

## Section 4: Emergency anaesthesia

Edited by Dr Joe Silsby

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- 4.9 ICU/HDU admission after emergency surgery

## 4.1

## Level of supervision during out-of-hours and emergency cases

Dr T Simpson, Dr M Greampet

### Why do this audit?

The skills of the anaesthetists should be matched to the patient's needs.<sup>1,2</sup> Managing high risk patients during out-of-hours by junior anaesthetists is associated with a poor outcome.<sup>3,4</sup> When dealing with a sick patient, non-consultant anaesthetists should seek appropriate advice and help from the supervising consultant.<sup>5</sup> In addition, the decision to operate at night should involve a senior anaesthetist.<sup>6</sup> With the implementation of European Working Time Directive, the time available for training is reduced and this may impact on the trainees' ability to practise independently.<sup>7</sup>

### Best practice: research evidence or authoritative opinion

- D Junior anaesthetists (Specialty doctors and trainees) should not anaesthetise
  - ◆ children less than 5 years and/or under 20 kg<sup>8</sup>
  - ◆ ASA 4 or 5 patients
  - ◆ in an isolated environment
 without direct supervision by a consultant or senior StR except for procedures for which they are deemed competent.
- D A trainee is responsible to, and subject to, clinical supervision by a designated consultant at all times.
- D All patients should have a named consultant<sup>9</sup> and their level of supervision (direct, local and distant) should be clearly documented on the anaesthetic record.<sup>5</sup>
- D Each department should have a local protocol to define when non-consultant anaesthetists should request consultant advice and help.<sup>2</sup>

### Suggested indicators

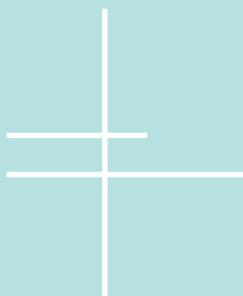
- D % cases of emergency surgery on children less than 5 years and/or under 20 kg where the consultant or senior StR with at least 6 months paediatric experience was present.
- D % cases of ASA 4 or 5 in which consultant or senior StR was present.
- D % cases at night in which consultant or senior StR was present or consulted.
- D % cases involving anaesthesia in remote sites or involving unfamiliar procedures during which consultant or senior StR was present.
- D % anaesthetic records with name of the responsible consultant and the level of supervision.

### Proposed standard or target for best practice

- D 100% of emergency paediatric cases (< 5 years and/or < 20 kg) should have a consultant or senior StR with paediatric experience present.
- D 100% of cases of ASA 4 or 5 should have a consultant or senior StR present.
- D 100% of cases started after midnight should fit the NCEPOD definition for urgent or emergency status.
- D A consultant or senior StR should be present or have been consulted in 100% of cases.
- D Auditors may decide to exclude some procedures with which both anaesthetic and surgical trainees are competent, though such exclusions and reasons for them should be explicit.
- D 100% anaesthetic records should include the name of the responsible consultant and the level of supervision.

### Suggested data to be collected

For all cases which fall into the above groups; who was the consultant with overall responsibility and what was their level of supervision? The presence/absence of senior anaesthetist and any discussion held with them should be recorded. Was it easy to access the consultant? Did the decision to operate involve a senior anaesthetist?



**Common reasons for failure to meet standard**

- D Failure of junior anaesthetists to recognise a sick patient.
- D No daytime emergency/routine list time available.
- D No easy access to senior help.
- D Lack of departmental guidelines for management of sick patients and when to contact the supervising consultant for appropriate help and advice.

**Related audits**

- 4.2 – Timing of emergencies on the 24-hour clock
- 9.3 – Staffing for paediatric anaesthetic services

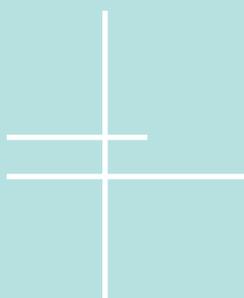
**CPD and Curriculum mapping**

CPD matrix codes: IH01, 2H02

Training curriculum competences: Annex B pages B-10, B-13

**References**

- 1 Campling EA, Devlin HB, Lunn JN. The report of the National Confidential Enquiry into Perioperative Deaths 1989. *NCEPOD*, London 1990 (<http://www.ncepod.org.uk/>).
- 2 NHS Quality Improvement Scotland, Anaesthesia Project Group. Anaesthesia – Care before, during and after anaesthesia. *NHS QIS*, Edinburgh July 2003 (<http://www.nhshealthquality.org/nhsqis/files/Anaesthesia.pdf>).
- 3 Campling EA et al. The report of the National Confidential Enquiry into Perioperative Deaths 1992/1993. *NCEPOD*, London 1995 (<http://www.ncepod.org.uk/>).
- 4 Campling EA et al. Who operates when? A report of the National Confidential Enquiry into Perioperative Deaths. *NCEPOD*, London 1997 (<http://www.ncepod.org.uk/>).
- 5 Guidance on the Supervision of Non-Consultant Anaesthetists (<http://www.rcoa.ac.uk/node/1836>).
- 6 WTD – Implications and Practical Suggestions to Achieve Compliance. Joint Royal College of Anaesthetists and Royal College of Surgeons of England Working Time Directive 2009 Project. *RCoA and RCSEng*, London 2009 (<http://www.rcoa.ac.uk/node/2288>).
- 7 Lansdown MRJ, Gray AJG, Treasure T, Layer GT. Appendicectomy: who performs it, when and how? *Ann R Coll Surg Engl* 2006;**88**:530–534.
- 8 Chambers WA. Message from the Honorary Secretary: The named consultant. *Anaesthesia News* 2004;**209**:16.
- 9 McHugh GA and Thoms GMM. Supervision and responsibility: The Royal College of Anaesthetists National Audit Project. *Br J Anaesth* 2005;**95**(2):124–129.
- 10 Curriculum for a CCT in Anaesthetics. 2nd edition Version 1.3, Chapter 6: Clinical supervision. pp 38–40. *RCoA*, London August 2010 (<http://www.rcoa.ac.uk/node/1462>).



## 4.2

## Timing of emergencies on the 24-hour clock

Dr C H Laxton

## Why do this audit?

Out-of-hours operating, particularly after midnight, may result in a poorer outcome for patients.<sup>1</sup> Senior surgical and anaesthetic involvement is reduced. There are also implications for training in view of the reduction of junior doctors' hours. NCEPOD has repeatedly suggested that all emergency patients should have prompt access to theatres, critical care facilities and appropriately trained staff, 24 hours per day every day of the year, whereas non-emergency cases should be managed within the standard or extended working day.<sup>2,3</sup> The British Orthopaedic Association has also recommended that all hospitals have daily, consultant-led trauma lists.<sup>4</sup>

## Best practice: research evidence or authoritative opinion

Daytime operating theatres for emergency surgery provide a significant reduction in operations after midnight.<sup>4,5,6,7</sup> Delays in waiting for theatre are reduced<sup>6</sup> and patients may be operated on at the clinically most appropriate moment.

Emergency operating lists during the day can allow excellent supervision and, therefore, greater training opportunities.<sup>4,5,7</sup>

More complex cases are operated on in normal working hours, and operative experience is not diminished.<sup>4,7</sup>

## Suggested indicators

- D % of emergency cases performed between 0800 h and 1800 h.
- D % of emergency cases performed between 1800 h and 2400 h.
- D % of emergency cases performed between 2400 h and 0800 h.
- D % of cases started after midnight which are true emergencies as defined by NCEPOD (immediate life-saving operations, where resuscitation is simultaneous with surgical treatment).<sup>2</sup>
- D % of cases of urgent or other non-emergency cases as defined by NCEPOD started after midnight with reasons.

## Proposed standard or target for best practice

- D The suggested target of best practice should be that 60% or more of emergency cases are standard or target started between 0800 h and 1800 h, with 5% or fewer emergency cases starting between 2400 h and 0800 h for best practice.
- D 100% cases starting after 2400 h should be classified as an 'emergency' as defined by NCEPOD or reasons for variance documented.
- D These targets may be redefined after the initial audit.

## Suggested data to be collected

- D Time of the start and finish of all emergency procedures on the 24-hour clock.
- D Surgical specialty.
- D Operation name/code.
- D NCEPOD classification.
- D ASA grade of patient.
- D Reason for the procedure being performed after 1800 h or after 2400 h.
- D Grades of all surgeons and anaesthetists present.

## Common reasons for failure to meet standard

- D Decision-making at junior level of surgeon and/or anaesthetist.
- D No daytime emergency theatre.
- D No theatre availability due to lack of theatre staff.
- D Over-running routine lists.
- D No emergency surgeon or anaesthetist available during the day.
- D Emergency theatre list fully booked – if this occurs regularly then more emergency sessions should be planned, or a second emergency theatre allocated.
- D Patients not ready for theatre during a daytime session (e.g. not starved, investigations not ready, not resuscitated)

**Related audits**

4.1 – Level of supervision during out-of-hours and emergency cases

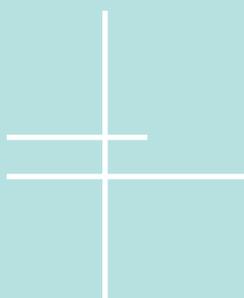
**CPD and Curriculum mapping**

CPD matrix codes: **1102, 1103, 1105**

Training curriculum competences: **Annex B page B-11**

**References**

- 1 Buck N, Devlin HB, Lunn JN. Report by the National Confidential Enquiry into Perioperative Deaths. *Nuffield Provincial Hospitals Trust*, London 1988.
- 2 Campling EA et al. Who operates when? A report of the National Confidential Enquiry into Perioperative Deaths. *NCEPOD*, London 1997 (<http://www.ncepod.org.uk/>).
- 3 Cullinane M et al. Who operates when? II. A report of the National Confidential Enquiry into Perioperative Deaths. *NCEPOD*, London 2003 (<http://www.ncepod.org.uk/>).
- 4 Jennings AG et al. Impact of the introduction of a daily trauma list on out-of-hours operating. *Ann Roy Coll Surg*, 1999;**81**:360–361.
- 5 Scriven MW et al. The use and impact of a daily general surgical emergency operating list in a district general hospital: a prospective study. *Ann Roy Coll Surg*, 1995;**77**:117–120.
- 6 Magee TR et al. Theatre delay for general surgical emergencies: a prospective audit. *Ann Roy Coll Surg*, 1995;**77**:121–124.
- 7 Calder FR, Jadhav V, Hale JF. The effect of a dedicated emergency theatre facility on emergency operating patterns. *J Roy Coll Surg Edin*, 1998;**43**:17–19.



## 4.3 Adequacy of resuscitation before emergency surgery

Dr C J Day

### Why do this audit?

The overall mortality of anaesthesia and surgery is low; but this conceals a much higher mortality rate in sub-groups such as urgent and emergency surgery. Tissue hypoperfusion can lead to organ failure with associated increased mortality and length of hospital stay. There is growing acceptance that adequate pre-operative resuscitation of high risk patients will improve outcome.

### Best practice: research evidence or authoritative opinion

Significant organ hypoperfusion can exist with little change in heart rate (HR) or blood pressure. Central venous pressure is a poor indicator of intravascular volume. Response (ideally of cardiac output or stroke volume) to a fluid challenge is useful if ongoing fluid losses are small.

Stroke volume variability or systolic pressure variability are good indicators of volume responsiveness in patients without AF, once positive pressure ventilation has been established.

Plasma lactate and SvO<sub>2</sub> (or superior venocaval saturation) are the best indicators of adequate organ perfusion and therefore resuscitation.

If little monitoring has been used, urine output or HR and BP response to induction of anaesthesia may identify gross under-resuscitation.

### Suggested indicators

Lactate measurement should be available from the lab if not from a blood gas analyser. A normal or falling lactate would be the best indicator of resuscitation. SvO<sub>2</sub> SVV or SPV once IPPV is established would also be good indicators. Retrospective interpretation of an anaesthetic record by more than one experienced anaesthetist may allow 'response to induction of anaesthesia' or urine output to suggest if resuscitation was inadequate. If this approach is used it might be appropriate to audit adequacy of monitoring as well.

### Proposed standard or target for best practice

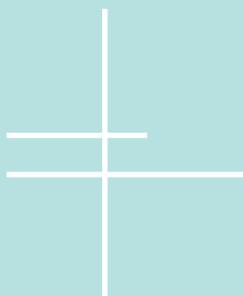
100% of patients should be adequately resuscitated before induction of anaesthesia. In some cases this may not equate with full restoration of circulating volume and tissue perfusion. For emergency patients (NCEPOD class 5) full resuscitation may only be possible or desirable after surgery has started (e.g. ongoing massive haemorrhage). NCEPOD defines emergency operations as immediate life-saving operations, where resuscitation is simultaneous with surgical treatment. Inevitably this will require a judgement to be made, ideally by more than one experienced anaesthetist.

### Suggested data to be collected

An initial PDSA (Plan, Do, Study, Act) cycle might look at just lactate, SvO<sub>2</sub> and any oesophageal Doppler or arterial waveform data (whichever is used locally). Feeding this data back may improve monitoring or data recording. A decision can then be made locally either to use the less reliable indicators or concentrate on improved monitoring.

### Common reasons for failure to meet standard

- D Inadequate monitoring used either because of unavailability or training in its use.
- D Difficulty interpreting less reliable variables.



### Related audits

4.4 – Management of the emergency laparotomy

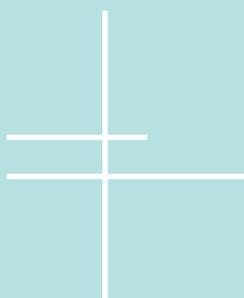
### CPD and Curriculum mapping

CPD matrix codes: **2A03, 2A04, 2A05**

Training curriculum competences: **Annex B pages B-10–13, Annex C pages C-22–24, Annex D pages D-17–18**

### References

- 1 Michard F et al. Pulse pressure variation: beyond the fluid management of patients with shock. *Critical Care* 2007;**11**:131 (<http://ccforum.com/content/11/3/131>).



## 4.4

## Management of the emergency laparotomy

Dr S S Thon, Dr C A Seller

## Why do this audit?

Emergency laparotomies are often carried out on sicker, frailer and more elderly patients (ASA  $\geq 3$ ). They are at greater risk of peri-operative complications and higher mortality, than those undergoing elective surgery.<sup>1,2,3</sup>

Pre-operative care of these patients can be lacking in *timely* input from senior staff, including Care of the Elderly Physicians. Such patients may be inadequately optimised pre-operatively and possibly inappropriately listed.<sup>1</sup> There is disparity in care and outcomes between hospital trusts.

Preparing these patients for surgery may take minutes to hours. They can be very challenging to manage in the peri-operative period. Age, ASA status and the requirement of vasoactive drugs in the post-operative period are significant predictors of survival.<sup>2,3</sup>

## Best practice: research evidence or authoritative opinion

- D Timely access to appropriate and effective surgery by an experienced team following pre-operative resuscitation should be the gold standard. Variance may involve diagnosis delay, inadequate resuscitation and inappropriate patient selection for emergency laparotomy. Senior surgical, anaesthetic and intensive care staff should be involved.
- D Delays in surgery, for the elderly particularly, worsen outcome.<sup>1</sup>
- D Pre-operative assessment should include; choice of the most appropriate surgery and use of risk assessment scores in conjunction with ASA status to guide risk stratification.<sup>4</sup> Surgery duration and small bowel resection has been associated with poorer outcomes.<sup>5</sup>
- D Discussions of risk and patient expectations should be approached from a multidisciplinary perspective. Plans, risks and likely outcomes should be openly discussed with the patient and family. The patient's wishes are paramount. This should be properly documented.
- D Minimum standards of intra-operative monitoring (AAGBI) are essential.<sup>6</sup> Evidence exists that these reduce peri-operative incidents.<sup>7</sup>
- D Fluid imbalances worsen morbidity and mortality. Appropriate fluid management is needed to lessen intra-operative hypotension and hypoperfusion.<sup>8</sup> Recent NICE guidelines recommend the use of Cardio Q Oesophageal Doppler (or equivalent technology) in major or high risk surgical patients in which invasive monitoring is considered.<sup>9</sup>
- D Pain is the fifth vital sign and effective analgesia is an important consideration.<sup>1</sup> Epidural analgesia has benefits to the patient in the peri-operative period and can improve post-operative outcome.<sup>10,11</sup> Some patients are too unstable, or the surgery too urgent to allow epidural use. Other analgesia modalities include trans versus abdominus plane (TAP) blocks, rectus sheath blocks/catheters, local infiltration and patient controlled opioid analgesia/infusions.
- D Peri-operative normothermia aids recovery.<sup>7</sup> Along with prophylactic antibiotics, high inspired  $\text{FiO}_2$  and peri-operative blood glucose control, preventing hypothermia can make a significant difference in surgical wound infection rates.<sup>12</sup> Hypothermia and its sequelae should be avoided.<sup>13</sup> Post-operative care in the UK has improved in the last decade, with more Level 2 and 3 beds available. However, usage is undersubscribed (37%) when matched with disease severity of patients undergoing emergency laparotomy.<sup>1</sup>

## Suggested indicators

- D Reasons for surgical delay.
- D % patients deemed adequately resuscitated pre-operatively.
- D % surgery 'out-of-hours'.
- D % patients with invasive monitoring.
- D % patients receiving additional cardiac output monitoring.
- D Strategies for intra-operative hypotension, e.g. fluids, vasoactive drugs.
- D Strategies for peri-operative analgesia, temperature and glycaemic control, timely antibiotic prophylaxis.
- D % patients requiring ICU/HDU care receiving appropriate level of post-operative care.
- D Time spent in PACU prior to discharge to ward.
- D % unplanned ICU/HDU admissions following PACU discharge.
- D Length of stay, 30 day survival.

## Proposed standard or target for best practice

- D 100% of patients should undergo emergency laparotomy at an appropriate time following 'appropriate' decision to operate.
- D 100% of patients should have monitoring essential and appropriate for safe conduct of surgery and anaesthetic.
- D 100% of patients ASA  $\geq$  3, should have senior staff directly involved.
- D Hypotension and hypothermia should be treated promptly. Blood glucose levels monitored regularly.
- D Appropriate fluid resuscitation, reversal of muscle relaxation and normal arterial blood gas pH at end of surgery/anaesthesia.
- D Where appropriate, the patient should have an epidural sited for peri-operative analgesia.
- D 100% of ASA  $\geq$  3 must have access to Level 2/3 care if needed.

## Suggested data to be collected

- D Patient: age, ASA status, risk assessment score, co-morbidities.
- D Peri-operative values: HR, BP, central venous pressure, core temperatures, haemoglobin, arterial/venous blood gas and lactate, blood glucose level.
- D % patients with invasive cardiovascular monitoring, cardiac output monitor use.
- D Methods for managing peri-operative hypotension.
- D Fluid balance (blood loss, urine output etc).
- D Temperature conservation methods.
- D Adequate reversal of neuromuscular blockade.
- D Analgesia strategies.
- D % use of depth of anaesthesia monitoring.
- D Grades of clinical staff in theatre.
- D Time of surgery.
- D Duration, procedure, pathology.

## Common reasons for failure to meet standard

- D Delays to timely surgery.
- D Inadequate pre-operative assessment.
- D Inadequate peri-operative monitoring.
- D Inappropriate decision to operate.
- D Full resuscitation may be possible after procedure, e.g. ruptured AAA.
- D No HDU/ICU capacity.

## Related audits

4.3 – Adequacy of resuscitation before emergency surgery

## CPD and Curriculum mapping

CPD matrix codes: 1I05, 2A03, 2A04, 2A05, 2G02, 2G03, 2G04, 3A03

Training curriculum competences: Annex B pages B-25–26, Annex C pages C-22–24, Annex D pages D-17–18.

## References

- 1 An Age Old Problem: A review of the care received by elderly patients undergoing surgery *NCEPOD*, London November 2010 (<http://www.ncepod.org.uk/2010eese.htm>).
- 2 Cook TM, Day CJE. Hospital mortality after urgent and emergent laparotomy in patients aged 65 and over. Risk and prediction of risk using multiple logistical regression analysis. *Br J Anaesth* 1998;**80**:776–781.
- 3 Ford PNR et al. Determinants of outcome in critically ill octogenarians after surgery: an observational study. *Br J Anaesth* 2007;**99**(6):824–829.
- 4 Rix TE, Bates T. Pre-operative risk scores for the prediction of outcome in elderly people who require emergency surgery. *World J Emerg Surg* 2007;**2**:16.
- 5 Margenthaler JA et al. Risk Factors for Adverse Outcomes following surgery for small bowel obstruction. *Ann Surg* 2006;**243**:456–464.
- 6 Recommendations for standards of monitoring during anaesthesia and recovery (4th edition). *AAGBI*, London March 2007 (<http://www.aagbi.org/sites/default/files/standardsofmonitoring07.pdf>).
- 7 The report of the National Confidential Enquiry into perioperative deaths 1999/2000 *NCEPOD* London 2001 (<http://www.ncepod.org.uk/2001cwo.htm>).
- 8 Grocott MPW, Mythen MG, Gan TJ. Perioperative Fluid Management and Clinical Outcomes in Adults (review). *Anesth Analg* 2005;**100**:1093–1106.
- 9 MTG3 CardioQ-ODM (oesophageal Doppler monitor): guidance. *NICE*, London May 2011 (<http://guidance.nice.org.uk/MTG3>).
- 10 Kehlet H, Holte K. Effect of postoperative analgesia on surgical outcome. *Br J Anaesth* 2001;**87**:62–72.
- 11 Rigg JR et al. Epidural anaesthesia and analgesia and outcome of major surgery: a randomised trial. *Lancet* 2002;**359**:1276–1282.
- 12 Prevention and treatment of surgical site infection. *NICE Clinical Guideline CG74*. *NICE*, London October 2008 (<http://www.nice.org.uk/CG74>).
- 13 Sessler DI. Perioperative heat balance. *Anesthesiology* 2000;**92**:518–596.

## 4.5

## Emergency provision of blood and blood products

Dr T Teare, Dr J Brown

**Why do this audit?**

Appropriate administration of blood products is essential for the effective management of massive haemorrhage. The process is complex, involving staff across a range of departments in potentially high stress situations. Excessive blood loss can jeopardise the survival of patients in many clinical settings. During the period October 2006 to September 2010, the National Patient Safety Agency (NPSA) was made aware of 11 deaths and 83 incidents where the patient came close to death as a result of delays in the provision of blood in an acute situation.<sup>1</sup> The early recognition of massive blood loss and the institution of effective actions are vital if avoidance of hypovolaemic shock and its consequences are to be avoided. One such action is the rapid provision of blood and blood components. A key element is the effective communication between all staff who will be involved in the provision and transportation of blood. The urgent provision of blood for life threatening haemorrhage requires a rapid focussed approach. Recent lessons from military practice have led to research in the civilian setting and the formulation of expert guidance for protocol-driven management of massive haemorrhage.

Despite recent AAGBI guidelines stating 'hospitals must have a major haemorrhage protocol in place',<sup>2</sup> many units are yet to introduce this into practice. This audit serves to investigate current local practice and assist development of or improve such a protocol.

The optimum management of the bleeding patient has many aspects of treatment as described in the AAGBI guidelines. However, this audit concentrates on just one: blood product administration.

**Best practice: research evidence or authoritative opinion**

The standards for this audit have been derived from AAGBI guidelines<sup>2</sup> and consensus recommendations from the British Committee for Standards in Haematology (BCSH), for administration and monitoring of massive transfusion.<sup>3</sup> These standards emphasise a number of key management points, including:

- D recognising and treating significant haemorrhage as a clinical emergency, requiring real-time input from senior doctors including a consultant haematologist
- D timeliness of delivery of blood to patient
- D greater use of FFP and platelets in initial treatment than has been seen traditionally
- D measuring specific physiological and laboratory parameters before, during, and after massive transfusion to reduce the multitude of serious complications that can result
- D all hospitals should develop and continually audit massive haemorrhage protocols.

**Suggested indicators**

- D % of cases where parameters are measured at baseline and repeated during/after the event: Haemoglobin(Hb), Platelets(Pts), INR, APPT, fibrinogen(fib), pH, Calcium(Ca), Temperature (Temp).
- D % of cases where time to start of blood transfusion is less than 1 hour
- D % achieving targets:
  - ◆ Hb > 8 g/dL
  - ◆ Pts > 75 × 10<sup>9</sup>/L
  - ◆ INR/APPT < 1.5
  - ◆ Fib > 1 g/L
  - ◆ pH > 7.3
  - ◆ Ca > 2.1
  - ◆ Temp > 36°C.
- D % achieving a ratio of fresh frozen plasma to blood units of at least 1:2.
- D % staff aware of major haemorrhage transfusion protocol.

**Proposed standard or target for best practice**

- D 100% of patients starting blood transfusion within 1 hour of massive haemorrhage declared
- D 100% parameters measured at baseline and repeated.
- D 100% achieving targets for parameters.
- D 100% achieving a ratio of fresh frozen plasma to blood units of at least 1:2.
- D 100% of staff aware of major haemorrhage transfusion protocol.

**Suggested data to be collected**

- D Number of patients identified as cases of massive haemorrhage (six units of blood or more issued from the same cross-matched sample or within 24 hours).
- D Time to start of first blood transfusion after massive haemorrhage declared
- D Demographics: age, sex.
- D Specialty (e.g. obstetrics).
- D Haemorrhagic pathology (e.g. abdominal aortic aneurysm)
- D 30-day mortality rate.
- D Type and quantity of products transfused (red cells, FFP, platelets, cryoprecipitate, factor vlla).
- D Lowest and highest serum samples during the event: FBC, clotting, fibrinogen, calcium, arterial blood gas (pH/Base excess).
- D Lowest temperature recorded.
- D Number of cases receiving emergency O-negative blood

**Common reasons for failure to meet standard**

- D Failure of early clinical recognition of massive haemorrhage.
- D Inadequate training and awareness of local protocols.
- D No protocol or protocol too complex.
- D human factors:
  - ◆ poor communication and understanding of urgency (clinical, portering and laboratory staff)
  - ◆ ineffective team working and role definition.

**Related audits**

- 4.3 – Adequacy of resuscitation before emergency surgery
- 4.4 – Management of the emergency laparotomy

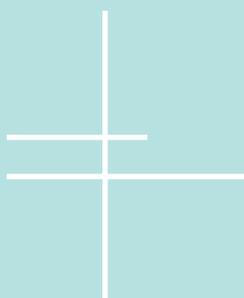
**CPD and Curriculum mapping**

CPD matrix codes: 1I05, 1E04, 2A05

Training curriculum competences: Annex B pages B-20 (IO\_BS\_09), B-25 (ES\_BK\_02), Annex C pages C-24 (GU\_IS\_03), C-44 (MT\_IK\_06–07), Annex D pages D-17 (GU\_HK\_02), D-18 (GU\_HS\_03)

**References**

- 1 The transfusion of blood and blood components in an emergency. National Patient Safety Agency Rapid Response Report (NPSA/2010/RRR017). NPSA, London October 2010 (<http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=83659&q=0%C2%ACblood%C2%AC>).
- 2 Blood transfusion and the anaesthetist: management of massive haemorrhage. AAGBI Safety Guideline. AAGBI, London 2010 ([http://www.aagbi.org/sites/default/files/massive\\_haemorrhage\\_2010\\_0.pdf](http://www.aagbi.org/sites/default/files/massive_haemorrhage_2010_0.pdf)).
- 3 British Committee for Standards in Haematology Writing Group (Stainsby D et al). Guidelines on the management of massive blood loss. *Br J Haematol* 2006;**135**:634–641.



## 4.6

## Management of the morbidly obese patient requiring emergency surgery

Dr N Cota, Dr S Harris, Dr N Kennedy

### Why do this audit?

Obesity is a significant problem, and the incidence is increasing worldwide.<sup>1</sup> Bariatric surgery has shown to improve outcomes, and be cost-effective.<sup>2</sup>

All anaesthetists and theatre staff are likely to have to deal with obese patients requiring emergency surgery for non bariatric surgery. In centres undertaking elective bariatric surgery, potentially also emergency surgery following complications, such as return to theatre for post-operative haemorrhage.

The fourth National Audit Project (NAP4), highlighted airway complications in the obese especially after failed regional techniques.<sup>3</sup> This group of patients are at a higher risk of peri-operative complications, and may need ICU/HDU admissions or special nursing care on the wards, with increased length of hospital stay and cost.<sup>4</sup>

The burden of emergency surgery in patients with morbid obesity and significant co-morbidities, adversely affects the peri-operative risk and outcome. Main causes of mortality are pulmonary embolism, myocardial infarction and sepsis-related complications, which are often more difficult to diagnose.<sup>5</sup>

There are scanty evidence-based protocols for the management of emergency surgery in the morbidly obese. The true cost of obesity-related peri-operative complications in the UK is unknown.

### Best practice: research evidence or authoritative opinion

The body mass index (BMI) is used to classify morbidly obese patients. BMI > 40 is morbid obesity, > 50 is super obesity and > 70 is mega obesity.

Patients with a BMI > 40 and those with a BMI > 35 and co-morbidities, are candidates for bariatric surgery.<sup>6</sup>

In comparison to the normal population (including smokers), morbidly obese patients have a higher number of cardiometabolic complications like coronary heart disease, hypertension, heart failure and type 2 diabetes. Other complications include obstructive sleep apnoea, non alcoholic steatohepatitis (NASH) and gastro-oesophageal reflux.

The AAGBI have produced guidelines for the peri-operative management of morbidly obese patients requiring elective surgery.<sup>7</sup> Most of these guidelines are transferable to emergency surgery. Pre-operative assessment and optimisation is a key component in the management of risk, but can be difficult to achieve for emergency surgery. In addition, all patients should have their BMI recorded. They should be managed by senior surgeons and anaesthetists experienced in the care of morbidly obese patients.

Delays in morbidly obese patients coming to theatre, are sometimes linked to manual handling issues and manpower. All trusts should have policies and equipment for dealing with morbidly obese patients.

These patients require special consideration, good planning, early communication and action plans between multidisciplinary teams.

### Suggested indicators

- D % of patients with BMI > 40 or > 35 and co-morbidity requiring emergency surgery.
- D Age, sex, BMI, ASA.
- D Surgeons experienced with operating on obese patients.
- D Anaesthetic lead for obesity, obesity competent anaesthetists/ODPs. Imaging facilities for the morbidly obese.
- D Equipment availability—bariatric table/bed (weight limit  $\geq$  250 kg), hover mattress or similar manual handling equipment.
- D Facility for pre-oxygenation in the head up position.
- D Appropriate venous thromboembolic (VTE) prophylaxis for morbidly obese, dose and length of treatment.
- D Recovery facilities appropriate for bariatric patient.
- D % requiring HDU/ICU admission if indicated.
- D length of stay, outcomes – morbidity, mortality.

<b>Proposed standard or target for best practice</b>	<ul style="list-style-type: none"> <li>D 100% patients should have a pre-operative assessment by a senior surgeon.</li> <li>D 100% patients should have a pre-operative assessment by a senior anaesthetist, with advice from anaesthetists with experience of morbidly obese patients if required.</li> <li>D 100% patients should have operation within 24 hours of admission to hospital, preferably between 0800–2400 unless otherwise clinically indicated.</li> <li>D 100% availability of 'obesity packs' (including specific equipment, protocol guidelines and contact numbers) in emergency theatres.</li> <li>D 100% availability of protocols for VTE prophylaxis.</li> </ul>
<b>Suggested data to be collected</b>	<ul style="list-style-type: none"> <li>D Patient demographic data including BMI, ASA.</li> <li>D Incidence of OSA, OSA treated/untreated.</li> <li>D Type of surgery, timing of emergency surgery.</li> <li>D Type of manual handling device used (slide sheets/hover mattress).</li> <li>D Number of people required for manual handling.</li> <li>D Grade and specialty of senior surgeon/senior anaesthetist.</li> <li>D Grade of laryngoscopy, position for pre-oxygenation/intubation.</li> <li>D Muscle relaxant used and indication.</li> <li>D Type of surgery – open/laparoscopic.</li> <li>D Type of anaesthetic – GA/regional.</li> <li>D VTE prophylaxis specific to morbidly obese patients peri-operatively.</li> <li>D Post-operative – HDU/ICU/ward. If critical care required reason for admission.</li> <li>D Length of stay.</li> </ul>
<b>Common reasons for failure to meet standard</b>	<ul style="list-style-type: none"> <li>D Inadequate or unavailable specialist bariatric equipment.</li> <li>D Inadequately trained staff.</li> <li>D No clear local guidance or protocol.</li> </ul>
<b>Related audits</b>	<p>4.1 – Level of supervision during out-of-hours and emergency cases  4.2 – Timing of emergencies on the 24-hour clock  4.4 – Management of the emergency laparotomy</p>
<b>CPD and Curriculum mapping</b>	<p>CPD matrix codes: <b>II05, 2A03, 2A07, 3A2I</b>  Training curriculum competences: <b>Annex D page D-18 (GU_HS_03)</b></p>
<b>References</b>	<ol style="list-style-type: none"> <li>1 Ezzati M et al; Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. <i>Lancet</i> 2002;<b>360</b>:1347–1360.</li> <li>2 Picot J et al. The clinical effectiveness and cost effectiveness of bariatric surgery for obesity. A systematic review and economic evaluation. <i>Health Technol Assess</i> 2009;<b>13(41)</b>:1–190,215–357,iii-iv.</li> <li>3 Cook TM et al. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia. <i>Br J Anaesth</i> 2011;<b>106(5)</b>:617–631.</li> <li>4 Kakarla VR et al. Are laparoscopic bariatric procedures safe in superobese (BMI <math>\geq</math>50 kg/m<sup>2</sup>) patients? An NSQIP data analysis. <i>Surg Obes Relat Dis</i> 2011;<b>7(4)</b>:452–458.</li> <li>5 Herrera MF et al. Diseases and problems secondary to massive Obesity. <i>Eur J Gastroenterol Hepatol</i> 1999;<b>11(2)</b>:63–67.</li> <li>6 NICE issued guidance on surgery for morbid obesity. <i>NICE</i>, 2002/041 (<a href="http://www.nice.org.uk/newsroom/pressreleases/pressreleasearchive/pressreleases2002/2002_041_nice_issues_guidance_on_surgery_for_morbid_obesity.jsp">http://www.nice.org.uk/newsroom/pressreleases/pressreleasearchive/pressreleases2002/2002_041_nice_issues_guidance_on_surgery_for_morbid_obesity.jsp</a>).</li> <li>7 Peri-operative management of the morbidly obese patient. <i>AAGBI</i>, London 2007 (<a href="http://www.aagbi.org/sites/default/files/Obesity07.pdf">http://www.aagbi.org/sites/default/files/Obesity07.pdf</a>).</li> </ol>

## 4.7

# Management of patients for fractured neck of femur surgery

Dr C J Day

## Why do this audit?

Over 70,000 operations are performed annually for fractured neck of femur. These patients often have significant co-morbidities which may be overt. The mortality rate for this group at one year is 30%, of which one third is directly attributable to the surgery.

## Best practice: research evidence or authoritative opinion

Outcome is affected by age and gender but also by co-morbidity, delay to surgery and peri-operative care. There are several good quality guidelines for the peri-operative care of these patients that rely on variable evidence from good quality studies to expert opinion. The most important step is the realisation that outcome can be improved by a systematic approach that increases their priority. In effect, designing a specialised service that encourages efficient preparation for surgery and timely operation by appropriate staff.

## Suggested indicators

- D In hospital (and 30 day) mortality.
- D Time to surgery.
- D Cancellation from operating list – and reason why.
- D Pre-operative fasting time.
- D Timing of surgery within standard NCEPOD 'safe operating hours'.
- D Pain scores prior to surgery, and post-operatively.
- D Hospital length of stay (or until 'ready for discharge' depending on perspective).
- D Anaesthesia performed or supervised by an anaesthetist experienced in anaesthesia in older people.
- D Type of anaesthesia.
- D Post-operative oxygen prescription.
- D Compliance with local thromboprophylaxis policy.
- D Major in-hospital complication (MI, pneumonia, LVF etc).

## Proposed standard or target for best practice

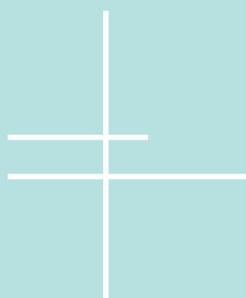
- D Recent specific attention to patients with a fractured neck of femur appears to be reducing mortality.<sup>1</sup> So auditing mortality against published results should be a start for continuing improvement.
- D Patients should be operated on within 48 hours of admission.
- D Fasting time as short as possible (consistent with local policy). There is some evidence that avoiding general anaesthesia might result in less post-operative cognitive complications. This is insufficient to be a strong recommendation but national data suggests an incidence of GA of 40%.

## Suggested data to be collected

For a hospital at an early stage in this process, it is likely to be worth spending time planning the whole service (or borrowing a plan from another hospital). However, when undertaking an audit, ideally focus on an aspect of the whole, for repeated PDSA cycles, before moving on to a different aspect.

## Common reasons for failure to meet standard

Anaesthetist may seem to have little influence over some of these outcomes. However, liaising with other disciplines and introducing changes in a limited way using a PDSA approach has produced impressive results in some centres.<sup>2</sup>



**Related audits**

4.1 – Level of supervision during out-of-hours and emergency cases

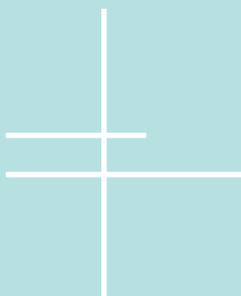
**CPD and Curriculum mapping**

CPD matrix codes: 1102, 1105, 2A03, 2G01, 3A08, 3A09, 3A10

Training curriculum competences: Annex B page B-59–60, Annex C page C-33–34, Annex D page D-23–24

**References**

- 1 SIGN Guideline 111. Management of hip fracture in older people. *Scottish Intercollegiate Guidelines Network*, June 2009 (<http://www.sign.ac.uk/guidelines/fulltext/111/index.html>).
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## 4.8

# Anaesthetic emergencies – drugs and equipment preparedness

Dr J Leedham, Dr S Patel

## Why do this audit?

Routine checks of standard anaesthetic equipment and medications have become integral to safe anaesthesia both in the UK<sup>1</sup> and worldwide. The World Health Organization's Surgical Safety Checklist has bolstered this practice.<sup>2</sup> Similar preparations for the management of anaesthetic emergencies are required, in order to prevent adverse outcomes. These emergencies are a small but significant cause of morbidity and mortality. They pose unique challenges often requiring a co-ordinated team response. It is fundamental that specific drugs and equipment, along with their protocols of use are readily available. All team members must know their location.

This is salient because of the diverse and often disparate environments within modern NHS hospitals in which anaesthesia is provided. These include A&E, delivery suites, ICU, radiology and psychiatric units. Prompt action should be taken if the specific drugs, equipment or knowledge of their whereabouts is deficient. They must be checked frequently and maintained in a state of readiness for use (see also audit 2.1).<sup>3</sup> Performing this audit regularly should help to keep all staff prepared.

## Best practice: research evidence or authoritative opinion

Various professional bodies publish management guidelines containing explicit or implicit equipment lists.

These are available online for the following emergencies respectively:

- D Association of Anaesthetists of Great Britain and Ireland (AAGBI): Malignant hyperthermia,<sup>4</sup> local anaesthetic toxicity,<sup>5</sup> anaphylaxis<sup>6</sup> and massive haemorrhage.<sup>7</sup>
- D Difficult Airway Society: Difficult airway.<sup>8,9</sup>
- D Resuscitation Council (UK): Cardiac arrest.<sup>10</sup>

Stipulation of the exact equipments required in each location is influenced by local factors and consensus, however minimum standards have been dictated by the RCoA<sup>11</sup> and AAGBI.<sup>12</sup>

## Suggested indicators

- D Existence of department lead or trainer for anaesthetic-critical incidents.
- D For each emergency stated above:
  - ◆ immediate availability of relevant drugs and equipments in all areas where anaesthesia is delivered
  - ◆ % anaesthetic team members who know the existence of these emergency drugs and equipments
  - ◆ % anaesthetic team members who know the location of these emergency drugs and equipments.
- D Locum and transitional staff's knowledge compared with permanent staff.

## Proposed standard or target for best practice

In all areas where anaesthesia is provided; all relevant staff, both locum and permanent should demonstrate 100% compliance with the proposed indicators.

## Suggested data to be collected

- D Data should be collected from each location throughout the hospital where anaesthesia is performed:
  - ◆ % of locations where emergency protocols are clearly displayed or readily available
  - ◆ inspection of current designated emergency equipment and drugs for % compliance with national or local guidelines
  - ◆ % of clinical areas with lists of 'essential' emergency equipment
  - ◆ % of clinical areas with written records of equipment checks
  - ◆ % of clinical areas with evidence of a mechanism for reporting deficiencies and restocking.
- D Anaesthetic team audited to include: anaesthetists, operating department practitioners (ODPs), anaesthetic nurses, recovery nurses and other relevant theatre staff.
- D Questionnaire asking relevant staff what emergency equipment and drugs they think exists, i.e. Dantrolene, Intralipid, difficult airway apparatus, massive haemorrhage equipment and cardiac arrest/defibrillator trolley.
- D Questionnaire asking relevant staff to specify the location if known of the above items.

### Common reasons for failure to meet standard

- D Absent or inadequate local policies.
- D Absent or inadequate equipment and drug stores.
- D Failure to communicate information to all relevant team members.
- D Inadequate induction of all team members, e.g. new trainees or locum staff.
- D Lack of familiarity with the contents and location of emergency equipment storage units, e.g. difficult intubation trolley.
- D Failure to adopt uniform layouts of equipment storage units.
- D Failure to replace used or expired emergency drugs or equipment.
- D Misplacement of emergency drugs and equipment from designated area to other locations.
- D Local consensus regarding what equipment is needed in each location is lacking.

### Related audits

2.1 – Adequacy and location of advanced airway management equipment

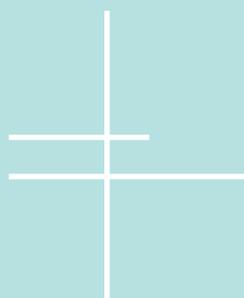
### CPD and Curriculum mapping

CPD matrix codes: 1102, 1103, 1105, 1B01–04, 2A06

Training curriculum competences: Annex B pages B-27–31, B-39–42, Annex C pages C-28–30, Annex D page D-19

### References

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- 4 Malignant Hyperthermia Crisis. AAGBI Safety Guideline. AAGBI, London 2011 (<http://www.aagbi.org/sites/default/files/MH%20guideline%20for%20web%20v2.pdf>).
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- 12 Good Practice – A guide for departments of anaesthesia, critical care and pain management. RCoA and AAGBI, London 2006 (<http://www.rcoa.ac.uk/node/360>).



## 4.9

## ICU/HDU admission after emergency surgery

Dr J Cole, Dr J Silsby

**Why do this audit?**

DH statistics show that there is evidence of ICU (level 3) and HDU (level 2) bed shortages in the UK.<sup>1,2</sup> The reason for the variation in bed availability is multifactorial and is thought to include:

- D seasonal pressures, e.g. H<sub>1</sub>N<sub>1</sub> pandemic, influenza
- D delayed discharge from ICU/HDU due to lack of ward beds
- D staffing levels.<sup>3,4</sup>

Following emergency surgery some patients will benefit from continued care and monitoring in a HDU/ICU environment. Inadequate availability of beds on the HDU/ICU may lead to:

- D delays in admission to HDU/ICU
- D prolonged stay in PACU for level 2 or level 3 care whilst awaiting a bed
- D increased requirement for inter-hospital transfers
- D increase in mortality.<sup>5</sup>

Increasing inter-hospital transfers between ICUs and HDUs supports the theory that there are insufficient beds. DoH statistics reflect the fact that the rate of inter-hospital transfers is higher during the winter months when there is more pressure on beds.<sup>6</sup>

Patients already in HDU/ICU beds may face premature discharge to make beds available. When patients are prematurely discharged (which is more common at night), there is evidence that these patients are at higher risk of a poor outcome.<sup>7</sup> NICE guidelines recommend that transfers should be avoided between 2200 and 0700 wherever possible. If they do occur then they should be documented as an adverse incident.<sup>8</sup>

Inadequate staffing levels on ICU/HDU may also lead to admission to ICU/HDU where the level of staffing would not meet recommended safe standards.<sup>3,4</sup>

By analysing the problems contributing to poor bed availability it will allow for a more accurate control of the resources used for maintaining such a service. The effectiveness of critical care service planning, especially with regard to surge (seasonal) planning,<sup>9</sup> can also be analysed.

**Best practice:  
research evidence or  
authoritative opinion**

Patients who are deemed to need continuing care in HDU/ICU should have a bed available to them. Identifying patients who would need level 2 or 3 support following emergency surgery can be done by assessments which include:

- D use of ASA, co-morbidity and surgical procedure<sup>10</sup>
- D DoH guidelines<sup>11</sup>
- D local unit guidelines.

**Suggested indicators**

The percentage of patients who have had emergency surgery and fit DoH guidelines for HDU/ICU care are:

- D sent to a general ward and are not admitted to HDU/ICU
- D inappropriately retained in recovery or theatre until an HDU/ICU bed is available
- D admitted onto a unit where the staffing levels would be considered inadequate
- D patients who have an inter-hospital transfer simply for continued care and not specifically for escalation of care
- D patients already on ICU/HDU having their level of care downgraded prematurely to facilitate further admissions to ICU/HDU.

**Proposed standard or target for best practice**

Patients who have had emergency surgery and fit DoH guidelines for HDU/ICU care should meet the following targets.

- D 0% should be sent to a general ward.
- D 0% should be retained in recovery until a bed on ICU/HDU is available.
- D 0% should be transferred to other hospitals unless it is for an escalation of care at a specialist centre.
- D 0% patients should have their level of care downgraded prematurely to facilitate further admissions.
- D 0% should be admitted onto a unit where staffing levels are inappropriate.

**Suggested data to be collected**

Denied, delayed or inappropriate admission to ICU/HDU can be analysed by collecting data from several sources including PACU, ICU/HDU and local hospital critical incident forms. Information to be collected would include:

- D inter-hospital transfer due to lack of beds
- D patients retained in PACU while awaiting critical care bed
- D premature discharge of ICU/HDU patients at inappropriate times
- D inadequate staffing levels – adverse incidence forms should allow data collection of this information.

**Common reasons for failure to meet standard**

- D Failure to recognise patients early on who will need level 2 or 3 care; inadequate use of DoH guidelines.
- D Inadequate bed numbers. Seasonal variation will impact on this.
- D Lack of general ward beds to allow timely discharge from ICU/HDU.

**CPD and Curriculum mapping**

CPD matrix codes: **2C01, 2C02, 2C07**

Training curriculum competences: **Annex B page B-51–52, Annex C page C-47–48, Annex D page D-35–37**

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