, together with visible algorithms for difficult airway and major haemorrhage management in the resuscitation room. A dose calculation chart, formula or other algorithm to establish appropriate doses in children should be available and visible. An agreed range of airway and ventilatory equipment should be available with evidence that portable ventilators have been pre-checked. The presence of capnography is especially important.

Documentation and real-time recording of processes

Every ED RSI should be specifically recorded for governance review. A standardised RSI audit form has already been developed. Trauma patients with cardio-respiratory instability or altered conscious level should be scrutinised in detail with particular emphasis on timely interventions.

Detailed objective information for performance improvement may be provided by video analysis of resuscitation room activity. This must be carried out in a carefully managed governance setting.

	<p>Alternatively, supernumerary observers can provide precise time recordings of observations and interventions. Key time intervals can then be used to drive performance improvement, using statistical process control (SPC). In this multidisciplinary environment, it is essential to maintain an atmosphere of openness and support, rather than attributing blame. The ED and anaesthetic staff must feel that they share ownership of the process.</p>
<p>Proposed standard or target for best practice</p>	<p>There should be evidence of the above governance infrastructure and team practice. All ED RSIs and major trauma calls should be subject to formal review. In 100% of ED RSIs, the defined audit form should be completed fully.</p> <p>The anaesthetic trauma team members should be of ST3 grade or above to manage RSI and haemorrhage control in major trauma patients, and should attend within 5 minutes of being called, more than 90% of the time. A trainee anaesthetist should be able to obtain senior advice within 3 minutes or direct practical assistance from a senior colleague within 20 minutes, whenever needed (100%).</p> <p>At least 20% of trainee anaesthetist RSIs in the ED should be supervised directly. In 100% of ED RSIs, a trained assistant should be present for the RSI itself and for subsequent mechanical ventilation, extubation and recovery.</p> <p>Failed intubation should occur less than in 1% of RSI cases.</p> <p>It is strongly recommended that accurate real-time data is recorded to allow discerning review of ED RSI and major trauma resuscitation. Drug and fluid usage, timeliness and appropriate attention to detail can be assessed in multidisciplinary meetings. Suggested recording forms and audit time intervals are shown below. For most of the intervals, there are no agreed targets, but where observed practice has been slow, continuing reduction is an aim in itself – quicker is better, provided that other quality issues are not compromised in the process. SPC charts should be used to underpin PDSA cycles.</p>
<p>Suggested data to be collected</p>	<p>See the Peri-RSI Chart and College RSI Audit Sheet (available on the College website)</p> <p>See the Shocked or Obtunded Major Trauma First Hour Chart (available on the College website)</p>
<p>Common reasons for failure to meet standard</p>	<ul style="list-style-type: none"> D The on-call anaesthetist may be busy elsewhere. Senior colleagues may be busy or not in the hospital. ED nurses are often not trained in assisting the anaesthetist or in managing mechanical ventilation, recovery and extubation. D Lack of systems for multidisciplinary review and poor governance arrangements. D In emergency situations, the focus is on delivering rather than recording care. Information may be lacking or estimated optimistically in retrospect.
<p>CPD and Curriculum mapping</p>	<p>CPD matrix codes: IB04, 2A02</p> <p>Training curriculum: Annex B page B-77–79, Annex C page C-43–45, Annex D page D-31–32</p>
<p>References</p>	<ol style="list-style-type: none"> 1 NAP4: Major complications of airway management in the UK. Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists. <i>RCoA</i>, London March 2011 (http://www.rcoa.ac.uk/nap4). 2 Simpson H, Clancy M. Recording rapid sequence induction: audit training and practice. <i>College of Emergency Medicine</i>, London January 2008 (http://www.collemergencymed.ac.uk/asp/document.asp?ID=3942). 3 Nolan J, Clancy M. Airway management in the emergency department. <i>Br J Anaesth</i> 2002;88:9–11. 4 Regional Networks for Major Trauma. NHS Clinical Advisory Groups Report. <i>DH</i>, September 2010 (http://www.excellence.eastmidlands.nhs.uk/). 5 Blood transfusion and the anaesthetist: management of massive haemorrhage. AAGBI, 2010. In: <i>Anaesthesia</i> 2010;65:1153–1161. 6 Rossaint R et al. Management of bleeding following major trauma: an updated European guideline. <i>Crit Care</i> 2010;14:R52. 7 Standards of practice and guidance for trauma radiology in severely injured patients. <i>Royal College of Radiologists</i>, London 2011 (http://www.rcr.ac.uk/docs/radiology/pdf/BFCR(11)3_trauma.pdf). 8 Trauma: who cares? <i>NCEPOD</i>, 2007 (http://www.ncepod.org.uk/2007report2/Downloads/SIP_report.pdf).

6.2 Anaesthesia in the radiology department (imaging)

Dr H Krovvidi

Why do this audit?

The demand for general anaesthesia for radiological procedures is ever increasing and the procedures done in the radiological suites have become more complex and of prolonged duration.¹

Critically ill patients from HDU/ICU are often required to be transferred to the radiology department for either investigations or for interventional procedures.

The same standards of general anaesthesia as available in operating theatres should be present in these remote locations.

Best practice: research evidence or authoritative opinion

The standards of monitoring during sedation and general anaesthesia are clear.² The recent RCoA¹ document along with AAGBI guidelines³ detail the need for skilled and exclusive assistance for the anaesthetist in the provision of a safe anaesthetic service wherever it is supplied. The guidelines for provision of anaesthetic services in magnetic resonance units have been published by AAGBI.⁴

There should be a nominated consultant responsible for anaesthetic services in radiology and those expected to work there should be familiar with the equipment and any protocols in use.

Suggested indicators

- D A named consultant lead for anaesthetic services in radiology.
- D % cases in which monitoring met the standards set out by the AAGBI.
- D % cases in which a trained anaesthetic assistant was present.
- D % cases in which specialised equipment (for example invasive vascular catheters, rapid infusion devices, blood and fluid warming devices and patient warming devices) was present for appropriate clinical situations.
- D % cases in which the patient was recovered in a appropriate post-anaesthesia care unit.
- D Induction programme includes the areas in radiology where anaesthesia is provided and a review of the equipment used.

Proposed standard or target for best practice

- D All departments that provide anaesthesia in radiology should have a nominated consultant lead.
- D 100% patients should be monitored to at least the minimum standard as set out by the AAGBI.
- D 100% cases should have a trained, dedicated assistant present.
- D 100% cases should have specialised equipment present for the appropriate clinical situation.
- D 100% patients should be recovered in a dedicated post-anaesthesia care unit.
- D All units should include this area in their induction programme.

Suggested data to be collected

- D Does unit have a nominated consultant?
- D Availability of monitors for each patient and measurements recorded.
- D Presence/absence of anaesthetic assistant and status.
- D Availability of a dedicated post-anaesthesia care unit.
- D Presence of specialised equipment for the appropriate clinical situation.
- D Does induction programme include this area?

Common reasons for failure to meet standard

- D Monitoring devices or equipment not available or broken.
- D Personnel limited in number with consequent inability to cope with unexpected demand.
- D Constraints of appropriate space for post-anaesthesia care.
- D Not included in induction programme.

CPD and Curriculum mapping

CPD matrix codes: 2F03, 2A07, 2A10, 3A05

Training curriculum: Annex C page C-23–24

References

- 1 Guidelines for provision of services for anaesthesia in the non-theatre environment. *RCoA*, London 2011 (<http://www.rcoa.ac.uk/node/766>).
- 2 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). *AAGBI*, London 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoringo7.pdf>).
- 3 The anaesthesia team 3. *AAGBI*, London 2010 (http://www.aagbi.org/sites/default/files/anaesthesia_team_2010_o.pdf).
- 4 Provision of anaesthetic services in magnetic resonance units. *AAGBI*, London 2002 (<http://www.aagbi.org/sites/default/files/mrio2.pdf>).



6.3

Anaesthesia for radiotherapy

Dr J Gannon

Why do this audit?

Anaesthesia for radiotherapy presents many challenges.^{1,2}

The majority of patients will be infants and young children where inadequate immobilisation can result in treatment failure and tissue damage. Patients requiring fractionated radiotherapy may require multiple daily anaesthetics for up to 6 weeks. Other issues include:

- D the service is often sporadic in nature
- D the location may be unfamiliar and isolated
- D the location and service often not included in the staff induction programme.

All personnel must leave the room during treatment which can cause several difficulties due to the lack of direct patient access. Therefore equipment to facilitate the remote observation of the patient and remote monitoring of vital signs is required.

Other issues include:

- D lighting may be poor
- D lack of permanent anaesthetic equipment, piped gases, scavenging and suction
- D radiotherapy staff unlikely to be of assistance
- D absence of recovery facilities.

Best practice: research evidence or authoritative opinion

There is little published evidence to support guidelines for best practice. However each department should have nominated clinical lead and the RCoA's 'Guidelines for provision of services for anaesthesia in the non-theatre environment' should be followed.³

Suggested recommendations include the following.

- D Intravenous induction via indwelling catheter.
- D Inhalation anaesthesia.
- D Spontaneous ventilation via an LMA.
- D Avoid daily intubations.
- D Lowest safe inspired oxygen concentration using air/oxygen mixture.⁴
- D Nitrous oxide should be avoided in immunosuppressed patients requiring repeat general anaesthesia⁵

Suggested indicators

- D Nominated consultant anaesthetist lead.
- D Patient monitoring to AAGBI standards.
- D Presence of trained dedicated anaesthesia support staff.
- D Presence of trained dedicated recovery staff.
- D Appropriate equipment: anaesthetic machine, suction, scavenging, drugs, resuscitation equipment.
- D Appropriate documentation.

Proposed standard or target for best practice

- D Nominated consultant anaesthetic lead.
- D 100% of anaesthetics delivered by appropriate experienced consultants.
- D 100% of patients monitored to AAGBI standards.⁶
- D 100% of patients to have CCTV monitoring of patient and breathing circuit/reservoir bag.
- D 100% of patients should have video-repeated remote vital signs monitoring.
- D 100% presence of trained dedicated anaesthesia support staff.
- D 100% presence of trained dedicated recovery staff.
- D 100% of cases to have adequate documentation.

Suggested data to be collected

- D Does unit have nominated consultant?
- D Presence of experienced consultant.
- D Availability of monitors for each patient and measurements recorded.
- D Availability of CCTV link
- D Presence/absence of anaesthetic assistant and status.
- D Availability of a dedicated post-anaesthesia care unit.
- D Presence of specialised equipment for the appropriate clinical situation.
- D Does induction programme include this area?

Common reasons for failure to meet standard

- D No clinical lead for service.
- D Lack of consultant anaesthetist due to sporadic nature of the service.
- D Poorly visible CCTV – patient and/or monitoring.
- D Lack of appropriate equipment.
- D Equipment failures.
- D Non availability of trained anaesthetic support and recovery staff.

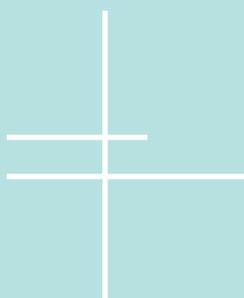
CPD and Curriculum mapping

CPD matrix code: **2A08**

Training curriculum: No direct links

References

- 1 Anaesthetic Services in Remote Sites. RCoA, London March 2011 (<http://www.rcoa.ac.uk/node/637>).
- 2 Harris EA. Sedation and Anesthesia Options for Pediatric Patients in the Radiation Oncology Suite. *Int J Pediatr* Volume 2010, Article ID 87092 (<http://www.hindawi.com/journals/ijped/2010/870921/>).
- 3 Guidelines for provision of services for anaesthesia in the non-theatre environment. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/766>).
- 4 Klein DS, Wilds PR. Pulmonary toxicity of antineoplastic agents: anaesthetic and postoperative complications. *Can Anaesth Soc J* 1983;30:399–405.
- 5 Brodsky JB, Cohen EN. Adverse effects of nitrous oxide. *Med Toxicol* 1986;1(5):362–374.
- 6 Recommendations for Standards of Monitoring during Anaesthesia and Recovery (4th Edition). AAGBI, London 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf>).



6.4 Anaesthesia for electroconvulsive therapy (ECT) in ECT clinics

Dr H G W Paw, Dr A K Gopaldaswamy

Why do this audit?

ECT clinics are sited at varying distances from the main hospital site. The standards for the administration, monitoring and management of anaesthesia in ECT clinics should be on par with those applied in the main hospital.¹

Best practice: research evidence or authoritative opinion

NICE guidance on the use of ECT² provides audit criteria for the audit of ECT but does not mention anaesthesia.

Royal College of Psychiatrists ECT Accreditation Service (ECTAS) was established in October 2003 to improve the standards and quality of administration ECT.³ ECTAS membership includes psychiatrists, anaesthetists, nurses and service users. The majority of ECT clinics in the UK now have now accreditation with ECTAS.

Suggested indicators

ECTAS in conjunction with the Royal College of Anaesthetists (RCoA) guidelines and standards has produced ECT anaesthesia standards for the ECT clinics relating to staffing, equipments, emergency drugs, protocols and documentation. All the accredited ECT clinics fulfil these by completing audit tools provided by ECTAS.

Proposed standard or target for best practice

As per ECTAS standards for anaesthesia produced in conjunction with the RCoA and the Association of Anaesthetists of Great Britain and Ireland (AAGBI).

- D Named consultant anaesthetist as the anaesthesia lead clinician for the ECT clinic with dedicated PA time in the job plan.
- D Anaesthetists must have good knowledge of anaesthetic techniques on the conduct and efficacy of ECT.
- D Protocols for ECT anaesthesia and other protocols as per ECTAS standards.⁴
- D Equipments for administration and monitoring as per ECTAS standards.
- D Comply with RCoA and AAGBI standards of clinical monitoring during anaesthesia and recovery.⁵
- D Documentation.

Suggested data to be collected

- D It is a requirement of all ECT clinics to comply with ECTAS standards to have the accreditation. ECTAS provide all the data collection tools, analyse and provide feedback.
 - D 100% compliance with Type I ECTAS standards.
 - D ECT clinics should have a named consultant anaesthetist.
 - D All anaesthetics at remote sites should be given by experienced StR, or more senior grades.
 - D High risk patients (ASA grade 3 and above) should be pre-assessed by a consultant and the optimal location including theatre for ECT should be determined.
 - D All anaesthetists should be supported by a suitably trained ODP.
 - D Standards for monitoring and recovery as stipulated by the AAGBI.
 - D Equipment serviced regularly and recorded.
 - D Revision and update of protocols every 2 years or earlier if required.
 - D Documentation of treatment, monitoring and any problems in the case notes.
-
- D As per ECTAS standards and data collection tools. (Note: ECTAS standards and data collection tools for audits are copyrighted and available to all the ECT clinic member.
 - D Anaesthesia documentation from the case notes.

Common reasons for failure to meet standard

- D Poor anaesthetic documentations in the case notes.
- D Failure to follow the agreed protocols and standards.
- D Lack or inadequate provision of equipment recommended by ECTAS and RCoA⁶ for remote site ECT clinics.
- D Lack of named consultant for ECT.

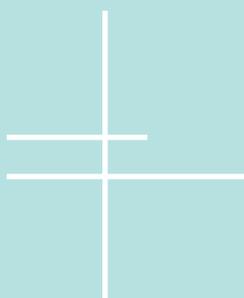
CPD and Curriculum mapping

CPD matrix codes: **IE03, 2A08**

Training curriculum: **Annex C page C-31**

References

- 1 Guidelines for provision of services for anaesthesia in the non-theatre environment. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/766>).
- 2 NICE Technology Appraisal 59: Electroconvulsive therapy (ECT). NICE, London April 2003 (<http://www.nice.org.uk/TA059>).
- 3 The ECT Accreditation Service (ECTAS): Standards for the administration of ECT, 9th edition, December 2011 (<http://www.ectas.org.uk>).
- 4 CR128. The ECT Handbook (2nd edition): The Third Report of the Royal College of Psychiatrists' Special Committee on ECT. RCPsych, London 2005 (<http://www.rcpsych.ac.uk/publications/collegereports/cr/cr128.aspx>).
- 5 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). AAGBI, London 2007 (<http://www.aagbi.org/publications/guidelines/docs/standardsofmonitoringo7.pdf>).
- 6 Anaesthetic services in remote sites. RCoA, London 2011 (<http://www.rcoa.ac.uk/node/637>).



6.5

Anaesthesia for cardioversion

Dr I Moideen, Dr D Whitaker

Why do this audit?

Cardioversion requires a brief period of general anaesthesia. Most of these are performed electively; however it may also take place as an emergency procedure at remote sites. The patients requiring cardioversion often have multi-system disease and those patients requiring emergency cardioversion will have unstable hemodynamic parameters. The presence of a trained anaesthetist along with support staff and full monitoring facilities are considered mandatory.

Best practice: research evidence or authoritative opinion

Minimum monitoring standards and the need for trained assistance are described by the Association of Anaesthetists.¹ All the patients should be prepared like any other patient for a general anaesthetic. Certain arrhythmias such as atrial fibrillation have high incidence of atrial thrombi² and systemic anticoagulation should be followed as per local or national guidelines.^{3,4} The Assessment of Cardioversion Utilising Transoesophageal Echocardiography (ACUTE) study has reported a 6-month follow up of 1,034 patients having cardioversion for atrial fibrillation; it showed embolic events were up to 2%, haemorrhagic rate up to 7.5%, all cause mortality up to 4% and maintenance of sinus rhythm up to 62%. Using Transoesophageal Echocardiography (TOE) may allow a shorter pre-operative anticoagulation period.⁵ An anterior-posterior electrode position may be more effective than the anterior-lateral position for external cardioversion.⁶ Cardioversion devices using biphasic waveforms have greater efficacy, requiring fewer shocks and lower delivered energy, which also results in less dermal injury than a monophasic shock waveform.⁷ Application of non-steroidal anti-inflammatory cream prior to cardioversion may reduce the incidence and severity of cutaneous burns.⁸

Suggested indicators

- D % cases in which full monitoring as per AAGBI guidelines used.
- D % cases performed with trained anaesthetist.
- D % cases performed with trained anaesthetic assistant.
- D % cases at which resuscitation equipment was checked less than 24 h before, and since any other resuscitation attempt.
- D % cases performed with external pacing equipment.
- D % elective patients who had received anticoagulation as per current guidelines.
- D % of patients with current electrolyte results available.
- D % patients without skin 'burns'.
- D % cases where cardioversion device used biphasic waveform.

Proposed standard or target for best practice

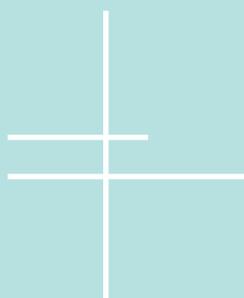
- D All indicators should be true in 100% patients.

Suggested data to be collected

- D As for each indicator.

Common reasons for failure to meet standard

- D Failure to regard full facilities as important.⁹
- D Inadequate staffing or training.
- D Inadequate provision of monitoring.
- D Failure to anticoagulate effectively.
- D Failure to use paddles and pads correctly.
- D Failure to use cardioversion device with biphasic waveform.



CPD and Curriculum mapping

CPD matrix codes: **2A08**

Training curriculum: **Annex B page B-55, Annex C page C-13, C-53**

References

- 1 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). *AAGBI*, London 2007 (<http://www.aagbi.org/publications/guidelines/docs/standardsofmonitoringo7.pdf>).
- 2 Maltagliati A et al. Usefulness of transoesophageal echocardiography before cardioversion in patients with atrial fibrillation and different anticoagulant regimens. *Heart* 2006;**92**:933–938.
- 3 NICE Clinical Guideline 36. Atrial fibrillation: the management of atrial fibrillation. NICE, London December 2011 (<http://www.nice.org.uk/CG36>).
- 4 2011 ACCF/AHA/HRS Focused Updates Incorporated Into the ACC/AHA/ESC 2006 Guidelines for the Management of Patients with Atrial Fibrillation. *J Am Coll Cardiol* 2011;**57**:e101–e198.
- 5 Klein AL et al. ACUTE Steering and Publications Committee for the ACUTE Investigators. Efficacy of transesophageal echocardiography-guided cardioversion of patients with atrial fibrillation at 6 months: a randomized controlled trial. *Am Heart J* 2006;**151**(2):380–389.
- 6 Kirchhof P. MD et al. Anterior-posterior versus anterior-lateral electrode positions for external cardioversion of atrial fibrillation: a randomised trial. *Lancet*, 2002 October 26;**360**(9342):1275–1279.
- 7 Biphasic versus monophasic shock waveform for conversion of atrial fibrillation. The results of an international randomized, double-blind multicenter trial. *J Am Coll Cardiol* 2002;**39**:1956–1963.
- 8 Ambler JJ et al. The effect of topical non-steroidal anti-inflammatory cream on the incidence and severity of cutaneous burns following external DC cardioversion. *Resuscitation* 2005;**65**(2):173–178.
- 9 Guidelines for provision of services for anaesthesia in the non-theatre environment. *RCoA*, London 2011 (<http://www.rcoa.ac.uk/node/766>).

6.6

Endoscopy under sedation

Dr I Jackson

Why do this audit?

Sedation by non-anaesthetists for endoscopy is common. Procedures performed under sedation include bronchoscopy, upper and lower gastrointestinal endoscopy and cystoscopy. Traditionally sedation has been carried out with a benzodiazepine or a mixture of benzodiazepine and opioid, with or without local anaesthetic. However there is increasing interest in the use of propofol. A prospective study of upper gastrointestinal endoscopy has shown a death rate of 1 in 2,000 and a morbidity rate of 1 in 200.¹ More recently, evidence from the Closed Claims database in the USA² reveals that 50% of claims from incidents occurring outside operating theatres are linked to endoscopy procedures. These claims were more likely to be judged as having received substandard care. This morbidity and mortality may be reduced if published guidelines for patient care are followed. Recovery facilities may be less adequate than those found in day surgery units.

Best practice: research evidence or authoritative opinion

The Royal College of Surgeons and the British Society of Gastroenterology have made recommendations for standards of care in endoscopy.^{3,4} An intercollegiate working party has also looked at sedation in adults.⁵ The Royal College of Anaesthetists has also provided guidance.⁶ Patients should complete a simple checklist to identify risk factors prior to sedation. Dedicated intravenous access, monitoring, oxygen supplementation and trained help to look after the patient during and after the procedure are recommended. Recovery facilities should be of similar standard to those in day surgical units. Each hospital should have two nominated consultants (one of whom is an anaesthetist and the other a user of sedation) to collaborate in the provision of safe sedation.

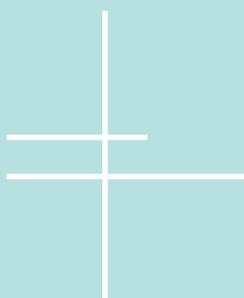
Suggested indicators

- D Lead consultants appointed.
- D Existence of hospital and unit guidelines on the use of sedation.
- D Evidence of regular team training for medical emergencies.
- D Evidence of presence of full resuscitation equipment and drugs.
- D % operators adhering to sedation guidelines.
- D % patients who have undergone an assessment prior to sedation.
- D % patients with:
 - ◆ dedicated intravenous access
 - ◆ continuous monitoring of heart rate, NIBP and SpO₂
 - ◆ supplementary oxygen
 - ◆ continual care during the procedure and recovery from a person trained in resuscitation and unconnected with the actual procedure.
- D % patients requiring the use of reversal agents.
- D % patients where procedure abandoned due to inadequate sedation.
- D % patients with an uncomplicated recovery (without medical intervention in the recovery area and without delayed discharge or admission to a ward).
- D % patients who meet standard criteria for discharge after day case surgery before they are discharged.

Proposed standard or target for best practice

- D All hospitals should have lead consultants appointed.
- D All hospitals should have sedation guidelines (reviewed at least every two years).
- D All units should have evidence of regular (at least annually) team training.
- D All units should have resuscitation equipment and drugs with evidence of regular checking of both.
- D More than 90% of cases should be managed within sedation guidelines.
- D 100% patients should have
 - ◆ dedicated intravenous access
 - ◆ continuous monitoring of heart rate, NIBP and SpO₂
 - ◆ supplementary oxygen
 - ◆ continual care during the procedure and recovery from a person trained in resuscitation and unconnected with the actual procedure.

	<ul style="list-style-type: none"> D 0% patients should require reversal of sedative or opioid. D < 5% of procedures should be abandoned due to inadequate sedation. D 100% patients should have an uncomplicated recovery. D 100% patients should meet standard criteria for discharge after day case surgery before they are discharged. D Admission rate should be under 2%.
Suggested data to be collected	<ul style="list-style-type: none"> D Name of sedation lead clinicians. D Sedation guidelines and when last reviewed. D Evidence of regular team emergency training and date of last session. D Presence of resuscitation equipment and drugs plus checking system. D % patients undergoing an assessment. D Presence of IV cannula, use of supplementary oxygen and monitoring. D Trained help during procedure and recovery. D Use of flumazenil and naloxone. D Events in the recovery period. D Time to fulfil standard discharge criteria. D Number of admissions. D Reason for admission.
Common reasons for failure to meet standard	<ul style="list-style-type: none"> D Lack of appreciation of the dangers. D Pressure to carry out large numbers of procedures. D Inadequate staffing of endoscopy units.
CPD and Curriculum mapping	<p>CPD matrix codes: 2A08, 2A10, 3A07</p> <p>Training curriculum: Annex B page B-73–75, Annex C page C-29–30</p>
References	<ol style="list-style-type: none"> 1 Quine MA et al. Prospective audit of upper gastrointestinal endoscopy in two regions of England: safety, staffing and sedation methods. <i>Gut</i> 1995;36:462–467. 2 Robbertze R et al. Closed claims review of anesthesia for procedures outside the operating room. <i>Curr Opin Anaesthesiol</i> 2006;19:436–442. 3 Report of the Working Party on Guidelines for Sedation by Non-Anaesthetists. <i>RCSEng</i>, London 1993. 4 Guidelines on Safety and Sedation for Endoscopic Procedures. <i>BSG</i>, London September 2003. (http://www.bsg.org.uk/clinical-guidelines/endoscopy/guidelines-on-safety-and-sedation-during-endoscopic-procedures.html). 5 Implementing and ensuring Safe Sedation Practice for Healthcare Procedures in adults. Report of a Working Party established by the Royal College of Anaesthetists. <i>RCoA</i>, London November 2001 (http://www.rcoa.ac.uk/node/2270). 6 Guidelines for provision of services for anaesthesia in the non-theatre environment. <i>RCoA</i>, London 2011 (http://www.rcoa.ac.uk/node/766).



6.7

Use of continuous capnography monitoring outside theatres

Dr N O'Keeffe, Dr D Whitaker

Why do this audit?

Capnography has been used in anaesthetic rooms and operating theatres since 1988¹ to prevent harm from accidental oesophageal intubation and other airway management problems. Besides monitoring lung ventilation, capnography can provide safety-critical information about the patient's circulation and metabolism and can aid the diagnosis of low cardiac output states and pulmonary embolism.² Despite these significant contributions to patient safety its use is not universal in clinical areas outside the operating theatre.³

Best practice: research evidence or authoritative opinion

Continuous capnography monitoring outside operating theatres has been recommended by the Association of Anaesthetists⁴ and the American Society of Anesthesiologists.⁵ The National Audit Project on major complications of airway management (NAP4) recommended continuous capnography in Intensive Care Units (ICU), Emergency Departments and Recovery Units.⁶ The Resuscitation Council Guidelines also recommended use of capnography in 2010.⁷

Suggested indicators

- D % ventilated patients in adult ICU in which continuous capnography was used.
- D % ventilated patients in paediatric ICU in which continuous capnography was used.
- D % patients intubated in Emergency Department in which continuous capnography monitoring was used.
- D % patients receiving moderate or deep sedation in which continuous capnography was used
- D % patients with airway devices in recovery in which continuous capnography was used.
- D % patients receiving in hospital CPR in which continuous capnography monitoring was used.
- D % neonates receiving resuscitation in which continuous capnography monitoring was used.

Proposed standard or target for best practice

- D Indicator should be true in 100% of intubated patients in ICU.
- D Indicator should be true in 100% patients intubated in Emergency Department.
- D Indicator should be true in 100% of patients receiving moderate or deep sedation.
- D Indicator should be true on first audit of at least some of the patients the other areas, 20% should then be added to this figure for the next audit and this repeated till 100% is reached.

Suggested data to be collected

- D As for each indicator. This topic could be an opportunity for a multidisciplinary audit with Emergency Department and Resuscitation colleagues.

Common reasons for failure to meet standard

- D Failure to have capnography equipment available.
- D Failure to have capnography equipment in working order.
- D Failure to appreciate the value of using capnography equipment.

CPD and Curriculum mapping

CPD matrix codes: 2A08, 2A10, 2A11, 3A07, 3A11

Training curriculum: Annex B page B-54–55, B-75, B-95, Annex C page C-69, C-31–32

References

- 1 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). *AAGBI*, London 2007 (<http://www.aagbi.org/publications/guidelines/docs/standardsofmonitoring07.pdf>).
- 2 Gravenstein JS et al. Capnography. *Cambridge University Press*, Cambridge 2011.
- 3 Association of Anaesthetists of Great Britain and Ireland Statement on use of Capnography outside operating theatres. *AAGBI*, London 2011 (http://www.aagbi.org/sites/default/files/Capnographyaagbi090711AJH%5B1%5D_o.pdf).
- 4 Whitaker DK. Time for capnography – everywhere. *Anaesthesia* 2011;**66**:544–549.
- 5 American Society of Anesthesiologists Standards for Basic Anesthetic Monitoring. ASA 2010 (<http://www.asahq.org/~media/For%20Members/documents/Standards%20Guidelines%20Stmts/Basic%20Anesthetic%20Monitoring%202011.ashx>).
- 6 Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists – major complications of airway management in the UK. *RCoA*, London March 2011 (<http://www.rcoa.ac.uk/nap4>).
- 7 Resuscitation Guidelines 2010. *Resuscitation Council (UK)* (<http://www.resus.org.uk/pages/guide.htm>).

