



GUIDELINES FOR THE PROVISION OF anaesthetic services

2015

The Royal College of
Anaesthetists

Introduction

Guidelines for the Provision of Anaesthetic Services (GPAS) forms the basis of recommendations produced by the Royal College of Anaesthetists for anaesthetists with managerial responsibilities for service, and for other healthcare managers. It was first published in 1994 and entitled 'Guidance for Purchasers'. It was revised under the current title in 1999, 2004 and 2009. Since 2012, it has been revised yearly, and published in electronic format only on the Royal College website. This latest version for 2015 incorporates the newest developments in clinical practice, service delivery and education.

Your input

We welcome comments and advice from clinicians and managers to enable new information obtained from audit and research to be incorporated into GPAS, so that the College's guidance reflects and supports best practice. For comments or advice please email GPAS@rcoa.ac.uk.

New for 2015

Far reaching changes to the inspection process were introduced in 2013 by the Care Quality Commission (CQC) under the leadership of Professor Sir Mike Richards, and as part of the response to the Francis Enquiry. The CQC now inspects organisations (because not all are hospitals) using five domains underpinned by standard Key Lines of Enquiry (KLOEs). The organisation must now be able to demonstrate that it is:

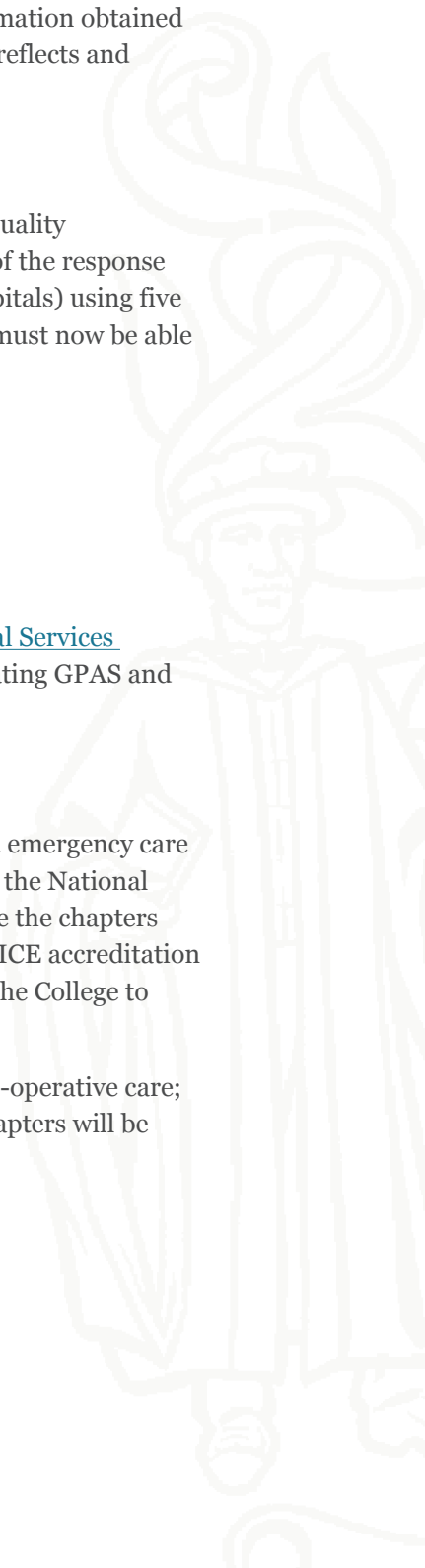
- Safe
- Effective
- Caring
- Responsive
- Well led

During the early part of 2014, each of the standards that underpin [Anaesthesia Clinical Services Accreditation \(ACSA\)](#) were mapped to one or more of these five domains, thus integrating GPAS and ACSA with the requirements laid down by the CQC.

The future

We are updating the process by which we develop the preoperative, postoperative and emergency care chapters for our guidelines so that they fulfil the standard criteria for accreditation by the National Institute for Health and Care Excellence (NICE), with the aim of applying for this once the chapters are completed. For further information about the pilot [please visit the project page](#). NICE accreditation requires a high level of evidence in recommendations, and this matches the desire of the College to promote evidence-based practice.

Other chapters that have not been updated for 2015 are: anaesthesia services for intra-operative care; acute pain management; chronic pain management and burns and plastics. These chapters will be comprehensively reviewed for 2016.



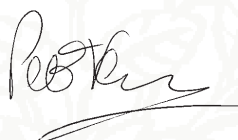
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Statement of intent

The documents below are for guidance only. They are not intended to replace the clinical judgement of the individual anaesthetist, and the freedom to determine the most appropriate treatment for individual patients in a particular place at a specific moment should not be constrained by a rigid application of this guidance.

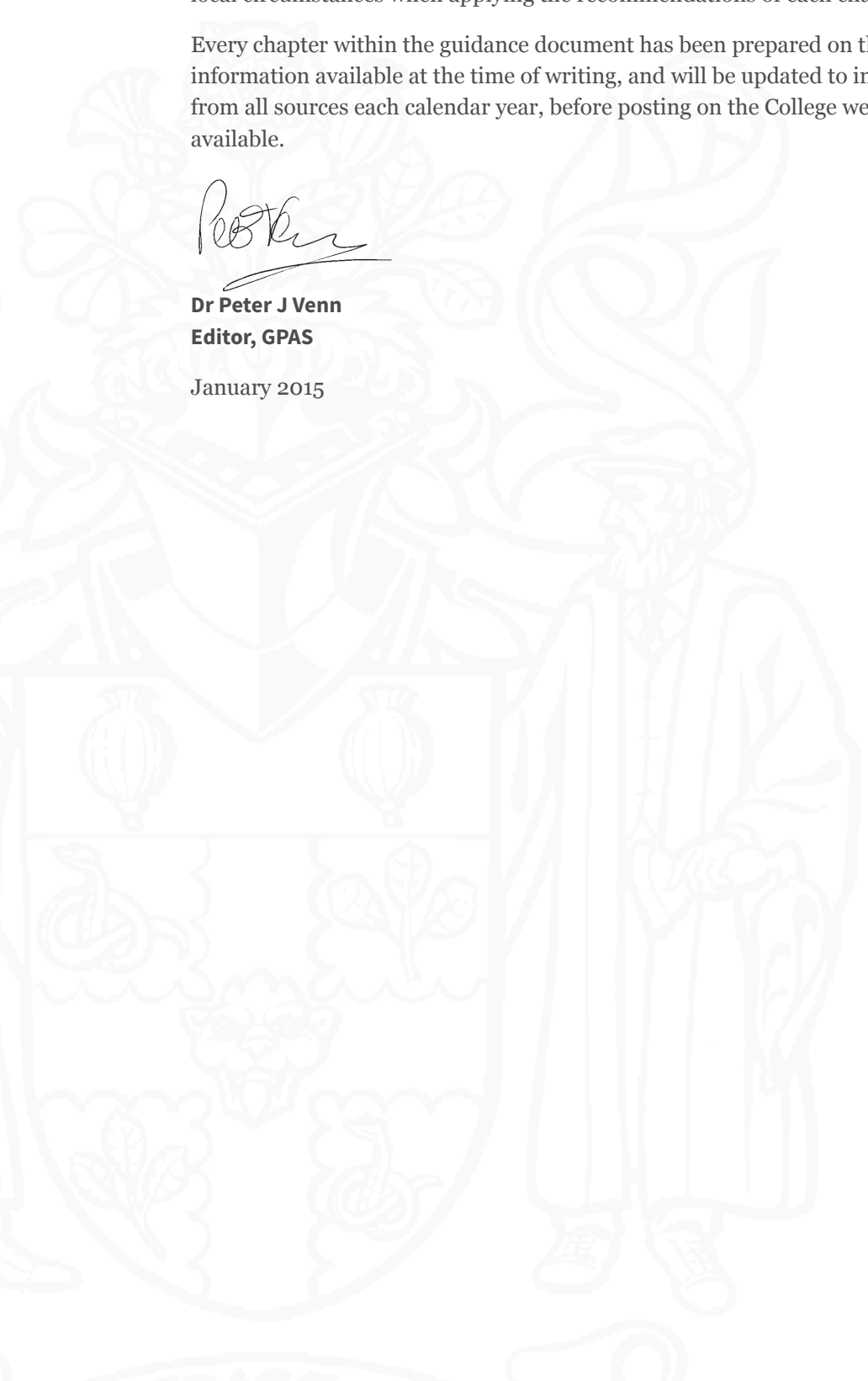
They are presented as a collection of guidance chapters, each written with best practice in mind, referenced to recommendations from national bodies. It is the view of the Royal College of Anaesthetists that it must be the responsibility of the individual reader to take into account particular local circumstances when applying the recommendations of each chapter.

Every chapter within the guidance document has been prepared on the strength of the best information available at the time of writing, and will be updated to include changes in guidelines from all sources each calendar year, before posting on the College website. Hard copies are no longer available.



Dr Peter J Venn
Editor, GPAS

January 2015



GPAS 2015 Change 1 dated 27 March 2015

Chapter 1, Page 10, Paragraph 5.5

Delete:

All consultants should participate as required in the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) and the Confidential Enquiry into Maternal and Child Health (CEMACH) and Royal College of Anaesthetists' National Audit Projects (www.nationalauditprojects.org.uk).

Insert:

All consultants should participate as required in the National Confidential Enquiry into Patient Outcome and Death (NCEPOD), the Confidential Enquiry into Maternal and Child Health (CEMACH), the National Emergency Laparotomy Audit (NELA) (www.nela.org.uk) and the Royal College of Anaesthetists' National Audit Projects (www.nationalauditprojects.org.uk).



Chapter 1

GUIDELINES FOR THE PROVISION OF anaesthetic services

Key points on the provision of anaesthesia services 2015

Author

Dr P J H Venn, Chairman, RCoA Quality Management of Service Committee

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

www.rcoa.ac.uk/gpas2015
gpas@rcoa.ac.uk

Summary

- Up-to-date directives, guidance and standards of safe specific anaesthetic practice should be referred to when considering the provision of all anaesthetic services. This includes publications from the General Medical Council (GMC) (www.gmc-uk.org), the Royal College of Anaesthetists (RCoA) (www.rcoa.ac.uk) and the Association of Anaesthetists of Great Britain and Ireland (AAGBI) (www.aagbi.org), the Academy of Medical Royal Colleges (www.aomrc.org.uk), government bodies such as the Department of Health (DH) (www.gov.uk/government/organisations/department-of-health) and its Arm's Length Bodies (www.education.gov.uk/aboutdfe/armslengthbodies) and those issued by other recognised learned societies. Most current publications and recommendations underpin the chapters that follow in this document.
- All patients undergoing anaesthesia must be under the care of a consultant anaesthetist, whose name is recorded as part of the anaesthetic record. An appropriately trained and experienced anaesthetist must be present throughout the conduct of all general and regional anaesthesia for operative procedures, including those procedures requiring intravenous sedation.¹ All non-consultant anaesthetists should be appropriately supervised.²
- Anaesthetists should never work beyond the level of their skill and knowledge, and departments should ensure that each job plan ensures patient safety first at all times. Staff with suitable skills should always be available to help with the case mix of patients at all times.
- All patients requiring the services of an anaesthetist must undergo appropriate pre-operative assessment and be seen by a member of the anaesthetic team before any procedure.¹
- All patients should be allowed to participate in decisions about their care, and given an opportunity to make choices where appropriate.
- Dedicated skilled assistance for the anaesthetist must be provided in every situation where anaesthesia and sedation are administered.³
- Appropriately trained and competent staff must provide care for all patients recovering from anaesthesia or sedation.^{1,3}
- All anaesthetic and monitoring equipment must comply with standards set by the AAGBI.¹
- All anaesthetic equipment must be fully serviced at the regular intervals designated by the manufacturer, and a service record must be maintained. All equipment should be checked by the user before use.⁴

1 Immediate post-anaesthesia recovery. AAGBI, London 2013 (<http://bit.ly/1eU6yIz>).

2 PA(A) supervision and limitation of scope of practice (May 2011 revision). RCoA, London 2011 (www.rcoa.ac.uk/node/1927).

3 The anaesthesia team 3. AAGBI, London 2010 (<http://bit.ly/1m043nw>).

4 Checking anaesthetic equipment. AAGBI, London 2012 (<http://bit.ly/1fsVhLG>).

- Departments of anaesthesia must contribute to an acute pain relief service and either have or provide access to a non-acute ('chronic') pain service with nominated lead consultants for each.⁵
- Where inter-hospital transfers require an anaesthetist, appropriately trained staff, dedicated equipment and satisfactory safety and personal insurance arrangements must be in place.⁶
- Departmental guidelines facilitating good anaesthetic practice in accordance with good medical practice and recent national guidance should be in place, observed, regularly reviewed and issued to all members of the anaesthetic department.⁷
- Anaesthetic records should contain the minimum recommended dataset.^{7,8}
- There must be effective mechanisms for the 'handover' both of the care of individual patients, and of overall services, providing continuity of care.⁹ Handover of drugs therapy is particularly important.¹⁰
- Appropriate and sufficient secretarial, administrative and information technology support must be provided for staff working in departments of anaesthesia.^{8,11}
- Appropriate facilities and suitable office accommodation must be available for all anaesthetists.¹²
- Continuing professional development and revalidation are mandatory requirements for all anaesthetists, including non-consultant and non-training grades.⁹ Employers, trusts or otherwise, should ensure that adequate funding and time are available for this purpose.^{7,13}
- All staff in clinical contact with patients must be appropriately trained in resuscitation skills and maintain their competence in them.¹⁴

5 Pain management services: good practice. *RCoA and BPS*, London 2003 (archived – copy available from The Faculty of Pain Medicine on request).

6 Interhospital transfer. *AAGBI*, London 2009 (<http://bit.ly/1gMDofV>).

7 The good practice guide. A guide for departments of anaesthesia, critical care and pain management (3rd edition). *RCoA and AAGBI*, London 2006 (www.rcoa.ac.uk/node/1470).

8 Information management: guidance for anaesthetists. *AAGBI and RCoA*, London 2008 (www.rcoa.ac.uk/node/2271).

9 Good Medical Practice. *GMC*, London 2013 (<http://bit.ly/1eI7lrw>).

10 Keeping patients safe when they transfer between care providers – getting the medicines right. Good practice guidance for healthcare professions. *RPS*, London 2011 (<http://bit.ly/1dkijld>).

11 Department of anaesthesia: secretariat and accommodation. *AAGBI*, London 1992 (www.aagbi.org/sites/default/files/depsec92.pdf).

12 Living and working conditions for hospital doctors in training (HSC 2000/036). *DH*, London 2000 (archived) (<http://bit.ly/1gtPqIj>).

13 Continuing professional development: guidance for doctors in anaesthesia, intensive care and pain medicine. *RCoA*, London 2013 (www.rcoa.ac.uk/node/1922).

14 Advanced life support (6th edition). *RC(UK)*, London 2011 (www.resus.org.uk/pages/pub_ALS.htm).

Key points on the provision of anaesthesia services 2015

- Workload, experience and supervision of trainee staff must satisfy the requirements of the RCoA and AAGBI, and training standards must satisfy GMC requirements.^{15,16,17,18}
- A College tutor representing the Royal College of Anaesthetists or consultant-in-charge of training must be appointed to organise and co-ordinate anaesthetic training. Dedicated time and administrative support should be provided for this activity, and a second tutor is recommended for larger departments.¹⁹
- Trainee rotas must be compliant with recommendations from NHS Employers for trainees and Working Time Directive (WTD) regulations without having a deleterious effect on medical training.^{20,21,22}
- Regular audit and review by departments of anaesthesia to measure activity and to quality assure anaesthetic practice and performance against national standards are essential.⁷
- All members of the anaesthetic team should participate in the national anaesthetic audits projects and must contribute to confidential enquiries. Where possible information should be provided for other national and local audits.^{9,23,24}
- Departments of anaesthesia must identify a consultant who is responsible for ensuring that all lists are covered by suitably trained anaesthetists. This consultant should be part of a theatre management group to facilitate optimal theatre efficiency.⁷
- The anaesthetic department must have a clinical director or lead clinician who is an anaesthetist, and appoint lead clinicians who are responsible for essential components of the service. This work must be recognised in the consultants' job plans.⁷
- A critical incident reporting system must be in place and a critical incident co-ordinator appointed. Regular audit, critical incident, morbidity and mortality and managerial meetings should be held and appropriately recorded.⁷
- Adequate arrangements, including time for preparation of documentation, must be made for annual appraisal and revalidation of all anaesthetists.^{7,9,25,26}

15 The CCT in Anaesthesia. RCoA, London 2010 (www.rcoa.ac.uk/node/230).

16 Generic Standards for Training. GMC, London 2010 (<http://bit.ly/1m7PBQj>).

17 Guidance on the supervision of non-consultant anaesthetists. AAGBI and RCoA, London 2008 (www.rcoa.ac.uk/node/1836).

18 Curran JP. Consultants provide supervision. RCoA Bulletin 2005;34:1724 (www.rcoa.ac.uk/node/7691).

19 College Tutor roles and responsibilities. RCoA, London 2011 (www.rcoa.ac.uk/node/2043).

20 Review of Junior Doctors' contract. NHSE, London 2012 (<http://bit.ly/Mca72d>).

21 European Council Directive 93/104/EC. EUR-Lex, 1993 (<http://bit.ly/1boLTNS>).

22 Working Time Directive – implications and practical suggestions to achieve compliance. RCoA and Roy Col Surg Engl, London 2009 (www.rcoa.ac.uk/node/2288).

23 National Confidential Enquiry into Patient Outcome and Death. NCEPOD, London (www.ncepod.org.uk).

24 Confidential Enquiry into Maternal and Child Health. Replaced in 2013 by Mothers and Babies: reducing the risk through audits and confidential enquiries across the UK (MBRRACE-UK) (www.npeu.ox.ac.uk/mbrpace-uk).

25 Terms and conditions of service for Specialty Doctors (England). NHSE, London 2008 (<http://bit.ly/1bWXDox>).

26 Raising the standard: information for patients. RCoA, London 2003 (www.rcoa.ac.uk/node/2136).

- There should be a mechanism to ensure a continuous programme of quality improvement following audits and adoption of national guidelines.
- A system must be in place for dealing effectively with complaints.^{2,7,27}
- All patients undergoing procedures should be provided with easily understood information materials covering anaesthesia and post-operative pain relief. Preferably they should receive this before they are admitted to hospital, or on admission if this has not been possible.^{7,8}

Introduction

Departments of anaesthesia must provide adequately staffed, safe and high quality services in any location where an anaesthetist provides anaesthesia or sedation. The main areas of responsibility are:

- **Provision of anaesthesia for in-patient surgery, both emergency and elective.** The service encompasses not only intra-operative care, but also pre-operative assessment and preparation of patients, post-operative care, and pain relief.
- **Provision of anaesthesia for out-patient or day surgery.** This will include the selection of suitable patients using medical and social criteria, the choice and planning of suitable facilities and techniques, and the provision of post-operative care and support.
- **Anaesthesia for obstetric services.** This includes antenatal advice and information, analgesia during and following childbirth, the provision of anaesthesia when needed, the provision of resuscitation skills and care for those mothers requiring critical care.
- **Anaesthesia services in critical care.** In all hospitals providing acute medical and surgical services there must be access to an appropriate critical care facility. This should have full-time medical cover and be sufficiently comprehensive to serve the needs of the local population, so that transfer of patients, once treatment has been started, is exceptional.
- **Provision of a pain relief service.** This includes services for the relief of acute pain and either provision of, or access to, a service for the management of non-acute ('chronic') pain.
- **Participation in adult resuscitation services.** The ability to resuscitate patients is a fundamental part of any anaesthetic service.
- **Anaesthesia and resuscitation services provided for children.** The provision of anaesthesia for generalist and specialist surgery such as cardiothoracic, neurosurgical, and transplant procedures may involve treating children, and appropriate standards similar to those for adults are required.
- **Provision of anaesthetic services in non-theatre environments.** This includes sites where anaesthesia is administered for electroconvulsive therapy (ECT), imaging services, endoscopy, community dentistry, the provision of anaesthesia in the emergency department, and for inter-hospital transfers. Anaesthetists also frequently participate in the teaching and training of other hospital staff in topics related to anaesthesia, including the use of equipment, resuscitation, practical procedures, pain management, and the recognition and management of critically ill patients.

27 The NHS Complaints procedure. *NHS Choices*, London (<http://bit.ly/18zciXt>).

- Anaesthetists also play a pivotal role in the management of theatre efficiency, and should be represented on theatre users committees.

Levels of provision of service

1 Staffing requirements

- 1.1 An appropriately trained and experienced anaesthetist must be present throughout the conduct of all general and regional anaesthesia for operative procedures, including those procedures requiring intravenous sedation, where these have been agreed to be provided by the anaesthetic department.¹
 - 1.2 An anaesthetist must be physically present with the patient whilst administering a general anaesthetic. If, in exceptional circumstances, for example where urgent treatment for another patient requires the anaesthetist to leave the patient, they must delegate responsibility to another appropriate person in line with GMC guidance on delegation.⁹
 - 1.3 The anaesthetic service for emergency activity, including surgery, must be provided by a competent anaesthetist who is either a consultant, or a non-consultant with appropriate skills and unimpeded access to a consultant for supervision.
 - 1.4 Departments of anaesthesia must ensure that a named supervisory consultant is available to all non-consultant anaesthetists, and that those whom they are supervising know their identity, location and how to contact them.^{7,17} The name of the supervisory consultant should be recorded on the anaesthetic record.
 - 1.5 Departments of anaesthesia must designate lead consultants to specific areas of practice where relevant. These include obstetrics, paediatrics, care of the elderly and obesity.²⁸ Where sub-specialty anaesthetic services are also undertaken, a lead must also be appointed for each.
 - 1.6 In hospitals receiving patients with major injury and trauma, there must be a sufficient number of appropriately experienced medical and non-medical staff to provide a 24-hour emergency service.
 - 1.7 A robust mechanism should be in place to cover for staff absences and local guidance must detail procedures that guarantee appropriate skills where the appointment of a locum anaesthetist is needed.
 - 1.8 Consultant work plans should reflect the additional responsibilities of training and direct supervision of trainees who work on full or partial shifts.
 - 1.9 All consultants and specialty doctors must have a job plan that is reviewed and agreed annually.
 - 1.10 All staff must have regular annual appraisal, and be provided with time for the preparation required for this and GMC revalidation.
- Physicians' Assistants (Anaesthesia) (PA(A))**
- 1.11 It remains the responsibility of those leading departments of anaesthesia, together with their constituent consultants, to ensure that PA(A)s work under the supervision of a consultant anaesthetist at all times as required by the RCoA.² A named consultant must have overall responsibility for the care of the patient at all times.

28 Guidelines on Managing the Obese Surgical Patient. Joint document from Association of Anaesthetists of Great Britain and Ireland (AAGBI) and the Society of Obesity and Bariatric Anaesthesia (SOBA). AAGBI, London 2014 (in press).

- 1.12** It is recommended that PA(A)s have a period of induction and a programme of continuing professional development led by a local clinical lead.²⁹

Pre-operative staffing

- 1.13** All patients undergoing a procedure requiring anaesthesia must be seen by an anaesthetist beforehand on the day. This visit should ideally be carried out by the anaesthetist who will administer the anaesthetic. Local pre-admission procedures and written information do not replace the final pre-operative meeting between anaesthetist and patient.
- 1.14** An anaesthetic pre-assessment service must involve consultant anaesthetists. Adequate medical, nursing and administrative staffing resources are essential for the efficient running of pre-operative anaesthetic assessment clinics for day surgery.

Anaesthetic assistance

- 1.15** The provision of qualified and competent assistance is mandatory in every situation where anaesthesia is administered.
- 1.16** The anaesthetic assistant must be immediately available and provide dedicated assistance to the anaesthetist throughout the entire anaesthetic procedure.

Post-operative staffing

- 1.17** Until patients can maintain their airway, breathing and circulation they must be cared for on a one-to-one basis by competent and appropriately trained recovery staff.
- 1.18** Sufficient numbers of recovery staff must be present until a patient is discharged to the ward.
- 1.19** Adequate provision should be made for a member of the anaesthetic team to visit certain groups of patients within 24 hours following their operation, or longer if necessary. Specific details can be found in Guidance on the provision of anaesthesia services for post-operative care.

2 Equipment, support services and facilities

Equipment

- 2.1** All equipment used to provide anaesthesia, including monitoring equipment, should comply with the recommendations of the AAGBI.³⁰ Health and Safety principles must be observed and compliance with Control of Substances Hazardous to Health (COSHH) (www.hse.gov.uk/coshh) regulations ensured.
- 2.2** Equipment must be serviced regularly and maintained to a standard of safe working order, checked by users, with records kept of maintenance and checking of function.

Support services

- 2.3** Wherever general and regional anaesthesia is administered there must be access to an appropriate range of laboratory and radiological services.
- 2.4** All hospitals should provide appropriate services for the relief of pain. Acute pain teams, primarily managing pain after surgery, may have wider roles including liaison with outreach and critical care staff. They also need the support of appropriately trained recovery, ward and other support staff to maintain continuity.

²⁹ Continuing Professional Development Guidance. *APA(A)*, London 2012 (<http://bit.ly/1dCYOuv>).

³⁰ Recommendations for standards of monitoring during anaesthesia and recovery. *AAGBI*, London 2007 (<http://bit.ly/1gbB7aS>).

- 2.5** Departments of anaesthesia require an appropriate level of secretarial and administrative assistance to release anaesthetists from clerical tasks, to maintain an organisational base and to contribute effectively to theatre efficiency. The level of support is dependent upon the number of consultants and clinical and administrative activity, but local requirements for such support must be acknowledged and provided by the employing organisations.
- 2.6** Departments of anaesthesia must have adequate information technology support to enable immediate access to the electronic patient data, theatre lists and schedules and staffing rotas. In large and complex departments consideration should be given to electronic rota management so that human resources can be released for other important administrative or clinical tasks related to the day-to-day running of the department and patient care.

Guidelines

Departmental guidelines for all areas of anaesthetic practice, locally determined in accordance with national guidelines, should be established, followed, regularly reviewed and disseminated to the anaesthetic department staff including every new member.

Facilities

- 2.7** Patients leaving the operating theatre will require specific care in a recovery facility located preferably in the theatre complex. Further details are available in [Guidance on the provision of anaesthesia services for postoperative care](#).
- 2.8** Specific facilities are required for children.
- 2.9** Adequate facilities must be available for all staff to take rest breaks, and access refreshments.
- 2.10** Departments of anaesthesia are amongst the largest in the hospital. Staff need accommodation for confidential interviews, teaching and educational activities, provision of books, current medical literature, and information technology including computing and internet access.
- 2.11** When staff are required to be resident or working out-of-hours in the hospital, living and working conditions should meet at least the minimum nationally agreed standards. These include study and rest accommodation, and access to good quality hot and cold food at any time.

3 Areas of special requirement

- 3.1** Specialist services requiring anaesthesia input, for example, provision of anaesthesia for children, critical care, resuscitation, obstetrics and chronic pain, have unique requirements. These are dealt with in later chapters of this document.

4 Training and education

Continuing professional development (CPD) and revalidation

- 4.1** It is a professional obligation of all members of the anaesthetic team to take part in and demonstrate evidence of CPD. This underpins the GMC's revalidation process and the concept of appraisal.^{7,9,13}
- 4.2** A department of anaesthesia cannot be approved for training unless a majority of the consultant anaesthetists are up to date with CPD.
- 4.3** CPD activities will include attendance at local, regional and national educational meetings, access to journals and the scientific literature, and use of e-learning programmes. Supporting professional activity time should be protected, and evidence that it has been properly utilised should be available at appraisal. Study leave must be properly funded and educational opportunities provided within the hospital.

- 4.4 Departments are expected to allocate time for morbidity and mortality, audit and education at a time when attendance can be maximised, including that of trainees. It is expected that this time will be during the working week.

Arrangements for trainee anaesthetists

- 4.5 The duties, working hours and supervision of trainees must be consistent with the delivery of high quality safe patient care.¹⁶
- 4.6 Trainee rotas must be compliant with the Working Time Directive (WTD). It is essential that trainee rotas are designed to maximise training opportunities within the time constraints of these directives.
- 4.7 Postgraduate training in anaesthesia, intensive care and pain management must be quality managed locally in accordance with arrangements laid down by Health Education England (HEE), working with the guidance of the Royal College of Anaesthetists, Faculty of Pain Medicine, Faculty of Intensive Care Medicine and specialty associations.
- 4.8 All doctors undertaking the role of trainer must be compliant with the arrangements for recognition laid down by the GMC.³¹
- 4.9 Training is delivered by departments of anaesthesia working within a school of anaesthesia. The clinical directorate for anaesthesia within each hospital is responsible for delivering in-service training in accordance with curricula developed by the RCoA and agreed by the GMC. The educational facilities, infrastructure and leadership must be adequate to deliver the approved curriculum.
- 4.10 Hospitals within a school will generally be expected to offer experience and training in anaesthesia for elective and emergency general surgery, urology, trauma and orthopaedics, obstetrics and gynaecology, ENT and oral surgery, day case surgery and surgery for children excluding neonates. In addition, experience in pain management, resuscitation techniques and intensive care medicine should be provided. Experience in emergency medicine will require an accident and emergency department, which is staffed and operational 24 hours a day.
- 4.11 All staff, including trainees and locums, must be supported to acquire the necessary skills and experience through induction, effective educational supervision, an appropriate workload, and time to learn.
- 4.12 A consultant must be responsible for every trainee.
- 4.13 Every trainee must have a named educational supervisor.
- 4.14 Regular trainee assessment and appraisal are essential. These are performed by the consultant staff and educational supervisors and usually led by the College tutor. Appropriate time and administrative resources must be allocated for this.
- 4.15 The teaching and acquisition of technical anaesthetic skills takes time, and teaching lists may need to take this into account when scheduling surgical throughput.

The College Tutor

- 4.16 Training is led by Royal College of Anaesthetists appointed College Tutors (CTs) who are responsible for the training and assessment arrangements in their hospitals. It is not expected that the CT will deliver personally all aspects of training and supervision, but rather that the CT will ensure that training is properly organised, delivered and accessible by the trainees. It is not a requirement of the College for CTs to take responsibility for the recruitment of trainees.^{18,19}

31 Recognising and approving trainers: the implementation plan. GMC, London 2012 (<http://bit.ly/1BMiidv>).

- 4.17 Many of the responsibilities of the CT underpin clinical governance and clinical risk management in the trust to the benefit of the entire organisation. Adequate time and administrative resources must be allocated within the job plan of the College Tutor.
- 4.18 CTs must be trained in the techniques of appraisal and assessment.
- 4.19 Whilst the day-to-day responsibility for training rests with the CT, the quality of trainees' clinical work is the responsibility of the clinical director.
- 4.20 In a hospital where there are no trainees, a College Tutor should still be appointed to represent Royal College guidance in quality improvement and service delivery.

Consultant and SAS/specialty doctor trainers

- 4.21 Clinical supervision, training and workplace-based assessments must be provided by consultants or SAS/specialty doctor grades who are recognised RCoA trainers within the department of anaesthesia.
- 4.22 Those involved in training must take necessary steps to acquire the skills of a competent teacher, and maintain their CPD requirements for the appraisal process and to the satisfaction of the GMC and the RCoA.

Other teaching arrangements

- 4.23 All departments of anaesthesia must organise programmes of educational activities. These will include lectures and tutorials on relevant topics, meetings and seminars on such matters as mortality and morbidity, critical incident reporting, clinical audit, research and journal review clubs. Interdisciplinary meetings should be organised where appropriate. It is expected that such meetings will take place during the working week of the department.
- 4.24 Instruction of foundation year doctors in the pre-operative preparation of patients for surgery, resuscitation techniques and basic critical care principles is commonly undertaken by departments of anaesthesia. Departments are also often involved in training of medical students in the principles of anaesthesia and resuscitation, and basic clinical skills, including fluid management and pain relief. Adequate time needs to be allocated to those arranging such training.
- 4.25 Anaesthetists provide a wide range of training for non-medical hospital staff, including nurses, midwives, anaesthetic assistants and paramedics. For those anaesthetists who undertake such teaching, adequate time for preparation and delivery is essential.
- 4.26 All hospital staff and those in clinical contact with patients must be trained in at least basic resuscitation skills, so that the initiation of resuscitation is not unduly delayed while awaiting the arrival of staff trained in advanced life support. All members of the anaesthetic team in clinical practice should be trained to appropriate levels in resuscitation, including paediatrics if necessary. Such training has to be repeated at predefined intervals, and should be documented. Resuscitation training officers should supervise this process.

5 Research and audit

Research

- 5.1 Innovation and improvement in anaesthetic practice for the benefit of patients are facilitated by research. Audits and similar practices cannot replace the fundamental purposes of research, which requires sufficient time and resources.
- 5.2 An understanding of the scientific basis of anaesthetic practice is essential for all anaesthetists and research is regarded by the RCoA as integral to the development of anaesthesia, intensive care and pain management. Trainees from intermediate level onwards require experience in research methods. Even if separate time is not allocated, the concepts identified for the CCT should be fundamental to the education of trainees at these stages of training.¹⁵
- 5.3 All research must be managed in accordance with the Department of Health Research Governance Framework and research governance requirements of their employing organisation. Anaesthetists must comply with the GMC Good Medical Practice guidance when undertaking research.⁹

Audit

- 5.4 All doctors must take part in regular systematic audit and departments of anaesthesia must support this.^{7,9}
- 5.5 All consultants should participate as required in the National Confidential Enquiry into Patient Outcome and Death (NCEPOD), the Confidential Enquiry into Maternal and Child Health (CEMACH),^{23,24} the National Emergency Laparotomy Audit (NELA) (www.nela.org.uk) and the Royal College of Anaesthetists' National Audit Projects (www.nationalauditprojects.org.uk).
- 5.6 Audit of all areas of anaesthetic practice requires time and incurs a financial cost, for which a budget is necessary. It should include critical incident reporting, risk management and outcome measures.
- 5.7 Hospital data collection systems are an essential support tool in providing the information required for audit, and must be in place and regularly updated to the highest standards of current technology.
- 5.8 The RCoA's audit 'recipes' provide templates to plan audit programmes.³²
- 5.9 As part of audit, patients' attitudes and comments about the anaesthetic service should be sought, and 360 degree feedback including patients is a necessary part of the process of appraisal for revalidation with the GMC.
- 5.10 There should be a robust system for departmental review of national patient safety guidelines and audits that affect clinical practice. Departments should implement recommendations such as those from NCEPOD and others as part of quality improvement initiatives, and audit compliance.
- 5.11 Ongoing audits should feed into a programme of continuous quality improvement that is centred around the needs of the patient.

32 Raising the standard: a compendium of audit recipes (3rd Edition). RCoA, London 2012 (www.rcoa.ac.uk/node/8622).

6 Organisation and administration

6.1 Departments should study the recommendations from the Academy of Medical Royal Colleges about waste and sustainability, and introduce mechanisms to reduce waste.³³

6.2 Every department should have a written policy in place that takes account of local circumstances to ensure the effective and economic use of anaesthetic resources in terms of:

- staffing
- equipment
- consumables such as drugs and disposable devices.

Lead clinicians in anaesthesia

6.3 Departments of anaesthesia must have a clinical services director (CSD), head of department or lead clinician who is an anaesthetist.

6.4 The lead clinician or CSD is accountable to the chief executive but cannot function without the support of consultant and other colleagues and must therefore be acceptable to them.

6.5 The lead clinician or CSD is responsible for staff management, including management of leave, job planning, management of poorly performing doctors and equitable distribution of work within the department sufficient to cover the service. They are also responsible for ensuring adequate resources, maintaining good communications, both within the department and between the department of anaesthesia and the wider trust network, and for ensuring guidelines are in place and regularly reviewed.

6.6 The lead clinician or CSD should be supported by, and work closely with, business and nurse managers, as well as having ready access to specialist managers in such areas as finance and human resources.

6.7 The lead clinicians or CSD should have a separate contract for this part of their work, working with an agreed job description. Adequate time must be available and they should receive appropriate administrative and information technology support to fulfil their roles effectively for the hospital.

6.8 Named consultants should also be appointed who are responsible for the individual components of the service, such as critical care, obstetric anaesthesia, acute and non-acute pain services, care of the elderly, paediatrics and day surgery. Lead clinicians for these components of the anaesthetic service should ensure that communication is managed in a way that meets the needs of appropriate confidentiality, protects the needs of patients and maintains the efficiency of the overall service.

6.9 Other essential roles that may need further delegation within the department of anaesthesia include pre-operative assessment, major incident planning, rostering and management of leave, equipment, reduction of waste, information technology, audit, clinical governance, transfusion, continuing medical education and professional development and training.

Theatre efficiency

6.10 The organisation of theatre services must match the needs of patients and take into account availability of surgeons, anaesthetists, nurses and paramedical staff. This will include 24-hour availability of an emergency theatre service to minimise the need to use out-of-hours services for situations other than true emergency surgery.

33 Protecting resources, promoting value: a doctor's guide to cutting waste in clinical care. *AoMRC*, London 2014 (<http://bit.ly/1ul13t4>).

- 6.11** Those managing the anaesthetic service should co-operate and communicate with surgical and other directorates to optimise the treatment of patients and encourage best use of available facilities.
- 6.12** Optimal theatre efficiency may be facilitated with the support of appropriate planning and management, diagnostic tools, information technology, human resources and service redesign, and implemented by a theatre management group. Anaesthetists must play a key role in this process, to ensure clear communication between all the managerial and clinical staff involved in daily running of theatres.^{34,35}
- Human resources, job planning and staff management**
- 6.13** All consultants, associate specialists and specialty doctors must participate in job planning.^{7,25,34,35,36}
- 6.14** All doctors must undertake an annual appraisal.^{7,9}
- 6.15** A number of anaesthetists also undertake local, regional and national duties in the fields of education, research and administration. This may occasionally involve them being away from their clinical duties on periods of professional leave. Such activities have the mutual benefit of forming part of CPD and aiding the development and running of the wider NHS.³⁷ These activities should be reflected in job planning and appropriate staffing levels.

7 Patient information

- 7.1** Patients have a right to information about their condition and the treatment options available to them, and all doctors have a duty to inform patients in sufficient detail about these options.⁹
- 7.2** Patients should be provided with adequate information about anaesthesia, pain relief and any other services provided by anaesthetists so that they can make informed decisions about their treatment and care. Patients should be given adequate time to consider the options available to them and make appropriate decisions about their care. However, information is conveyed, it is a duty of the anaesthetist administering the anaesthetic to explain what is proposed in order to satisfy the requirements for informed consent to anaesthesia.
- 7.3** Leaflets and internet-based material are written and updated under The Lay Committee of the RCoA, and by the AAGBI, and are a useful source of information for patients undergoing anaesthesia.³⁸

34 Theatre efficiency. Safety, quality of care and optimal use of resources. *AAGBI*, London 2003 (<http://bit.ly/1dCZ6kX>).

35 Health Acute Hospital Portfolio: Operating theatres – review of national findings. *Audit Commission*, London 2003 (<http://bit.ly/1bWXRfr>).

36 A UK guide to job planning for specialty doctors and associate specialists. *NHSE*, London 2012 (<http://bit.ly/LUECsP>).

37 Anaesthetists undertaking wider NHS work. CMOs letter to NHS employers and supporting statement from *RCoA*, *AAGBI*, *FPM* and *FICM*. *RCoA*, London 2013 (www.rcoa.ac.uk/node/11410).

38 Information about anaesthesia. *RCoA*, London (www.rcoa.ac.uk/node/3321).

Chapter 2

GUIDELINES FOR THE PROVISION OF anaesthetic services

ACSA REFERENCES

2.1.1	2.5.2
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Anaesthesia services for pre-operative assessment and preparation 2014

Authors

Dr K Jones, Torbay Hospital
Dr M Swart, Torbay Hospital
Dr W Key, Torbay Hospital

Approved by the Preoperative Association

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for pre-operative assessment and preparation 2014

Summary

A comprehensive pre-operative assessment and preparation service is fundamental to high quality, safe practice. The service is part of the responsibility of the anaesthetist as peri-operative physician. The goal is to ensure an excellent patient and family centered experience with shared or collaborative decision-making embedded. Appropriate education and professional development for staff should be available and training in pre-operative assessment and assessment of competence is now important in this specialist area. This service is an integral part of the anaesthetic pathway and should be fully funded.

There are two main components to pre-operative assessment and preparation. The traditional component is based primarily on the provision of a safe and appropriate anaesthesia. This is primarily a safety check and patient communication process most often carried out on the day of surgery by the anaesthetist involved in the case. A more recent development is the concept of the anaesthetist as the peri-operative physician and it is in this capacity that the second component is undertaken. It is now broadly accepted that there is a need to assess the chance of harm and benefit afforded by any surgical or anaesthetic intervention and this information should be communicated to the patient. This should facilitate the collaborative decision making process which will lead to the selection of appropriate intra-operative and post operative care that takes into account the patient's preferences and values.

- Pre-operative care is the responsibility of an inter-professional team which should include pre-operative nurses, anaesthetists, surgeons and pharmacists.
- There are two main components; assessment and preparation:
 - ▼ Assessment should consist of establishment of rapport with the patient followed by the gathering of standardised information, diagnosis, and the identification and management of safety issues relevant to that individual patient.
 - ▼ Preparation includes optimisation, giving essential information, collaborative decision-making and patient choice.
- Most patients undergoing elective surgery should attend a pre-operative assessment and preparation clinic.¹⁻² Healthy patients having minor day-case surgery can in certain circumstances have telephone assessments.
- Patients admitted as emergencies should undergo an equivalent process before anaesthesia is induced.
- Pre-operative assessment should take place as early as possible in the patient's care pathway so that all essential resources and obstacles can be anticipated before the day of the operation, including discharge arrangements.²
- In the case of emergency and urgent surgery, assessment should take place as early as possible.³
- Before undergoing an operation that requires general or regional anaesthesia all patients should have a preoperative visit by an anaesthetist, ideally the person who will actually administer the anaesthetic.¹
- The general practitioner has a role to play by ensuring that patients are 'fit for referral' and by initiating the collaborative decision-making process.⁴⁻⁵

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- The secondary care clinic should be led by nurses predominantly or other extended role practitioners using agreed protocols and with support from an anaesthetist.
- Sufficient consultant anaesthetic sessions should be provided to allow either a review of the medical notes or consultations between senior anaesthetists and patients at increased risk of mortality and morbidity (>1 in 200 risk of dying) and a facility for patients at greatest risk (>1 in 100 risk of dying) to undergo more extensive testing and discussion.⁴
- The output from consultations with patients at increased risk of mortality or morbidity must be documented in the patient's medical notes. In addition, mechanisms for clear communication of these consultations to patients, anaesthetists, surgeons, general practitioners and other healthcare workers must be in place.³
- All patients (and relatives where relevant) should be fully informed about the planned procedure and be encouraged to be active participants in decisions about their care (collaborative decision-making).⁵
- High risk surgical patients should have their expected risk of death estimated and documented prior to intervention, and due adjustments made in planning the urgency of care and seniority of staff involved.⁶
- The information should include the intended pathway (day surgery or enhanced recovery) and methods of pain relief.⁷⁻⁸
- Each trust should have agreed written policies, protocols or guidelines covering:
 - ▼ time allocated for the anaesthetist to undertake pre-operative care in both out-patient clinic and ward settings. Job plans should recognise an adequate number of programmed activities¹⁻²
 - ▼ pre-operative tests and investigations⁹⁻¹⁰
 - ▼ pre-operative blood ordering for potential transfusion.¹¹
 - ▼ management of anaemia to reduce risk of allogenic blood transfusion
 - ▼ management of diabetes, anticoagulant therapy¹²⁻¹³
 - ▼ pre-operative fasting and the administration of pre-operative carbohydrate drinks^{1-2,14}
 - ▼ venous thromboembolism risk assessment and thromboprophylaxis (including timing of administration of thromboprophylactic agents to patients undergoing regional anaesthesia)¹⁵⁻¹⁶
 - ▼ use of the World Health Organisation Surgical Safety Checklist.¹⁷⁻¹⁸
- Electronic systems should be in place to enable the capture and sharing of information, support risk identification and allow data to be collected and available for audit and research purposes.
- Every effort should be made to achieve the national 18 week referral to treatment target (RTT18).

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Introduction: the importance of pre-operative anaesthetic care

- Pre-operative assessment and preparation are essential to the planning and delivery of optimum, safe anaesthesia and to ensuring that patients and their families fully understand their risks.
- A safety guideline on the role of the Anaesthetist in Pre-operative Assessment and Preparation and the Anaesthesia Team has been published by the Association of Anaesthetists of Great Britain and Ireland (2010).¹
- The pre-operative clinic and anaesthetist have important roles to play in ensuring that collaborative decision-making becomes a reality. This is defined as a process in which clinicians and patients work together to select tests, treatments, management or support packages, based on clinical evidence and the patient's informed preferences. It involves the provision of evidence-based information about options, outcomes and uncertainties, together with decision support counselling and a system for recording and implementing patients' informed preferences. The individual values of patients and their perspective on how healthcare interacts with their life are key to this.⁵
- Collaborative decision-making should run throughout the patient journey; it is now viewed as an ethical imperative by the professional regulatory bodies, which expect clinicians to work in partnership with patients. Patients want to be more involved than they are currently in making decisions about their own health and healthcare, and there is compelling evidence that patients who are active participants in managing their health and healthcare have better outcomes than patients who are passive recipients of care.⁵
- If the patient decides to proceed, he or she must be as fit as possible for surgery and anaesthesia. Pre-operative assessment and preparation allow risks to be clearly identified and mitigated, or managed in a planned and consistent way.
- General practitioners have an important part to play by ensuring (prior to surgical referral) that the patient has:
 - ▼ engaged in collaborative decision-making from the outset
 - ▼ gone through a 'fitness for referral' process to identify and optimise conditions amenable to treatment, for example:⁴
 - diabetes
 - asthma
 - heart disease/hypertension
 - anaemia (Hb <13 for men and <12 for women) particularly for surgery where significant blood loss is predictable
 - ▼ been given appropriate lifestyle advice and support regarding smoking, obesity, malnutrition or inactivity.¹⁹⁻²⁰
- A secondary care pre-anaesthetic care service allows elective patients to be risk-assessed and a triage system to identify those patients who are suitable for assessment by a nurse, those who would benefit from a consultation with an anaesthetist and those at highest risk and who would benefit from further dynamic assessment (such as a cardiopulmonary exercise testing or dobutamine stress echocardiography) as well as an in depth consultation on the chance of benefit or harm from the proposed surgery.²¹
- A pre-operative consultation with an anaesthetist should always take place at some stage prior to surgery (or any other procedure requiring an anaesthetic) to confirm earlier findings or, in the case of the emergency admission, initiate pre-operative care.²
- More than 75% of patients undergoing elective surgery can expect to follow a day surgery pathway. If in-patient care is necessary, an enhanced recovery pathway is now considered to provide optimum care and the pre-operative service should ensure that patients are clear about their own responsibilities and expected length of stay.^{15,22}

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- Identification of patients with specific problems such as dementia (with risk of post-operative delirium) and poor nutritional status (with increased risk of morbidity) should be facilitated.
- As a result of the assessment, the appropriate level of post-operative care can be determined and booked in a:
 - ▼ day surgery facility
 - ▼ ward
 - ▼ high dependency unit
 - ▼ critical care unit
 enabling both optimum care and efficient planning.
- The anaesthetist is able to develop a plan for the anaesthetic and agree it with the patient, or in the case of children also with a parent or other responsible adult.²³
- Patients following an enhanced recovery pathway should be prescribed carbohydrate drinks to take pre-operatively.⁸
- Discharge planning can be started as soon as the patient opts for surgery so that all essential resources and obstacles to discharge can be identified and dealt with, including liaison with social services. This will minimise late cancellation of operations and reduce length of stay in hospital.
- Pre-operative care allows overall optimum planning of patient care, with the right staff and resources available to reduce cancellations and improve the efficiency of operating lists.²⁴
- A patient who is fully prepared for surgery can usually be admitted to a surgical admission ward on the day of surgery, thereby reducing unnecessary days in hospital.
- Business planning by trusts and anaesthetic departments should ensure that necessary time and resources are directly targeted towards pre-operative preparation.¹⁴
- These guidelines apply to the care of all patients who require anaesthesia or sedation provided by an anaesthetist. In exceptional circumstances, such as emergency surgery, these guidelines may need to be modified and the reasons for so doing should be documented in the patient's record.

Levels of provision of service

1 Staffing requirements

- 1.1 Any patient undergoing a procedure requiring the services of an anaesthetist must be assessed by an anaesthetist before the procedure.¹⁻²
- 1.2 Anaesthetists need time to cover the following essential points in the more immediate pre-operative phase. The anaesthetic room is not an appropriate place for this except in a genuine emergency.

Assessment

- Correct identification of the patient.
- Interview and medical case notes review to establish current diagnoses and past medical and anaesthetic history.
- Examination, including airway assessment.
- Review of results of relevant investigations.
- The presence of any risk factors.

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- The need for further tests to give the patient more information about their individual risk. This information also needs to be disseminated to the anaesthetist involved in the case as well as the extended peri-operative team.

Preparation

- The patient's understanding of, and consent to, the procedure, and a share in the decision-making process.
- An explanation of and agreement to the anaesthetic technique proposed.
- Pre-operative fasting, the proposed pain relief method, expected sequelae, and possible major risks (where appropriate).
- The prescription and ordering of any pre-operative medication including carbohydrate drinks.
- The documentation of details of any discussion in the anaesthetic record.
- Information that may be reinforced by attendance at communal sessions such as 'joint clinics' for hip and knee surgery at which there may be anaesthetic input.

1.3 An anaesthetic pre-operative assessment service must involve consultant anaesthetists.¹⁻² Dedicated anaesthetic presence in the pre-operative assessment and preparation clinic is required for:

- the review of results and concerns identified by nursing staff
- consultations with patients identified by a triage process to allow optimal delivery of pre-operative assessment resources
- cardiopulmonary exercise testing or other functional assessment of fitness on high risk patients and a subsequent consultation on chance of harm or benefit
- the training and support of nursing and other staff
- liaison with general practitioners including the establishment of 'fitness for referral' protocols
- the establishment of internal protocols, for, example, diabetic patients or those on anticoagulant therapy.

1.4 The following time allocation (per week) is a guide to the minimum staffing that should be provided per 1,000 in-patients passing through a pre-operative preparation clinic:

- | | |
|---------------------------------------|---------------------|
| ■ Reviews/consultations | 1 session (1.25PAs) |
| ■ High risk clinics | 1 session (1.25PAs) |
| ■ Clinical leadership for the service | 1 session (1.25PAs) |

(for audit, research, teaching, protocol development, IT development, primary care liaison). Backfill and secretarial support should also be provided.²¹

1.5 Local protocols should determine the grade and experience of the nurse undertaking pre-operative assessments and accompanying the patient to the operating department. For 1,000 patients, the following minimum staffing is required:²⁰

0.6 RGN

0.3 HCA

This staffing to patient ratio is based on 80% of patients as day cases and 20% as in-patients assuming day case patients have a 30 minute nurse consultation and in-patients have 45 minutes.

1.6 Other health professionals, for example, physiotherapists, occupational therapists, specialist nurses, stoma therapists and pharmacists can add considerable value to the service.²¹

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2 Support services and facilities

- 2.1 Patients should be admitted to a ward or alternative facility leaving sufficient time before the operating list on which they are scheduled. If an adequate pre-operative assessment has been performed, admission can be on the day of surgery but it remains essential that the anaesthetist who will be administering the anaesthetic is able to confirm the findings of the assessment and agree final details with the patient.
- 2.2 Information from the patient's pre-operative assessment should be readily available, ideally as part of an electronic patient record so that information is easy to transfer between locations and to enable data collection for later analysis.
- 2.3 If the patient has not been seen in a pre-operative clinic, for example in an emergency admission, he or she should undergo an equivalent assessment and preparation process and the findings documented, before the final anaesthetic assessment.
- 2.4 If patients are not available in sufficient time before their operation for the anaesthetist to conduct a satisfactory pre-operative assessment, it is possible that surgery may be delayed or postponed. The provision of a good pre-operative assessment and preparation process should minimise this.
- 2.5 There must be a locally agreed hospital policy for pre-operative investigations, pre-operative fasting schedules, administration of pre-operative carbohydrate drinks and continuation of regular medication.
- 2.6 There must be a locally agreed protocol for administration of thromboprophylactic agents to patients undergoing surgery, including VTE risk assessment for identification of patients at low, moderate and high risk, and a recommended prophylactic method for each group. This should include reference to those patients likely to receive regional anaesthesia.
- 2.7 Written guidelines should cover the policy for the collection of patients from the ward or admissions unit, as well as the handover by ward staff to a designated member of the operating department staff.
- 2.8 Operating lists should be made available to the anaesthetist before the list starts.
- 2.9 Anticipated difficulty with anaesthesia should be brought to the attention of the anaesthetist as early as possible before surgery. This includes planned admission to a critical care unit, the need for special skills such as those of fiberoptic intubation, or a known history of anaesthetic complications.
- 2.10 Operating lists should include details of the patient's operation, date of birth, hospital identification number, any alerts and the ward in which they are located.
- 2.11 The World Health Organisation's Surgical Safety Checklist should be used and is fully endorsed by the RCoA as the instrument for promoting team working and patient safety.¹⁷⁻¹⁸
- 2.12 The whole operating team must agree to any change to a published operating list. This list should ideally be reprinted including a date and time of the update.
- 2.13 A pre-operative blood-ordering schedule should be agreed with the local transfusion service for each procedure.¹¹

3 Areas of special requirement

Children

- 3.1 The special needs of children must be considered at all stages of peri-operative care. They should attend a pre-operative clinic in the same way as adults. They may benefit from a visit to the locality to which they will be admitted.²⁴

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3.2 The child should be helped to understand events that are happening or will happen. There are specific issues around consent for children that need to be understood.

3.3 A parent or legal guardian should ideally be with the child at all times.²³

Elderly patients

3.4 Pre-operative assessment of some elderly patients may need cross-specialty advice involving anaesthetists, surgeons and physicians. The development of this team approach requires time and resources that must be recognised and provided.^{3,25–26}

3.5 A multidisciplinary team of senior surgeons, anaesthetists and physicians needs to be closely involved in the care of elderly patients who have poor physical status and high operative risk.²⁶

3.6 A scoring system to identify increased potential for post-operative delirium should be used to assess this risk.²⁷

3.7 There should be established liaison with social services for patients who need such support to prevent delay in discharge.

Learning disabilities or special needs

3.8 There should be close co-operation with other specialists. For example, a Learning Disability Liaison Nurse may be available to support patients and carers while attending the hospital for either out-patients, day surgery or as an in-patient. If patients lack capacity and are unbefriended then the involvement of an IMCA should be sought.

4 Training and education

4.1 Training of anaesthetists includes attaining the competency to perform medical assessment of patients before anaesthesia for surgery or other procedures.²⁸

4.2 The RCoA has established essential knowledge, skills, attitudes and workplace objectives needed in the area of pre-operative assessment in training to attain a Certificate of Completion Training (CCT) in anaesthesia.

4.3 The pre-operative assessment service should enable multidisciplinary training for medical students, nurses, specialist doctors in training and allied health professionals. Educational materials are available to facilitate this.²⁴ Training schools should give consideration to establishing specific modules in pre-operative assessment for senior trainees.

4.4 The anaesthetist should have the skills to hold a competent interview, assess and communicate chance of benefit and harm, and facilitate collaborative decision-making.

5 Research and audit

5.1 The NHS Modernisation Agency outlined measurable key performance indicators in theatre management and pre-operative assessment.

5.2 Regular audits of the following aspects of pre-operative care may include:

- effectiveness of pre-operative information provided to patients
- pre-operative documentation of consultation by anaesthetists
- consent to anaesthesia
- effectiveness of pre-operative assessment services
- adequacy of surgical clerking
- pre-operative visiting
- pre-operative airway assessment
- pre-operative fasting in adults
- pre-operative medication

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- thromboprophylaxis
- choice of technique: general, local or regional anaesthesia.

6 Organisation and administration

- 6.1** Organisation of pre-operative preparation is essential for enhancing the quality of care in a number of ways.
- If a patient is fully informed, they will be less stressed and may recover more quickly.
 - A health check ensures good medical health before anaesthesia and surgery.
 - Planning admission and discharge individually ensures that patient and carers know what to expect, facilitating earlier post-operative care at home.
 - Cancellations due to patient ill health or DNAs are reduced.
 - Admission on the day of surgery and early discharge are more likely.
- 6.2** Business planning by trusts and anaesthetic departments should ensure that necessary resources, including enough time, are targeted towards pre-operative assessment.
- 6.3** Optimum organisation is described in the Preoperative Preparation module of the NHS Institute for Innovation and Improvement's 'Productive Operating Theatre' tool. This toolkit has been designed to help theatre teams to work together more effectively to improve the quality of patient experience, the safety and outcomes of surgical services, the effective use of theatre time and staff experience.²⁹
- 6.4** Objective assessment of risk must become routine. Identification of higher risk needs to trigger joint advance planning specific to that case.³
- 6.5** Pre-operative care requires careful co-ordination and communication with individual surgeons, general practitioners, medical records, out-patients' clinics and specialist services such as diabetes. The anaesthetic lead for the pre-operative preparation clinic should ensure adequate systems are in place and be responsible for overseeing the adequacy of these processes.²
- 6.6** The secondary care pre-operative service should liaise closely with primary care and commissioners to promote a 'fitness for referral' process.⁷
- 6.7** Electronic information systems should be developed to support all parts of the patient pathway to enable the sharing of essential information for safe care.

7 Patient information

Information

- 7.1** Patients should be fully informed about the planned procedure and participate in a collaborative decision-making process. Patients should be informed of the increasing number of decision aids available at NHS Direct to help them with their choices.³⁰
- 7.2** All patients undergoing elective procedures should be provided with easily understood information materials covering their operation, anaesthesia and post-operative pain relief before admission to hospital.³¹
- 7.3** The anaesthetist should explain what the patient will experience before and after anaesthesia, and include any choices of anaesthetic technique and details of post-operative management.
- 7.4** The anaesthetist should invite and answer questions from the patient or, if appropriate, the patient's relatives.
- 7.5** The anaesthetist should document in the patient's case notes that all of the above have been properly performed.

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Consent

- 7.6** The competent patient has a fundamental right, under common law, to give, or to withhold, consent to examination, investigation and treatment.³²
- 7.7** No other person can consent to treatment on behalf of any adult.³²
- 7.8** Doctors may treat a patient who is not competent without consent provided it is necessary and in the patient's best interests. Where a patient is not competent, there should be a mechanism for appropriate documentation as to why the procedure under consideration is in the patient's best interests. This should include any evidence obtained from discussion with the family or other careers relating to whether a patient might reasonably have consented if competent.³²
- 7.9** In the case of children under the age of 16 years, consent should be given by the parent or guardian. In England and Wales, a child who is deemed 'Gillick-competent' under the age of 16 years may give, but not withhold, consent.³²
- 7.10 Patients consenting to be subjects of research**
A patient's consent to participate in research projects should be obtained by those conducting the study and not by the anaesthetist providing care for the operation. Consent must be obtained on a separate signed document and approval should be sought from the anaesthetist who will be delivering the anaesthetic to the patient.

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GUIDELINES FOR THE PROVISION OF anaesthetic services

Anaesthesia services for intra-operative care 2014

Author

Dr S H Koh, Gloucestershire Royal Hospital

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for intra-operative care 2014

Summary

- An appropriately trained and experienced anaesthetist must be present throughout the conduct of all general and regional anaesthetics and procedures requiring sedation given by an anaesthetist.¹⁻² In exceptional circumstances, for example where urgent treatment is required for another patient, the anaesthetist may need to delegate this care for a short period.³ Please see 1.2 below for clarification.
- An anaesthetic assistant who is trained, competent and holds an appropriate recognised national qualification must be present throughout the entire anaesthetic procedure, and provide exclusive assistance to the anaesthetist.⁴
- All anaesthetic equipment must be checked before use according to the Association of Anaesthetists of Great Britain and Ireland (AAGBI) published guidelines.⁵
- The recommended standards of monitoring must be met for every patient.¹
- Within each theatre suite there must be at least one portable storage unit with specialised equipment for management of the difficult airway.⁶
- Policies and equipment must be in place to protect patients and staff from cross-infection.⁷
- Fully resourced, dedicated daytime emergency and trauma lists should be provided.⁸
- If appropriate resources are not available the level of clinical activity should be limited to ensure safe provision of intra-operative care.
- All staff in theatre should be compliant with the use of a WHO surgical safety checklist.⁹

Guidance on the provision of anaesthesia services for intra-operative care 2014

Introduction: the importance of intra-operative anaesthetic care

- General anaesthesia is a state of induced, reversible loss of consciousness, during which the patient will be unaware of their surroundings and of painful stimuli.
- Regional and local anaesthesia are states in which parts of the body are rendered insensible to painful stimuli. These states may be accompanied by sedation which alters the patient's level of consciousness.
- The effects of anaesthesia and of the surgical procedure may have profound physiological consequences for the patient, and require monitoring and, if needed, correction throughout anaesthesia.
- The continuous presence of an appropriately trained and experienced anaesthetist is essential as the main determinant of patient safety during anaesthesia.³
- Monitors with appropriately set alarms may detect critical incidents and provide an early warning of the consequences of an error.
- The safe provision of anaesthesia requires the help of competent anaesthetic assistance at all times.
- Anaesthetic equipment is subject to frequent, repetitive use and needs regular servicing according to manufacturer's specification to prevent malfunction.
- Careful and regular checks of anaesthetic equipment between patients minimises the risks posed by anaesthesia.
- The anaesthetic record is an important medical document, which should contain the relevant physiological measurements and relevant observations during every anaesthetic.

Levels of provision of service

1 Staffing requirements

- 1.1 All anaesthetists and anaesthetic assistants, including locum and agency staff, must undergo a proper induction process.¹⁰
- 1.2 An appropriately trained and experienced anaesthetist must be present throughout the conduct of all general and regional anaesthetics and procedures where sedation has been given by an anaesthetist.¹⁻² However, there may be exceptional circumstances where an anaesthetist is required to provide urgent treatment to another patient in the vicinity and no other suitable anaesthetist is immediately available. An example would be a life-threatening airway problem in a patient in the recovery unit. In such circumstances then the anaesthetist may need to attend to this emergency, and he or she may need to delegate to other members of the theatre team (who may not be anaesthetists) for a short period if this is safe and feasible.
- 1.3 One anaesthetist cannot provide direct care for more than one patient receiving general or regional anaesthesia, or sedation.
- 1.4 As soon as the care of the patient is transferred to the anaesthetist, an anaesthesia assistant who is trained, competent and holds an appropriate national qualification must provide exclusive assistance to the anaesthetist.³
- 1.5 The anaesthetic assistant must be immediately available throughout the entire anaesthetic procedure.³

Physicians' Assistants (Anaesthesia) (PA(A))

- 1.6 It remains the responsibility of those leading departments of anaesthesia, together with their constituent consultants, to ensure that PA(A)s work under the supervision of a consultant anaesthetist at all times as required by the RCoA.² A named consultant must have overall responsibility for the care of the patient at all times.

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- 1.7 It is recommended that PA(A)s have a period of induction and a programme of continuing professional development led by a local clinical lead.¹¹

2 Equipment, support services and facilities

Equipment

General

- 2.1 Facilities for monitoring, ventilation of patients' lungs and resuscitation including defibrillation must be available at all sites where patients are anaesthetised.
- 2.2 The following ancillary anaesthetic equipment must also be available at all sites where patients are anaesthetised:
- oxygen supply
 - facemasks
 - suction
 - airways (for example 'Guedel')
 - laryngoscopes
 - tracheal tubes and connectors
 - intubation aids (for example, bougies, forceps, etc)
 - laryngeal mask airways
 - heat-moisture exchange filters
 - self-inflating bag
 - trolley/bed/operating table that can be tilted head-down rapidly
 - placement and monitoring of local, regional blocks where necessary.
- 2.3 In each theatre suite there must be at least one portable storage unit with specialised equipment for management of the difficult airway.⁶ In addition, a fiberoptic laryngoscope should be readily available.
- 2.4 User manuals should be available as needed for anaesthetic equipment.
- 2.5 All anaesthetic equipment must be checked before use according to the AAGBI published guidelines.⁵ Anaesthetic machine checks should be recorded in a logbook and on the anaesthetic chart.¹²
- 2.6 Anaesthetic machines should never be able to supply a hypoxic gas mixture.¹³
- 2.7 All anaesthetists and anaesthetic assistants should receive systematic training in the use of new equipment.⁴
- 2.8 A named consultant should oversee the provision of anaesthetic equipment.¹⁴
- 2.9 There must be a planned maintenance and replacement programme for all anaesthetic equipment.¹⁴
- 2.10 Appropriate equipment must be available to minimise heat loss by the patient and to provide active warming.¹⁵
- 2.11 Additional specialised equipment is needed for babies and young children.
- #### *Monitoring*
- 2.12 The recommended standards of monitoring, instrumental or otherwise, must be met for every patient.¹

Guidance on the provision of anaesthesia services for intra-operative care 2014

- 2.13** The following equipment must be available to monitor the anaesthetic machine:
- oxygen analyser
 - device to display airway pressure whenever positive pressure ventilation is used, with alarms that warn if the pressure is too high or too low
 - vapour analyser whenever a volatile anaesthetic agent is in use.
- 2.14** The following equipment must be available to monitor the patient:
- pulse oximeter
 - non-invasive blood pressure monitor
 - electrocardiograph
 - capnograph
 - a means of measuring the patient's temperature
 - a nerve stimulator when a muscle relaxant is used.
- 2.15** Some patients will require additional monitoring equipment, such as invasive pressure which should be readily available, and cardiac output monitors to which there should be access.¹
- 2.16** All monitors should be fitted with audible alarms.

Support services

- 2.17** Local standards and guidelines for patient care should be developed, building on those published nationally.
- 2.18** Guidelines for the management of rare emergencies, such as malignant hyperthermia, anaphylaxis and peri-arrest arrhythmias, must be displayed prominently.⁹
- 2.19** Policies and equipment must be in place to protect patients and staff from cross-infection, including the safe disposal of sharps.⁶
- 2.20** Anaesthetic sites must have scavenging systems that meet the Health and Safety Executive's occupational exposure standards for anaesthetic agents.¹⁶
- 2.21** All anaesthetic records must contain the relevant portion of the recommended anaesthetic data set for every anaesthetic and be kept as a permanent document in the patient's case notes.¹⁷
- 2.22** Services must be available for:
- haematology
 - blood transfusion
 - chemical pathology, including blood gas analysis
 - chest radiography
 - electrocardiography.
- 2.23** There should be policies in place for the safe and rational use of blood and blood products.¹⁸⁻²²

Facilities

- 2.24** The anaesthetic room and operating theatre must conform to Department of Health building standards.²³
- 2.25** There must be policies and facilities in place to protect patients and staff who are hypersensitive to latex-containing products.²⁴
- 2.26** A system must be in place to allow the presence of parents or carers at induction of anaesthesia in children.²⁵

Guidance on the provision of anaesthesia services for intra-operative care 2014

3 Training and education

- 3.1 See [Key points on the provision of anaesthesia services](#), for further details of education and training requirements in anaesthesia services.

4 Research and audit

- 4.1 There should be a multidisciplinary programme for auditing intra-operative care.
- 4.2 There should be a system in place to allow reporting and regular audit of critical incidents and near-misses.⁹
- 4.3 Systematic audit should include the pattern of work in operating theatres.⁸

5 Organisation and administration

- 5.1 If appropriate resources are not available, the level of clinical activity should be limited to ensure safe provision of intra-operative care.⁹
- 5.2 Fully resourced, dedicated daytime emergency and trauma lists should be provided.⁹
- 5.3 The theatre team must all engage in the use of the WHO surgical safety checklist. Up-to-date, clear and complete information about operating lists must be available. Any changes must be agreed by all relevant parties, to ensure that the correct operation is performed on the correct side (if relevant) of the correct patient.⁹

6 Patient information

- 6.1 Information to patients should include what to expect in the anaesthetic room and operating theatre.²⁶
- 6.2 Patients from non-English speaking groups may need interpreters.
- 6.3 Patients with learning and other difficulties may need special assistance and consideration.

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Chapter 4

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Anaesthesia services for post-operative care 2014

Author

Dr S H Koh, Gloucestershire Royal Hospital

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for post-operative care 2014

Summary

- After general or regional anaesthesia, all patients should recover in a specially designated area, which should conform to the guidelines of the Department of Health (DH) and Association of Anaesthetists of Great Britain and Ireland (AAGBI) for design and equipment.¹⁻³
- Patients must be cared for in the recovery area by appropriately trained staff,⁴ on a one-to-one basis until they have regained control of their airway, demonstrated cardiovascular stability and are able to communicate.¹
- An appropriate standard of monitoring should be maintained until patients have recovered from anaesthesia and comprehensive records must be kept to allow effective 'handover' to ward staff.¹
- Agreed criteria for discharge of patients from the recovery room to the ward should be in place.¹
- All patients should receive effective control of pain and post-operative nausea and vomiting (PONV). Local guidelines should be available for the treatment of acute pain and PONV. Scoring systems for pain, PONV and sedation should be in place.^{1,5}
- Where emergency surgery is performed, the recovery unit should be open and staffed by appropriately trained resident or on-call personnel.⁵
- There should be a specially designated area for the recovery of children.^{1,6}
- For particular categories of patients, visits should be made by an anaesthetist within 24 hours of discharge from the recovery unit.⁷⁻⁸
- Requirements for critical care after surgery should be assessed and facilities made available for all patients deemed to need these.⁹⁻¹⁰

Guidance on the provision of anaesthesia services for post-operative care 2014

Introduction: the importance of post-operative anaesthetic care

- All patients who have undergone operations, under either general or regional anaesthesia, are at risk of compromise to airway, breathing and circulation.
- Transport of patients, especially between hospitals, immediately after anaesthesia can be hazardous.
- Most patients can be managed in a recovery room, but some may need to be transferred to a critical care environment.
- The purpose of the post-anaesthetic recovery area is to provide care until patients can be safely discharged awake to a general ward or home in a stable condition, or be transferred to a critical care unit if further close monitoring and care are necessary.
- If adequate standards of care are not provided serious complications can occur.

Levels of provision of service

General principles

After general or regional anaesthesia, all patients should recover in a specially designated area.

1 Staffing requirements

- 1.1 Until patients can maintain their airway, breathing and circulation they must be cared for on a one-to-one basis.
- 1.2 At least two appropriately trained staff should be present in the recovery room while there is a patient who does not fulfil the criteria for discharge to the ward.
- 1.3 Whenever emergency surgery is undertaken, the recovery unit should be continuously open and adequately staffed.
- 1.4 The anaesthetist should handover the patient to the recovery room staff. This includes information relevant to after-care.
- 1.5 The anaesthetist is responsible for ensuring that the endotracheal tube is removed safely.
- 1.6 A nurse or ODP who is trained in the management of supraglottic airways may remove them, although an anaesthetist should be immediately available.
- 1.7 If an anaesthetist needs to hand over the responsibility for a patient's care to a colleague before they have met the agreed discharge criteria they must make sure that they have the appropriate qualifications, skills and experience to provide this care.
- 1.8 After agreed criteria for discharge from recovery have been met, an appropriately trained member of staff must accompany patients who are to be transferred to the ward. Relevant information must be given at handover.
- 1.9 Adequate provision should be made for a member of the anaesthetic team to visit the following groups of patients within 24 hours following their operation:
 - those graded as 'American Society of Anesthesiologists (ASA) Physical Status 3, 4 or 5'
 - those receiving epidural analgesia in a general ward
 - those discharged from recovery with invasive monitoring in situ
 - those for whom a request is made by other medical, nursing or other clinical colleagues
 - those for whom there is any other appropriate need.
- 1.10 Specialist recovery staff normally work as part of a team in large recovery units attached to main operating theatre suites, but many hospitals have isolated recovery areas, e.g. for obstetrics, cardiac catheter laboratories and facilities for electroconvulsive therapy, which may only be used intermittently, although sometimes for high-risk patients. Patient safety

Guidance on the provision of anaesthesia services for post-operative care 2014

considerations dictate that patients recovering in these environments should only be cared for by registered recovery practitioners who are members of the hospital's core recovery team and who are familiar with these areas and allocated to work in them as and when required.¹

2 Equipment, support services and facilities

- 2.1 The size, design and facilities of the recovery area should meet the AAGBI and DH guidelines.
- 2.2 The recovery room should be sited within the operating department and away from the department's admission area. Similarly, the routes that patients take to individual theatres, to the recovery room and to the wards, should, as far as is possible, not cross. It is particularly important to make careful provision in this respect when the patients are children.
- 2.3 The recovery area should be situated as close to the operating theatres as possible, and if there are several operating suites each should have a fully equipped recovery area.
- 2.4 An emergency call system must be in place and understood by relevant staff.
- 2.5 There should be enough recovery trolleys of an acceptable design. Where it can be done without compromising safety, patients undergoing major surgery may be transferred to a bed immediately after surgery.
- 2.6 Oxygen and suction should be present in every recovery bay and ideally be delivered by pipeline.
- 2.7 Currently acceptable standards of patient monitoring should be available for all patients.¹ This includes pulse oximetry, non-invasive blood pressure monitoring, an electrocardiograph and if patients' tracheas remain intubated or they have their airways maintained with a supraglottic or other similar airway device, continuous capnography.¹¹⁻¹² A nerve stimulator, thermometer and patient warming devices should be readily available. Ideally, there should be compatibility between operating theatre, recovery room and ward equipment.
- 2.8 All drugs, fluids and equipment (including a defibrillator) required for resuscitation and management of anaesthetic and surgical complications should be immediately available in every recovery area.
- 2.9 In every recovery area, emergency boxes or drugs for use for management of cardiovascular collapse, anaphylaxis and malignant hyperthermia must be available and regularly maintained. There should be wall-mounted algorithms for the treatment of these conditions.
- 2.10 The range of drugs and the means of their delivery should be subject to regular review. The methods of delivery include devices for epidural, patient controlled analgesia and other drug administration.
- 2.11 Devices for patient warming should be available.
- 2.12 Locally devised protocols should be available for discharge criteria, analgesia and treatment, and prevention of nausea and vomiting.

3 Areas of special requirement

- 3.1 **Children**
Particular provision should be made for the care of children.
- 3.2 **Critically ill patients**
When critically ill patients are managed in a recovery area because of bed shortages, the primary responsibility for the patient lies with the hospital's critical care team. The standard of nursing and medical care should be equal to that in the hospital's critical care units.¹³

Guidance on the provision of anaesthesia services for post-operative care 2014

3.3 Specialist surgical units

Specialised units such as those involved in cardiothoracic surgery, neurosurgery and transplant surgery should have their own policies and staffing requirements.

4 Training and education

- 4.1 All recovery staff should be trained, to the UK national core competencies for post anaesthesia care.⁴
- 4.2 At least one member of the recovery staff present at any given time should be certified as an advanced life support provider and, for children, hold an appropriate paediatric life support qualification.

5 Research and audit

- 5.1 Regular revision and audit of standards of care, guidelines and protocols and critical incident reporting are essential in the ongoing development and improvement of post-anaesthetic patient care.

6 Patient information

- 6.1 Information provided to patients about their anaesthetic should include what to expect in the recovery room.
- 6.2 Some patients, adults or children may need interpreters, parents or other members of their family to be with them. This need is best determined by recovery staff, who are also sensitive to the need for privacy of other patients in the recovery room.

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Anaesthesia services for emergency surgery

Authors

Dr A Norris, Queen's Medical Centre, Nottingham

Dr J Mole, Queen's Medical Centre, Nottingham

Dr A Hutchinson, Queen's Medical Centre, Nottingham

Dr T de Beer, Queen's Medical Centre, Nottingham

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for emergency surgery

Summary

- Emergency anaesthesia and surgery comprises an estimated 40-50% of the surgical workload in the UK, accounts for up to 80% of all adverse outcomes, and consumes disproportionate resources.¹
- Often emergency patients are amongst the sickest in the hospital. They have a high incidence of co-morbidity and frailty, and an unacceptably high risk of death or serious complications.²
- Currently in the UK, much care is sub-optimal and there is twofold variability of mortality between units. Additionally, outcomes are worse within the same units at weekends.¹⁻³
- The care of emergency patients is resource intensive. Historically it has been under resourced. Elective work has had priority over emergency work, often driven by centrally determined targets. Despite the significant workload, emergency surgery and anaesthesia have attracted little dedicated resource, commitment to research, or training. Most surgeons and anaesthetists pursue an elective specialty and see emergency work as a necessary shared service provision rather than as a specialised interest to pursue improved standards. With inadequate senior input and poor clinical leadership, there have often been unsatisfactory standards of care [John McFie address at NCEPOD launch 2011 ([www.ncepod.org.uk/2010report3/slides/John Macfie.ppt](http://www.ncepod.org.uk/2010report3/slides/John%20Macfie.ppt))].
- The need for improvement in the care of emergency patients has become widely recognised. The Department of Health has stated recently that emergency surgical patients should receive priority over elective work. This sea change provides multiple challenges and opportunities for anaesthetists.⁴
- There is a need for planning of the emergency surgical services by commissioners and providers at every level within the NHS. The planning should include assessment of current and future needs. Emergency admissions have been increasing at approximately 3% per year (www.hesonline.nhs.uk/). Over the next twenty years it is estimated that the UK population will increase from 62 million in 2011 to 73 million in 2031, and the over 75 age group will increase from 4.8 million to 8.7 million (Office of National Statistics). This change in population demographics will have a major impact on the resources required.
- There needs to be appropriate and adequate facilities to allow expeditious patient care. There should be sufficient, suitably trained staff throughout the patient pathway. There needs to be a focus on patient-centred care. The service should be consultant led, with decision-making made in a timely manner, and at a sufficiently senior level.
- The pre- and post-operative care arrangements must be appropriate to enable recognition of and adequate response to the acutely ill patient.⁵
- Historically in the UK, there has been inadequate critical care provision for the high risk emergency surgical patient. Increasing provision and use will improve outcome, particularly in the elderly.¹⁻²

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- The governance structure of emergency surgical and anaesthetic care should be explicit and embedded in the planning. Care must be patient-centred, within a culture, which aims for best practice in every part and that is shown to be so in terms of patient outcomes. Clinical governance must be underpinned by adequate information collection and feedback mechanisms. This requires clear leadership, expertise, resource and excellent communication both within and between multidisciplinary teams.
- Healthcare costs are constantly rising. Expenditure that improves the quality of care and reduces both complications and length of stay will be both effective and efficient.

Introduction: the importance of emergency services

There is an increasing body of evidence about what constitutes good practice in emergency anaesthesia. However, because of the nature of emergency anaesthesia, and consequent lack of high level evidence, it is inevitable that to some extent the standards here represent a consensus view. A selection of key primary research evidence has been referenced.

Levels of provision of service

1 Leadership, planning and organisation

Local

- 1.1 Leadership is key to improvement. Hospitals should have a named individual responsible for the management of the emergency anaesthesia service. This individual or another clinician should take responsibility for the emergency surgical service overall. The emergency surgical service should be structured as any other service, with appropriate management and governance arrangements, in order to demonstrate that the organisation overtly recognises the requirements and importance of emergency surgery and to enable service development.
- 1.2 The priority of emergency services in the organisation should be made explicit, including a commitment to prioritise emergency work over elective cases.⁴
- 1.3 There must be short-, medium- and long-term planning. The increases in the amount and complexity of emergency work, and the effects of an ageing population have significant implications, which must inform this process.
- 1.4 Hospitals should plan for the predictable emergency surgical workload for all specialities and allocate the necessary operating time. This includes immediate access to operating theatres for the most urgent emergency surgery patients. To do this, hospitals must:
 - measure the predictable emergency surgery workload
 - allocate operating theatre resources to match the emergency workload
 - schedule emergency work in 'normal' working hours where possible
 - decide on a model of emergency surgery delivery that is appropriate for their hospital
 - allocate equipment, IT and resources as required for the designated surgery.
- 1.5 Where appropriate, consideration should be given to the model of splitting elective and emergency work either on the same or different sites.^{1,6}

Regional and national

- 1.6 There is a need to ascertain and allocate emergency services appropriate to individual hospitals. Networks of interconnected hospitals may allow more specialist emergency work to be provided.

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- 1.7 A national system is required for relevant data collection [similar to others: Trauma Audit and Research Network (TARN) and the Intensive Care National Audit and Research Centre (ICNARC)] to allow every emergency surgery provider to benchmark its performance and consider improvements, or alter the service it provides accordingly (see Audit, below).

2 Facilities

- 2.1 A hospital receiving emergency patients requiring anaesthesia must have 24-hour availability of a staffed and dedicated emergency operating theatre.
- 2.2 Access to emergency theatre should be available 24/7, but surgery between midnight and 8.00 am should normally be restricted to urgent surgery that is life or limb threatening.

Access to theatre

- 2.3 Access to theatre must be monitored through review of workload and audit of breaches and other relevant key performance indicators to identify and prevent unnecessary delays. The percentage of theatre utilisation must allow an appropriate balance of accessibility to efficiency. The National Audit Office specifies 65% for emergency theatres.
- 2.4 A dedicated emergency theatre may be inappropriate for the smallest institutions, but emergency patients should take preference over elective work. Local policies need to be in place to prevent unnecessary delays to emergency patients.
- 2.5 There need to be explicit arrangements made for the provision of extra site care needed from disciplines that are not available onsite: such as neurosurgery, cardiothoracic, vascular, ENT, maxillo-facial, hepatobiliary, burns, and plastic surgery.
- 2.6 The geographical arrangement of theatres, ED, critical care and imaging must allow the rapid transfer of critically ill patients and reduce unnecessary delays and risks to these patients.
- 2.7 On sites undertaking work beyond immediate stabilisation, the presence of all the core specialities, including sufficient critical care to ensure their availability for emergency admissions, together with recovery facilities, and access to a full range of laboratory and radiological services are required.

3 Resources: staffing

- 3.1 The emergency anaesthetic service should be consultant led at all times. During predictable emergency work, one other physician anaesthetist (who may be a specialty trainee) should be available to allow response to new emergencies.
- 3.2 Dedicated appropriately trained assistance should be available to anaesthetists at all sites in the hospital where emergency anaesthesia care is required.
- 3.3 There should be adequate staffing of emergency areas to allow safe movement and transfer of these patients.
- 3.4 In all but the smallest units a consultant anaesthetist should be dedicated to the emergency service in daylight hours (that is, without other clinical responsibilities).
- 3.5 Duration of emergency shifts should be appropriate to minimise poor outcomes associated with fatigue.

4 Resources: operating theatre equipment

- 4.1 The emergency theatre(s) must be adequately equipped and stocked at all times for immediate use for all types of urgent cases usually encountered by the hospital.
- 4.2 Specialist equipment and drugs not commonly used, which are not time critical, must be available at short notice as appropriate.

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- 4.3 Hospitals must ensure that staff are trained and competent to use the equipment provided. Equipment must be properly maintained.
- 4.4 The theatre must have an adequate airflow system to reduce infection and have the capacity for effective warming if used for infants and/or burns patients.
- 4.5 Theatre tables must be available for all types of surgery undertaken, including imaging access (carbon fibre), capacity for the morbidly obese patient, and adjuncts for safe positioning and transfer.
- 4.6 Appropriate equipment for transfer of the patient within theatre must be available and enough trained staff present to use them safely.
- 4.7 There must be adequate protection from blood spray and radiation for all staff working in the operating theatre.

Patient warming devices

- 4.8 These should be readily available for use in the anaesthetic room, operating theatre, recovery unit and emergency department.
- 4.9 A high-performance blood-warming system should be available immediately. A cell salvage system should be available for procedures associated with a risk of blood loss exceeding 1.5 litres.

Monitoring

- 4.10 Routine monitoring for anaesthesia according to AAGBI guidelines must be available for all areas where anaesthesia is undertaken. Alarms should be set at an appropriate level.
- 4.11 End tidal carbon dioxide monitoring is essential whenever and wherever endotracheal intubation takes place.⁷ This specifically includes out-of-theatre areas.
- 4.12 Invasive cardiovascular monitoring should be available immediately. Equipment required for goal directed therapy should be available for all major surgery and high risk patients, though efficacy remains uncertain.⁸

Difficult airway management

- 4.13 A 'difficult airway trolley', including equipment necessary for the failed intubation and the 'can't intubate, can't ventilate' scenario, should be available in all areas where endotracheal intubation may be needed.
- 4.14 Equipment for fiberoptic intubation should be available, with appropriate storage, maintenance and sterilising procedures timed according to infection control standards. Disposable fibrescopes may be appropriate for low volume areas.

Regional anaesthesia and analgesia

- 4.15 Ultrasound scanning, nerve stimulators and all equipment and drugs necessary for local and regional techniques should be available to ensure optimal peri-operative analgesia and to avoid or minimise general anaesthesia where appropriate.
- 4.16 Equipment necessary to provide a range of patient analgesia must be available. There must be adequate facilities for the post-operative monitoring of patient analgesia.

Infusion devices

- 4.17 Infusion devices for intravenous anaesthesia, use of vasoactive drugs, insulin and other drugs must be available.

Blood storage

- 4.18 Clearly signed and appropriate blood storage facilities need to be in close proximity to the emergency operating theatre. Satellite storage facilities or a clear process for use of insulated boxes with preservation of the cold chain should be in place to enable resuscitation at other sites such as interventional radiology.

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Interventional radiology, emergency department and other sites where emergency anaesthesia may be required

- 4.19 Similar resources should be available to emergency operating theatre, especially monitoring, access to drugs, infusion devices and airway rescue. Higher cost disposable equipment choices should be considered for areas where frequency of use is very low.

5 Process

Communication and non-technical skills

- 5.1 Poor communication and other non-technical skills are regularly highlighted as major factors in poor care. Units should adopt tools to improve patient care including local formalised case reviews. Communication tools should be considered (for example, Situation-Background-Assessment-Recommendation (SBAR)).⁹
- 5.2 Referrals should occur directly between consultants when possible to improve communication and minimise delays.

Pathways and documentation

- 5.3 The pathways for unscheduled adult general surgical care must be formalised.¹ The principles guiding this pathway include: early senior input, assessment and planning, identification of high risk patients and avoidance of delays.

High risk patient identification and management

- 5.4 Pre-operative risk assessment should be formalised, preferably using a scoring system such as POSSUM (the Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity and its variant Portsmouth POSSUM).¹⁰ The assessment should be documented and communicated to patients as part of the consent procedure if possible.
- 5.5 High risk patients (estimated mortality of >5%) should have senior multidisciplinary input.^{1,4}
- 5.6 High risk patients (estimated mortality of >10%) should have a consultant anaesthetist present or an anaesthetist whom the responsible consultant anaesthetist knows to be competent to undertake the case.
- 5.7 Some patients, for example those with uncontrolled bleeding or septic shock, require surgery and resuscitation to take place concurrently. Such patients require care from a consultant anaesthetist and preferably one other anaesthetist until stability is achieved.

Care pathways of the emergency patient

- 5.8 A clear diagnostic and monitoring plan should be made on admission.⁵ This should include the planned timing of investigations, surgery and expected recovery.
- 5.9 All patients should have a named and documented, supervisory consultant anaesthetist. Any non-consultant anaesthetists under supervision should know their consultant's identity, location and means of contact.
- 5.10 An anaesthetist should assess all patients undergoing emergency surgery requiring anaesthesia. The exact timing of this visit will be dependent upon the urgency of surgery.
- 5.11 Patients should be optimally resuscitated before emergency surgery. Resuscitation should be goal rather than process driven (see also 5.13).
- 5.12 Post-operative care should be planned, as far as possible, pre-operatively.

Critical care

- 5.13 Critical care needs to be involved early, preferably before surgery or other major interventions, such as prolonged interventional radiological procedures. Patients need to be seen by an ICU consultant within 12 hours of admission to critical care.

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- 5.14** High risk patients (P-POSSUM mortality > 5%), should be considered for Level 2/3 care. Patients with a >10% predicted mortality normally need to be admitted to Level 3 care (unless a decision has been made to limit care or enter an end-of-life care pathway)
- 5.15** Any patient undergoing a laparotomy outside of normal working hours who does not go to critical care needs to be on a Level 1 unit or extended recovery unit. These patients need to be made known to outreach or acute care teams and monitored appropriately. There should be a low threshold for escalation to critical care. Where critical care is the chosen destination after surgery, admission needs to be within four hours of the end of surgery.
- 5.16** If pre-optimisation is appropriate, consideration should be given to performing this in the anaesthetic room. Often multidisciplinary input is required for pre-optimisation.
- 5.17** Emergency surgery patients on the general ward need to be monitored for deterioration by way of the Early Warning Score tool (EWS), with support from critical care outreach or acute care teams.⁵

5.18 Handovers

Increasing medical shift-work, and complexity of management means that effective handover is essential to the safe care of patients. Clear guidelines are needed for staff, including locums. The Royal College of Physicians have described good handover practice for acutely ill patients and provided templates (www.rcplondon.ac.uk/resources/acute-care-toolkit-1-handover). Complex cases need documentation of discussions.

5.19 Consent

Risk assessment should be documented.

Deaths

- 5.20** When further active management is likely to be futile, senior clinicians should discuss limits to care, including end-of-life pathways, with the patient and/or relatives, preferably with all relevant specialties involved. Clear documentation is essential, and limits to care including 'DNR' should be regularly reviewed.
- 5.21** Sometimes death will occur in the operating theatre. Policies and facilities including an appropriate interview room are needed to support relatives of the deceased and also staff involved.¹¹⁻¹²

Specific patient groups

5.22 Children

Good quality children's emergency surgical services have specific requirements for surgical and other medical staff in addition to facilities, equipment, and processes for safeguarding their wellbeing. A networked approach may be appropriate for many regions and has been recommended by the RCS. In hospitals accepting adult and paediatric emergency cases, a lead clinician for paediatric emergency surgery must be in place. The paediatric lead will work closely with the lead clinicians for the emergency surgical service to ensure that paediatric requirements are identified and developed.

Standards for children's surgical services can be found through the British Association of Paediatric Surgeons (www.baps.org.uk) and the Association of Paediatric Anaesthetists of Great Britain and Ireland (www.apagbi.org.uk).

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5.23 *Elderly*

Increasing numbers of older patients are undergoing emergency surgery. These patients are typically frail, have multiple co-morbidities, and poor outcomes.² For example, in one study a thirty minute increment of operative duration increased odds of mortality by 17% in patients older than 80 years. Higher levels of evidence exist to show improved outcomes in this group by adherence to pathways and the presence of clear processes:

- Multidisciplinary care and especially 'medical care of the elderly' involvement is encouraged.^{1,13}
- Care pathways and particularly timing and milestones should be in place.
- Quality indicators for processes and outcomes must be in place.¹⁴⁻¹⁵

5.24 Appropriate clinical policies

Appropriate clinical policies and standard operating procedures (SOPs) for operating theatres must be in place, including major incident plans. All staff should be able to find them easily and be familiar with their contents.

5.25 Emergency theatres additionally should ensure that policies on the following areas are prominently displayed or easily accessible:

- Use of O-negative blood. Major transfusion protocols (includes blood bank support and use of transfusion 'packs').
- Airway management, including follow up for difficult patients.
- Infection:
 - ▼ Management of severe infection: Recognition and source control: managed according to surviving sepsis guidelines (www.survivingsepsis.org/GUIDELINES/Pages/default.aspx).
 - ▼ Infection control policies/self protection/health and safety (HIV, hepatitis, chemical)/antibiotic prophylaxis.
 - ▼ Warming.
- Thromboprophylaxis.
- Escalation plan for; theatre capacity, staff, senior involvement.
- Teams should train for and practise their SOPs for serious, complex and rare emergencies as well as major incidents.

5.26 Transport/transfer

Only appropriately trained staff should transfer patients while continuing appropriate monitoring. Staff must be available for the transfer of deteriorating and Level 2 and 3 patients. Staffing needs to be adequate so that emergency theatres and ICU patients are not compromised (unless an independent transfer service is in place).¹⁶ Transfers need to be documented and audited.¹⁶⁻¹⁸

6 Outcomes

6.1 Process outcomes, quality markers

Audit – National

- National level audit similar to ICNARC and TARN of emergency surgical activity and outcome is essential, and hospitals are urged to enrol with the Emergency Laparotomy Network (www.networks.nhs.uk/laparotomy), as well as other national audits for common high risk procedures or patient groups, including the national hip fracture database (www.nhfd.co.uk/), and the vascular surgery database (www.vascularsociety.org.uk/national-vascular-database.html).
- Outcomes for other types of emergency surgery should be audited via Hospital Episode Statistics for benchmarking purposes.

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Audit – Local

Audit of provision of service and adherence to process for emergency surgery are outlined in the RCoA Audit Recipe Book.¹⁹

Recommended locally auditable measures include, but are not limited to:

- lead clinician identified
- seniority of clinician present
- anaesthetic assessment conducted
- documented risk assessment
- emergency operating theatre available at all times. In all but smallest general hospitals this will be one or more dedicated emergency operating theatres
- staff available to run emergency theatre at all times
- out-of-hours work: life/limb after midnight
- lead clinician view of adequacy of resuscitation before emergency surgery
- decision to surgery interval
- invasive monitoring
- cell salvage if blood loss >1,000 ml and use of blood products
- post-operative analgesia
- appropriate level of post-operative care for risk
- adherence to other standard operating procedures (SOPs), including: sepsis bundles, warming, glycaemic control and thromboprophylaxis
- case review process.

6.2 Clinical outcome measures

- Mortality.
- Return to theatre within 24 hrs.
- Frequency of complications.

Evidence supports a focus on avoiding complications with the aim of improving long-term outcomes.²⁰ More importantly, picking up complications early and treating appropriately appears to mark out centres associated with better outcomes.²¹

6.3 Outcomes: clinical governance

- There is a need for a strong safety culture. Governance pathways should be understood. Reporting mechanisms should be accessible and used. Team training is encouraged and is expected for SOPs and Major Incident Plans.
- All deaths and serious morbidity should be reviewed formally and reported regularly by the lead anaesthetic clinician for emergency surgery.
- The methodology should be explicit and identify underlying relevant factors to inform learning and development of safe systems. Targeted feedback and collation of learning points at an individual, departmental and organisational level should follow.
- Case reviews selected from the reported deaths and serious morbidities should be undertaken and reported with an emphasis on areas for learning. Key messages should be collated to preserve organisational memory.
- The mechanism of feedback into the department and, where appropriate, to the Trust or executive management team should be explicit.

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7 Education and training (clinical and non clinical)

- 7.1** Emergency anaesthesia should be led by and frequently delivered by consultant anaesthetists. Ongoing training for emergency teams is required. It is also a key area of training for both technical and non-technical clinical skills as well as wider professional learning. Specialty trainees should be appropriately supervised. Where emergency work is scheduled and predictable, such sessions should be utilised as teaching resources.
- 7.2** Consultants should demonstrate ongoing continuing education in emergency and/or trauma work and departments should facilitate this with local teaching where appropriate and by facilitating access to other education and training. The RCoA strongly endorses the recommendations of the College of Surgeons' regarding access to CPD and the need to identify required competencies of all emergency staff and the consequent need to manage staffing rotas accordingly. In view of limited time and information associated with emergency care, the need for staff to be competent in respect of consent, mental capacity, and safeguarding children and vulnerable adults is especially important.

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Chapter 6

GUIDELINES FOR THE PROVISION OF anaesthetic services

Anaesthesia services for day surgery 2015

Author

Dr I Smith, University Hospital of North Staffordshire, Stoke-on-Trent

Dr M Skues, Countess of Chester Hospital, Cheshire

**In association with the British Association of Day
Surgery (BADs)**

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

www.rcoa.ac.uk/gpas2015
gpas@rcoa.ac.uk

Guidance on the provision of anaesthesia services for day surgery 2015

Summary

- Day surgery should have a dedicated clinical lead or clinical director with allocated programmed activities to allow them to lead service development.^{1,2,3}
- Anaesthesia for day surgery should be consultant led. All anaesthetists delivering day surgical care must be trained, experienced and skilled in day surgery practice because high quality anaesthesia is pivotal to a successful outcome.^{1,3}
- Consultant anaesthetic involvement is essential in policies, protocols and guidelines designed to facilitate smooth running of the day surgery unit.^{1,3,4,5}
- The location of the day surgery unit (DSU) must be given careful consideration in order to accommodate all of the necessary facilities and access to peri-operative support services.¹
- Patient selection and pre-assessment of criteria of fitness for general anaesthesia for day surgery must be developed and agreed by anaesthetists.^{1,2,5,6}
- Pre-assessment clinics should be consultant led and delivered by a specifically trained pre-assessment team.^{5,7}
- The recommended standards of monitoring, trained anaesthetic assistance and post-anaesthetic recovery must be met for every patient undergoing day surgery under a general anaesthetic or sedation.^{8,9,10,11,12}

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- Children experiencing day surgical care require all the facilities and staffing that would be expected in any paediatric unit.^{13,14,15,16,17,18,19}
- Training in anaesthesia for day surgery is essential so that anaesthetists practising in this area develop techniques that permit the patient to undergo the surgical procedure with minimum stress and maximum comfort, and optimise their chance of early discharge.^{2,20}
- Effective audit is essential in the provision of quality anaesthesia for good day surgery.^{2,3,21,22}
- Specific instructions and information must be available for patients, their relatives and community services.^{3,23}

Introduction: the importance of anaesthesia services for day surgery

- Day surgery encompasses a spectrum of surgical procedures that allows the patient to go home on the day of surgery, usually after a few hours.
- Day surgery represents high quality patient care with reduced tissue trauma, enhanced recovery, effective analgesia, minimal adverse events, provision of appropriate information and post-operative support.
- Improvements in the provision of anaesthesia and analgesia and the introduction of minimal-access techniques allow a range of surgical procedures to be undertaken on a day case basis which formerly would have required in-patient services.^{24,25}
- ‘True day surgery’ patients are those undergoing day surgery requiring full operating theatre facilities and/or a general anaesthetic. This chapter encompasses the anaesthetic service provision to ‘true day surgery’ patients who are admitted and discharged on the day of their surgical treatment. It does not include ‘short-stay’, endoscopy or out-patient procedures.

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- 25 Castoro C et al. Policy brief. Day surgery: making it happen. IAAS, Copenhagen 2007 (<http://bit.ly/1coW8YX>).

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- Some patients may not be appropriate for smaller or isolated day units but can still be managed as day cases through larger centres. The decision will reflect the available facilities, the skills of the medical team, the patient's fitness, the technical ease of the procedure, the post-operative morbidity and the social circumstances of the patient in relation to the available community resources.
- Many hospitals perform a variety of day surgery work, such as dental and ophthalmic surgery, in specialised units. This chapter encompasses standards of provision of anaesthetic services for day surgery in these sites. However, standards of provision of anaesthesia in imaging suites, stand-alone dental departments and psychiatric units are outlined in a later chapter of this document 'Guidance on the provision of anaesthetic care in the non- theatre environment'.²⁶
- Outsourcing of surgical activity may mean that day surgery units or 'treatment centres' may be sited in a geographically separate location from the main hospital building. Self-contained units must be sufficiently equipped and have access to all the necessary peri-operative support services. Patient selection should consider the availability of additional help in an emergency, and ease of overnight admissions if needed.
- Increasing numbers of patients will present to day surgery for more complex surgical procedures.²⁴ Many will present with significant co-morbidities requiring early anaesthetic input.
- Anaesthetists play a pivotal part in the successful outcomes of day surgery patients. Working as part of the multidisciplinary team, anaesthetists can, and usually do, contribute in more ways than providing anaesthesia.
- Roles which must have senior anaesthetic input include:^{2,3,4,22}
 - agreement, development and support of pre-operative assessment and post-operative care guidelines and processes
 - pre-operative assessment of complex patients to ensure as many as possible are managed as day cases and for those needing investigation and treatment
 - referral to other specialties
 - liaison with surgical teams.
- The success of a day surgery unit is also determined by the skill and experience of pre-assessment staff.²⁷ Adequate resources for training, staffing and support services are essential to the pre-assessment service.⁷

26 Guidance on the provision of anaesthetic care in the non-theatre environment. RCoA, London 2015 (www.rcoa.ac.uk/node/17848).

27 The pathway to success – management of the day surgical patient. BADS, London 2012 (<http://bit.ly/100lc2a>).

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Levels of provision of service

1 Staffing requirements

- 1.1 Day surgery must be a consultant-led service with a dedicated clinical lead or clinical director who has programmed activities (PAs) allocated to their job plan.^{1,2,3}
 - 1.2 High quality anaesthesia is pivotal to successful outcomes in day surgery. All anaesthetists delivering anaesthesia for day surgery must be experienced and skilled in techniques appropriate to day surgery practice.^{1,3} The majority of anaesthesia for day surgery should be delivered by consultant anaesthetists.²⁸ Consultant anaesthetists must have been trained in this field to the standards required by the Royal College of Anaesthetists.²⁰ Staff or associate specialist grades and experienced trainee anaesthetists may also provide anaesthesia for day surgery. However, these doctors must have undertaken suitable training in the provision of anaesthesia for day surgery, and must have unimpeded access to a consultant anaesthetist for advice and supervision.²⁰
 - 1.3 All patients undergoing surgery with anaesthesia must be seen by an anaesthetist on the day of operation.⁵
 - 1.4 Trained anaesthetic assistance and post-anaesthetic recovery staff must be provided for every patient undergoing general anaesthesia.^{8,9,10,12}
 - 1.5 Pre-assessment clinics should be consultant led and delivered by a specifically trained pre-assessment team.^{5,7}
 - 1.6 Adequate levels of trained nursing staff must be provided in recovery for the numbers of patients and their needs. No fewer than two staff should be present when there is a patient in the recovery room who does not fulfil criteria for discharge to the ward.^{8,9,12}
- Physicians' Assistants (Anaesthesia) (PA(A))**
- 1.7 It remains the responsibility of those leading departments of anaesthesia, together with their constituent consultants, to ensure that PA(A)s work under the supervision of a consultant anaesthetist at all times as required by the RCoA.²⁹ A named consultant must have overall responsibility for the care of the patient at all times.
 - 1.8 It is recommended that PA(A)s have a period of induction and a programme of continuing professional development led by a local clinical lead.³⁰

2 Equipment, support services and facilities

Facilities

- 2.1 The minimum operating facility required is a dedicated operating session in a properly equipped operating theatre.
- 2.2 The ideal day surgery facility is a purpose-built, self-contained DSU with its own ward, recovery areas and dedicated operating theatre(s). This may be contained within a main hospital or in its grounds to facilitate access to in-patient or critical care facilities, or it may be a freestanding unit remote from the main hospital site.

28 Who operates when? II. *NCEPOD*, London 2003 (<http://bit.ly/1hh3pCO>).

29 PA(A) supervision and limitation of scope of practice (May 2011 revision). *RCoA*, London 2011 (www.rcoa.ac.uk/node/1927).

30 Continuing Professional Development Guidance. *APA(A)*, London 2012 (<http://bit.ly/1dCYOuv>).

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- 2.3** A viable alternative is for patients to be admitted to and discharged from a dedicated day surgery ward with surgery undertaken in the main theatre suite. This arrangement may be more flexible for complex work and avoids duplicating theatre skills and equipment. Every effort should be made to avoid mixing day cases and in-patients on the same operating list and day case patients should never be managed through in-patient wards, as this greatly increases their chance of an unnecessary overnight stay.^{3,27}
- 2.4** Facilities for privacy and confidentiality during pre-operative discussion and examination must be provided.³ Pre-operative discussions with patients in the middle of crowded waiting rooms are not appropriate as they do not allow patient confidentiality.²⁷

Equipment

- 2.5** Theatre and anaesthetic-related equipment must always be equivalent to in-patient surgery and be regularly maintained.¹
- 2.6** The recommended standards of monitoring must be met for every patient.⁸
- 2.7** Full resuscitation equipment and drugs must be provided as outlined by up-to-date resuscitation guidelines and hospital policy.^{1,31} Staff should be trained to ALS standards.
- 2.8** Peripheral nerve blocks, spinal/epidural blocks and intravenous regional anaesthesia often provide excellent conditions for day surgery.^{32,33} Equipment to facilitate these blocks, such as nerve stimulators and ultrasound, should be available.
- 2.9** Equipment and drugs to deliver suitable short-acting anaesthesia should be available in day surgery.

Support services

Pre-assessment services

- 2.10** Effective pre-assessment and patient preparation, performed as early as possible in the planned patient pathway, is essential to the safety and success of day surgery.^{7,27}
- 2.11** Local pre-assessment guidelines and protocols should be established, and effective training organised under the direction of named consultant anaesthetists.
- 2.12** Consultant anaesthetic advice should be available to comment on an individual patient's suitability for day surgery and to assist with optimisation.
- 2.13** Clinical investigations rarely inform the suitability for day surgery or influence subsequent management or outcome.^{2,34} Those which are appropriate should be ordered at pre-assessment according to a robust locally agreed protocol. A mechanism for the review and interpretation of the results of tests ordered before the day of surgery must be developed.

Day of surgery services

- 2.14** Adequate time and facilities should be provided within the DSU to allow:
- review of pre-assessment and laboratory investigations
 - elicit any further clinical information
 - undertake any relevant clinical examination, including airway assessment
 - discuss anaesthetic technique to be used
 - provide post-operative instructions (reinforced by a patient information leaflet)

31 Resuscitation guidelines. *RC (UK)*, London 2010 (www.resus.org.uk/pages/guide.htm).

32 Upper limb plexus and peripheral nerve blocks in day surgery – a practical guide. *BADS*, London 2007 (<http://bit.ly/1ea6KUC>).

33 Spinal anaesthesia for day surgery patients; a practical guide (3rd Edition). *BADS*, London 2013 (<http://bit.ly/1c10oro>).

34 Chung F et al. Elimination of pre-operative testing in ambulatory surgery. *Anesth Analg* 2009;**108**:467–475.

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- document any relevant discussion and findings on an anaesthetic record
 - ensure consent is understood and signed, and laterality of operation site confirmed.
- 2.15** The support services of radiology, pharmacy and investigative laboratories must be available. The facility to perform a 12 lead electrocardiogram (ECG) and other point of care tests, such as INR, should be available within the DSU itself.
- Post-operative support services and facilities*
- 2.16** Each DSU must have a fully equipped recovery area, staffed by recovery personnel trained to defined standards.^{8,9,12} Transfer from the immediate recovery area to a second (ambulatory) recovery area may take place when the patient is awake, in control of their airway, oriented and without continuing haemorrhage.^{8,9,12}
- 2.17** The secondary recovery area must provide essential close and continued supervision of all patients who should be visible to the nursing staff.
- 2.18** There must be easy access to in-patient beds for peri-operative complications. If a patient requires overnight admission, an in-patient bed must be found. Some DSUs have additional short stay overnight capacity which can sometimes be used for this purpose.
- 2.19** If day surgery is being undertaken on an isolated site, protocols must define finding an in-patient bed and mechanism of transport for a patient needing an overnight stay.
- 2.20** Locally agreed written discharge criteria must be established. Discharge is usually delegated to senior nursing staff according to protocols.³⁵ If a patient does not satisfy the agreed discharge criteria they must be referred to the anaesthetist or surgeon concerned (or their deputies) for assessment.³⁵
- 2.21** Locally agreed policies must be in place for the management of post-operative pain after day surgery. This should include pain scoring systems in recovery, prescription of pain relief medication on discharge with written and verbal instructions on how to take medications and what to take when the medications have finished.
- 2.22** Patients may be discharged home with residual sensory or motor effects after nerve blocks or regional anaesthesia.³² The duration of the effects must be explained and the patient must receive written instructions as to their conduct until normal sensation returns.
- 2.23** Post-operative short-term memory loss may prevent verbal information being assimilated by the patient.³⁶ If post-operative analgesia has been provided, clear, written instructions on how and when to take it and the maximum safe dose should normally be provided. Other important information should also be backed up in writing.^{2,35}
- 2.24** A 24-hour telephone number must be supplied so that every patient knows whom to contact in case of post-operative complications. This should ideally be to an acute surgical area and must not be an answer-phone.
- 2.25** Following most procedures under general anaesthesia, a responsible adult should escort the patient home and provide support for the first 24 hours after surgery.² A carer at home may not be essential if there has been good recovery after brief or non-invasive procedures and where any post-operative haemorrhage is likely to be obvious and controllable with simple pressure.^{37,38}

35 Nurse led discharge. *BADS*, London 2009 (<http://bit.ly/1k3tVjA>).

36 Blandford CM et al. Ability of patients to retain and recall new information in the post-anaesthetic recovery period: a prospective clinical study in day surgery. *Anaesth* 2011;**66**:1088–1092.

37 Patient safety in the ambulatory pathway. *BADS*, London 2013 (<http://bit.ly/OtlvrP>).

38 Ten dilemmas in the day surgery pathway. *BADS*, London 2013 (<http://bit.ly/1fx1xWG>).

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- 2.26 Transport home should be by private car or taxi; public transport is not normally appropriate.
- 2.27 The general practitioner (GP) must have been notified of the patient's proposed treatment in advance. Where the patient's GP may need to provide post-operative care within a short time of discharge, arrangements for this should have been made in advance of the patient's admission. The patient's GP should be informed of the patient's discharge as soon as possible, either by telephone call or fax/email. A discharge summary should be written for each patient by the surgeon concerned. Ideally the patient should be given a copy in case emergency treatment is needed overnight.

Information technology

- 2.28 Information technology systems in the DSU should provide appropriate information but must not burden staff.

3 Areas of special requirement

Management of children

- 3.1 Day surgery is particularly appropriate for children.
- 3.2 The lower age limit for day surgery depends on the facilities and experience of staff and the medical condition of the infant. Ex-preterm neonates should not be considered for day surgery unless medically fit and beyond 60 weeks post-conceptual age.¹³ Infants with a history of chronic lung disease or apnoeas should be managed in a centre equipped with facilities for post-operative ventilation.¹⁰
- 3.3 The specific needs of children must be considered at all stages of day care. Children experiencing day surgical care require all the facilities and staffing that would be expected in any paediatric unit. This may be achieved by providing separate paediatric day surgery units in larger institutions, separate areas for children in a single unit, or closing the unit to adults on particular days when only paediatric surgery is undertaken. It is particularly important that children are recovered in separate areas by appropriately trained and qualified staff.
- 3.4 The management and care of children undergoing day surgery should comply with standards of care irrespective of whether children are managed in a specialist paediatric unit or an adult unit adapted for children.¹⁴
- 3.5 Nursing staff caring for children must be skilled in paediatric and day surgical care and trained in child protection.
- 3.6 Anaesthetists who anaesthetise children must have received appropriate training. Their competency in anaesthesia, resuscitation and child protection must remain current. If they do not undertake regular paediatric sessions then a mechanism should be found using CPD time to maintain skills, often by attachment to a local paediatric unit.
- 3.7 There must be clear discharge criteria for children following day care surgery.¹³
- 3.8 There must be access to a paediatrician. Where the DSU does not have in-patient paediatric services, robust arrangements should be in place for access to a paediatrician and transfer to a paediatric unit if necessary.
- 3.9 Other safeguards must be in place when providing day surgery for children in DSUs that are not in hospitals with in-patient paediatric care.

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- 3.10** The provision of good quality information to parents and children is essential. This should include:
- fasting guidelines
 - clear instructions for use of drugs for pain relief
 - what to do if the child becomes unwell before or after the operation.
- 3.11** A pre-admission programme for children should be considered to decrease the impact and stress of admission to the DSU on the day of surgery.

4 Training and education

- 4.1** As day surgery will form a substantial proportion of most consultant anaesthetists' workload, appropriate and comprehensive training in this sub-specialty must be given according to current standards.²⁰
- 4.2** Training needs to emphasise the following aspects:
- patient selection and optimisation for day surgery
 - effective post-operative pain relief
 - post-operative nausea and vomiting prevention strategies
 - the necessity of a multidisciplinary team approach in day surgery care
 - the requirement for 'street fitness' on discharge
 - the post-operative management of patients in the community.
- 4.3** Appropriate continuing professional development programmes are also essential for maintaining safe day surgery.

5 Research and audit

- 5.1** Each DSU should have a system in place for the routine audit of important basic parameters such as unexpected admissions following surgery, DNA rates and patients cancelled on day of operation.^{2,3}
- 5.2** Audits should rely only on procedure-specific data and not on overall percentages. Auditors can compare activity by procedure and unit.
- 5.3** The Royal College of Anaesthetists has also issued guidance for audits in day surgery.²²
- 5.4** Audit should be co-ordinated and led by designated staff members.
- 5.5** Audit should be integrated in wider areas of anaesthetic and surgical practice.
- 5.6** Audit in clinical practice and patient care in day surgery should involve all staff. A system should exist for the regular feedback of audit information to staff to reinforce good practice and help to effect change. This feedback may take the form of regular meetings or updates, or a local newsletter.
- 5.7** Traditionally, much anaesthetic research (particularly the development of anaesthetic agents) has been conducted in the day surgery setting. The swift transit through first and second stage recovery is an ideal testing ground for new anaesthetic and analgesic agents.

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6 Organisation and administration

- 6.1 Each DSU should have a clinical director or specialty lead. This will often, but not always, be an anaesthetist. The role of the clinical director is to champion the cause of day surgery and ensure that best practice is followed. This role should be recognised by adequate programmed activity allocation and provided with appropriate administrative support.^{1,3}
- 6.2 There should be a senior nurse manager who, with the clinical director, can provide the day-to-day management of the unit.
- 6.3 Many larger units, especially those that are freestanding, may find it helpful to have a separate business manager to support the clinical director and senior nurse.
- 6.4 The clinical director should chair a management group and liaise with all those involved in day care. This will include representatives from surgery, anaesthesia, nursing, pharmacy, management, finance, community care (both nursing and medical), audit, professions allied to medicine, and representatives of patient groups.
- 6.5 Mixed in-patient and day surgery lists may increase flexibility, but this practice should be minimised as conflicting priorities can compromise the care of both groups.²⁷
- 6.6 Day case patients should always be managed on dedicated day case ward areas to ensure safe and timely discharge.^{3,27,36}
- 6.7 The surgeon involved in the case must remain responsible for the patient, and he/she or a suitable deputy must be available to deal with any problems that arise.
- 6.8 For commissioning purposes, suggested indicators of quality of a DSU include: day surgery existing as a separate and 'ring fenced' administrative care pathway, a senior manager directly responsible for day surgery, pre-operative assessment undertaken by staff familiar with the day surgery pathway, provision of timely written information, appropriate staffing levels, nurse-led discharge, provision for appropriate post-operative support including follow up and outreach after home discharge and involvement and feedback from patients, the public and community practitioners.³ This list, however, is not exhaustive and other factors – such as theatre utilisation, levels of unplanned overnight admissions after day surgery, management of pain relief and post-operative nausea and vomiting, and complication and readmission rates – are also important quality indicators which should be audited regularly.
- 6.9 A number of unplanned surgical operations (for example abscess drainage, superficial lacerations or hand trauma) can be managed on a day case basis^{2,39} with semi-elective admission to day surgery facilities on the day of operation and discharge later the same day. In contrast, the accommodation of emergency in-patients within the ward environment of day surgery facilities, without alteration of the surgical pathway, represents a failure of bed capacity planning and causes disruption of effective ambulatory care.³

7 Patient information

- 7.1 Clear and concise information given to patients at the right time and in the correct format is essential to facilitate good day surgery practice.² Much of this information may be given to patients at pre-assessment. Verbal information should always be reinforced with printed material. Alternative means of communication with patients, including the internet and text messaging, should be considered.

39 Smith I. Emergency day surgery (Editorial). *J One-day Surg* 2009;**19**(1):2–3.

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- 7.2 Information must be arranged in such a way that it is comprehensive and comprehensible and should be available in a format suitable for the visually impaired. It may be necessary to provide information leaflets in a number of different languages to accommodate the needs of the local population.
- 7.3 Whatever form the information takes it must be sufficient to allow informed consent.²³
- 7.4 At a minimum, information provided to patients should include:
- Date and time of admission to the unit. Location of the unit, and travel instructions.
 - Details of the surgery to be undertaken, and any relevant pre-operative preparations required of the patient.
 - Information on the anaesthetic to be provided, including clear instruction for pre-operative fasting, and the way in which patients will manage their medication.
 - Post-operative discharge information, including details of follow up appointments, management of drugs, pain relief and dressings, and clear instruction on whom to contact in the event of post-operative problems.
 - Patients must also be made aware at the pre-admission visit that conversion to in-patient care is always a possibility.

Further reading

- Smith I et al. Day case surgery. Oxford specialist handbooks. *Oxford University Press*, 2012.

Chapter 7

GUIDELINES FOR THE PROVISION OF anaesthetic services

Anaesthesia services for care in the non-theatre environment 2015

Author

Dr C Peden, Royal United Hospital, Bath

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of services for anaesthetic care in the non-theatre environment 2015

Summary

- Anaesthetic services in the non-theatre environment include life support and resuscitation, as well as the provision of sedation and anaesthesia for patients in the intensive care unit, radiology department, emergency department (ED), endoscopy, cardiac catheter laboratories and for those undergoing cardioversion, electroconvulsive therapy (ECT), and intra- and inter-hospital transfer during critical illness.
- The risks associated with anaesthesia in the non-theatre environment should be minimised by proper planning and anaesthetic service provision. Where appropriate, the guidelines for anaesthesia in remote sites should be followed.¹ Whenever possible all anaesthetic equipment should be standardised across all areas providing anaesthetic services. When sedation is provided national standards and guidance should be followed.^{2,3,4}
- There should be a named lead anaesthetist responsible for each of the principal services provided outside the main operating theatres.
- Monitoring and anaesthetic equipment should comply with the national standards stipulated for use in operating theatres.^{2,5} and be checked in accordance with national standards.⁵ These should include the routine use of capnography in any situation where anaesthesia is induced. Continuous capnography should be used for all patients undergoing moderate or deep sedation, and should be available wherever any patients undergoing anaesthesia or moderate or deep sedation are recovered.⁶ In areas where X-rays or other radiation is used, slave monitors in screened areas should be provided.
- Where general anaesthesia is provided, dedicated trained assistance for the anaesthetist is essential.⁷ It is of particular importance in the non-theatre environment that the whole team participate in a safety briefing and use the appropriate version of the WHO checklist and venous thromboembolic (VTE) assessment.^{8,9}
- An appropriate location and staff for the post-anaesthesia recovery of the patient must be identified.¹⁰

1 Anaesthetic services in remote sites. *RCoA*, London 2011 (www.rcoa.ac.uk/node/637).

2 Safe Sedation Practice for Healthcare Procedures: Standards and Guidance. *AoMRC*, London 2013 (www.rcoa.ac.uk/node/15182).

3 Guidance on the provision of anaesthesia services for sedation. *RCoA*, London (www.rcoa.ac.uk/node/17861).

4 AAGBI Safety Guideline. Checking Anaesthetic Equipment 2012 (<http://bit.ly/1fsVhLG>).

5 Recommendations for standards of monitoring during anaesthesia and recovery (4th Edition). *AAGBI*, London 2007 (<http://bit.ly/1gbB7aS>).

6 The use of capnography outside the operating theatre. Updated statement from the Association of Anaesthetists of Great Britain and Ireland. *AAGBI*, London 2011 (<http://bit.ly/1eIFl7i>).

7 The anaesthesia team 3. *AAGBI*, London 2010 (<http://bit.ly/1cHPiWe>).

8 Safe surgery saves lives. *WHO*, 2009 (www.who.int/patientsafety/safesurgery/en/).

9 Report of the independent expert working group on the prevention of venous thromboembolism in hospitalised patients. Sir Liam Donaldson. *DH*, London 2007 (<http://bit.ly/MoudFY>).

10 Immediate post-anaesthesia recovery. *AAGBI*, London 2013 (<http://bit.ly/1eU6yIz>).

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- Inter- or intra-hospital transport of the unconscious or anaesthetised patient should meet published standards.¹¹ Emergency and critically ill patients must be resuscitated and stabilised before transfer.^{8,12}
- Regular audit of anaesthesia or sedation in the non-theatre environment should be performed for quality assurance.^{13,14}

Introduction: the importance of anaesthetic services in the non- theatre environment

- The demand for anaesthetic expertise outside the operating theatre is increasing. The complexity and diversity of the cases has also increased as interventional radiological procedures replace major surgical procedures, for example, coiling replacing open subarachnoid aneurysm repair and endovascular aneurysm repair (EVAR) replacing open aortic aneurysm repair.
- Many of the procedures are undertaken in geographically remote locations, for example electroconvulsive therapy (ECT) in isolated psychiatric units. Such environments require appropriate staffing levels, skill mix and facilities.¹
- A wide range of services require anaesthetic support outside the operating theatre. This list is not exclusive but the commonest areas are:
 - the radiology department for both emergency and routine diagnostic procedures (CT and MRI). Interventional procedures such as neuroradiology are being performed with increasing frequency
 - the emergency department for critically ill or injured patients
 - the psychiatric unit for ECT
 - the coronary care unit for cardioversion
 - the dental department for both sedation and anaesthesia
 - the cardiac catheter laboratory for haemodynamically unstable patients undergoing percutaneous coronary intervention, and children undergoing investigation and treatment
 - the endoscopy unit for sedation
 - the radiotherapy department for planning and treatment of adults and children undergoing radiotherapy
 - the intensive care unit
 - inter- and intra-hospital transport of critically ill patients.
- The patients include those who are emergency cases and critically ill patients, paediatric patients (often with complex medical conditions) and patients with learning disabilities who may otherwise not tolerate procedures, such as dental extractions.
- These standards are relevant to, but do not specifically focus on, intensive care units or inter- hospital transport because these environments are covered in other standards documents.

11 Interhospital transfer. AAGBI Safety Guideline. *AAGBI*, London 2009 (<http://bit.ly/1fiecT>).

12 Guidelines for the transport of the critically ill adult (3rd Edition). *ICS*, London 2011 (<http://bit.ly/1kXecFZ>).

13 Implementing and ensuring safe sedation practice for healthcare procedures in adults. Report of an intercollegiate working party chaired by The Royal College of Anaesthetists. *AoMRC*, London 2001 (www.rcoa.ac.uk/node/2270).

14 Raising the standard: a compendium of audit recipes (3rd Edition). Section 6: Anaesthesia and Sedation outside theatres. *RCoA*, London 2012 (www.rcoa.ac.uk/node/8632).

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Levels of provision of service

1 Staffing requirements

- 1.1 It is essential that a dedicated, skilled anaesthetic assistant with an appropriate nationally recognised qualification is available in locations outside the operating theatre where help may not be immediately available to the anaesthetist should difficulties arise. Unfortunately it is often in these more challenging, less frequently used environments that recommended standards are not met. It must be stressed that ‘the safe administration of anaesthesia cannot be carried out single-handedly; competent and exclusive assistance is necessary at all times.’⁷
- 1.2 If sedation is performed without an anaesthetist present, a designated, appropriately trained individual should be responsible for monitoring the patient and keeping records. This should be their sole responsibility¹² and comply with the Trust’s sedation policy.
- 1.3 If patients are cared for in an isolated/single specialty unit there must be appropriate medical cover and nursing care.
- 1.4 If patients are recovered from anaesthesia or sedation in an isolated unit, they should receive care to the same standard as that required in an operating theatre post-anaesthetic care unit (PACU).¹⁰ For major procedures, such as endovascular aneurysm repair (EVAR), which may require prolonged recovery, this may mean transferring the patient to the main PACU in the hospital.
- 1.5 In areas where anaesthesia or sedation are carried out frequently, a named consultant anaesthetist should be involved in developing the service, the training and revalidation of staff, and ensuring that safety standards and audit are appropriate.^{13,15}

2 Equipment, support services and facilities

- 2.1 Any environment in which patients receive anaesthesia or sedation must have full facilities for resuscitation available, including a defibrillator, suction, oxygen, airway devices and a means of providing ventilation. All patient trolleys should be capable of being tipped into the head down position and be easily transferred to the rest of the hospital. Access to lifts for easy trolley transfer must be available.
- 2.2 The anaesthetist must ensure that an adequate supply of oxygen is available before starting any procedure. Many of the sites where anaesthesia is provided outside the main operating theatres do not have piped oxygen; if anaesthesia is provided frequently in such a location, the use of the location should be reviewed or piped oxygen provided. Where piped oxygen is available, back-up cylinders must always be available.
- 2.3 Ideally, anaesthetic equipment should be standardised throughout the hospital. Remote anaesthesia locations have often suffered from having older equipment not in use elsewhere. This is not acceptable and the location should be reviewed.
- 2.4 **Drugs**
Wherever anaesthesia or sedation is undertaken, a full range of emergency drugs including specific reversal agents such as naloxone and flumazenil must be made available. In remote locations where anaesthesia is undertaken, drugs to treat rare situations, such as dantrolene for malignant hyperthermia, should be available within five minutes. Emergency drug stores, and individual drugs retained for rare events, should be checked regularly for expiry dates.

15 Safe Sedation, Analgesia and Anaesthesia within the Radiology Department. RCR, London 2003 (<http://bit.ly/1jNbxP4>).

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2.5 Environment

Many remote locations are not designed specifically for the management of anaesthetised patients. There may be radiological equipment that makes access to, or visualisation of, the patient difficult. The room may be darkened to provide optimal image viewing, but hinder direct observation of the patient. Many of the tables upon which radiological procedures are undertaken do not tip. Imaging equipment arms may move around the patient with the risk of dislodgement of airway tubing, lines and monitoring equipment. The environment may be deliberately cooled to provide optimal operating conditions for equipment or operators, posing a particular problem when managing paediatric patients. The anaesthetist must consider all of these factors when planning anaesthesia. Simple solutions to be considered include the availability of a torch to record notes and observe the patient, the provision of warming equipment for all patients, and transport incubators for babies.

2.6 Safety

Patient safety is, as always, of paramount importance, and particular attention should be paid to teamwork, communication and the use of checklists when working in less familiar environments.⁵ At the team briefing an explicit plan should be agreed for getting help if needed.

2.7 There are also environmental hazards for staff to consider, such as radiation exposure, magnetic resonance (MR) fields and lack of scavenging. Pregnant personnel may be particularly at risk in these environments and should follow local occupational health policy. All staff should complete a screening questionnaire before entering the magnetic field of an MR system.

2.8 In remote off-site locations, such as psychiatric hospitals where anaesthesia is provided for ECT, advanced plans should be made to manage patient transfer if required.

2.9 Pre-admission assessment guidelines and protocols

Many patients having elective procedures outside the operating theatre can be managed as day cases and should be assessed accordingly in conjunction with local guidelines. More complex patients require assessment to at least the same standard as required for surgery.¹⁶ If there is any concern about the safety of the procedure being undertaken at a remote location, for example, ECT in a psychiatric hospital, then arrangements should be made to perform the procedure in an operating theatre environment.

3 Areas of special requirement

3.1 Children

Children should be managed always in line with RCoA recommendations.¹⁷ Children presenting for anaesthesia outside the operating room may present particular challenges because procedures required are likely to be for diagnostic imaging (MR or CT) or radiotherapy. These children may, therefore, have complex medical conditions requiring repeated treatments or investigations, and specialist assessment and expertise. There is debate as to whether children undergoing MR or CT are best managed with anaesthesia or sedation. Guidance for paediatric sedation should be developed for the local context by

16 Pre-operative assessment and patient preparation. The role of the anaesthetist. *AAGBI*, London 2010 (<http://bit.ly/1hpooXa>).

17 Guidance on the provision of paediatric anaesthesia services. *RCoA*, London 2015 (www.rcoa.ac.uk/node/17853).

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a multidisciplinary team;^{18,19} sedation for children in a district hospital is very different to that in a specialist children's centre. Paediatric sedation should be managed in accordance with recognised guidelines.²⁰

3.2 The emergency department (ED)

Patients requiring anaesthesia in the emergency department are frequently critically ill or injured, and may be in extremis. Their physiological derangement and sensitivity to anaesthetic agents, coupled with the potential for increased difficulty in tracheal intubation, requires the presence of an anaesthetist with the competence to manage these challenges in a timely and effective manner. NCEPOD commented in their 2007 report²¹ that patient care for critically ill and injured patients may be compromised by inexperienced doctors providing anaesthesia, compounded by a lack of trained assistance, inadequate supervision and problems with availability of drugs and equipment.

The College of Emergency Medicine recognises that emergency physicians should have the requisite skills to manage an airway in the first 30 minutes of admission.²² Many emergency patients are managed with rapid sequence induction by emergency physicians,²³ most of whom are senior doctors. Such procedures should only be undertaken by doctors with adequate training and experience in anaesthetic agents and airway management. The safe management of these vulnerable patients depends on close liaison between emergency physicians and anaesthetists to ensure that clear guidelines are in place, emergency department support staff are trained to assist with intubation and that audit and discussion of complications is undertaken regularly. A designated consultant anaesthetist should be responsible for ensuring that services meet the recommendations laid out here and in other guidelines.^{13,14,24}

Failed intubation is more common in the emergency department.²² The [4th National Audit Project 'Major complications of airway management' \(NAP4\) \(March 2011\)](#) raised particular concerns about complications of airway management in ICU and the emergency department. At least one in four major airway complications reported to NAP4 was from the ICU or the emergency department. Common factors included unrecognised oesophageal intubation or unrecognised displacement of tracheal tubes or tracheostomy tubes after patient movement, intervention, or during transport. Capnography was frequently absent or a flat capnography trace due to airway displacement was misinterpreted during cardiopulmonary resuscitation. The absence of capnography, or the failure to use it properly, contributed to 80% of deaths from airway complications in the ICU and 50% of deaths from airway complications in the emergency department.⁶ Difficult intubation equipment, waveform capnography and training for the management of the emergency airway must be available.^{22,23} As airway management in the ED can be particularly challenging, dedicated trained assistance should be provided. Use of an emergency checklist for intubation should be considered.²⁴

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- 18 Sury M et al. Guideline Development Group. Sedation for diagnostic and therapeutic procedures in children and young people: summary of NICE guidance. *BMJ* 2010;**341**:6819.
- 19 Guidelines for sedation in children and young people. RCoA/AAGBI reponse. RCoA, London 2011 (www.rcoa.ac.uk/node/772).
- 20 Sedation in children and young people (CG112). NICE, London 2012 (<http://guidance.nice.org.uk/CG112>).
- 21 Trauma: who cares? A report of the National Confidential Enquiry into Patient Outcome and Death. NCEPOD, London 2007 (<http://bit.ly/NrHLBh>).
- 22 Nolan J, Clancy M. Airway management in the emergency department. *Br J Anaesth* 2002;**88**:9–11.
- 23 Stevenson AGM et al. Tracheal intubation in the emergency department: the Scottish district hospital perspective. *Emerg Med J* 2007;**24**:394–397.
- 24 Raising the standard: a compendium of audit recipes (3rd Edition). Section 6, Audit 6.1: Anaesthesia in the accident and emergency department. RCoA, London 2012 (www.rcoa.ac.uk/node/8632).

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Hospitals need to ensure that their anaesthesia and/or intensive care services are staffed to a level, that allows them to respond in a timely manner to care for emergency patients in the ED. The RCoA Audit guidelines make recommendations about response times for anaesthetists to the ED.²⁵ Local response times should be audited and standards set. Other considerations for the management of the critically ill patient in the ED are:

- the ability of equipment to warm or cool rapid infusions of fluid or blood
- the easy availability of a blood gas analyser to monitor arterial blood gases in the emergency department
- many of these patients will require inter-hospital transfer to the regional trauma centre and local and national guidelines for transfer should be followed.^{11,12} Transfer of patients within the hospital to ICU, radiology or the operating theatre will require a tipping transfer trolley equipped with a portable defibrillator, oxygen cylinders, suction, a transport ventilator, infusion pumps and monitoring with adequate battery life. All equipment must be checked regularly
- documentation, to the standard used in the operating theatre, should be kept for all cases and this should include the grade and specialty of the doctor performing and supervising the anaesthetic.

A joint document in 2012 from the College of Emergency Medicine and the Royal College of Anaesthetists on 'Safe Sedation of adults in the emergency department' reminds clinicians of the different levels of sedation and sets standards for sedation in the emergency department.²⁶ A recent review of clinical policy on procedural sedation and analgesia by the American College of Emergency Physicians broadly supports the standards set in this document.²⁷

3.3 The radiology department

The frequency with which complex procedures are carried out in the radiology department is increasing. Patients requiring general anaesthesia in the radiology department may have life-threatening conditions. The radiology department represents a more difficult environment in which to give an anaesthetic than an operating theatre.¹⁵ Staff should be aware of the environmental challenges and exposure to ionising radiation should be kept to a minimum by the use of screens or lead-gowns; remote slave monitors in screened viewing areas should be provided and staff should remain as distant from the imaging source as possible if they must remain in the X-ray environment.

Patients who are moved from the emergency department for investigation must be stable before transfer. The anaesthetist accompanying the patient must be senior enough to manage all eventualities in an isolated environment and should be accompanied by dedicated trained assistance.

Equipment for induction, maintenance and emergence from routine general anaesthesia should be available at all times and of similar quality to that available in the operating theatre. Radiology tables do not tilt into a head down position. The patient may therefore require induction, or emergence from anaesthesia on a tipping trolley.

25 Safer intubation through the use of a pre-induction checklist. *RTIC Severn*, 2011 (www.saferintubation.com/).

26 Safe Sedation of Adults in the Emergency Department. Report and Recommendations from the Royal College of Anaesthetists and the College of Emergency Medicine Working party on sedation, anaesthesia and airway management in the emergency department. *RCoA*, London 2012 (www.rcoa.ac.uk/node/10214).

27 Clinical Policy: Procedural sedation and analgesia in the emergency department. American College of Emergency Physicians subcommittee on procedural sedation and analgesia. *Ann Emerg Med* 2014;**63**:247–258.

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Trainee anaesthetists must be familiarised with equipment and the location of resuscitation devices in the radiology department as part of their induction to a new hospital; they will frequently be the anaesthetist accompanying patients for emergency scans.²⁸

MRI

Guidelines are available for the management of patients in the Magnetic Resonance Suite.^{29,30} Essential points to be considered are:

- anaesthetic equipment that is used in the MRI scanning room must be MR compatible
- remote monitoring of the patient with slave screens is essential to allow the anaesthetic team to monitor the patient from outside of the magnetic field
- particular consideration must be given to the problems of using infusion pumps. All non-essential pumps and equipment must be removed from the patient before entering the magnetic field
- all staff taking a patient to MR should understand the unique problems caused by monitoring and anaesthetic equipment in this environment. It is not acceptable for inexperienced staff unfamiliar with the MR environment to escort or manage a patient here, particularly out of hours
- the patient and all staff should have an MR safety and exclusion questionnaire completed before entering the magnetic field
- in the event of an adverse incident in the MRI scanning room, the patient should be removed from the scanning room without delay; immediate access to an anaesthetic preparation room or resuscitation area is essential.

Interventional radiology

If a radiology department provides an emergency interventional service for which general anaesthesia may be required, plans for staffing this anaesthetic service should be made, particularly outside of normal working hours.^{31,32,33} Procedure specific agents such as those required to manipulate coagulation, intracranial pressure and arterial blood flow, should be immediately available. Interventional vascular radiology may involve treating unstable patients with severe haemorrhage. Such patients may include those with significant gastrointestinal bleeding or patients with post partum haemorrhage.³⁴ Equipment to deal with these patients must be easily available. This includes that necessary to introduce and monitor invasive vascular catheters, rapid infusion devices, blood and fluid warming devices and patient warming devices. The hospital's major haemorrhage protocol should be displayed in a visible location and periodically rehearsed.

Cardiac catheter laboratories

Anaesthetists are requested to provide services for an increasing number of cardiological procedures, pacemaker box changes, lead extractions, defect closures, revascularisations and TAVIs. Exactly the same conditions apply as for the radiology department with some

28 Raising the standard: a compendium of audit recipes (3rd Edition). Section 6, Audit 6.2: Anaesthesia in the radiology department. RCoA, London 2012 (www.rcoa.ac.uk/node/8632).

29 Provision of anaesthetic services in magnetic resonance units (updated 2010). AAGBI, London 2002 (<http://bit.ly/1mD7MxH>) and MRI update – safety in magnetic resonance units. AAGBI, London 2010 (<http://bit.ly/1dprByN>).

30 Safety guidelines for magnetic imaging equipment in clinical use. MHRA, London 2007 (<http://bit.ly/1cgxfCZ>).

31 Webb ST, Farling PA. Aneurysmal subarachnoid haemorrhage. *Anaesth* 2005;**60**:560–564.

32 Interventional vascular radiology and interventional neuroradiology. A report of the National Confidential Enquiry into Peri-operative Deaths. NCEPOD, London 2000 (<http://bit.ly/1cHYHx1>).

33 Varma MK et al. Anaesthetic considerations for interventional neuroradiology. *Br J Anaesth* 2007;**99**:75–85.

34 The role of emergency and elective interventional radiology in postpartum haemorrhage (Good Practice No.6). RCOG, London 2007 (<http://bit.ly/1gwQPgV>).

additional conditions. A separate set of full anaesthetic patient monitoring, including ECG, is recommended in addition to the cardiologist's arrangements, which can be unreliable, with a remote slave monitor in the screened viewing area. These cardiac patients are often at high risk of cardiac arrest and the facilities and adequate space for managing this possibility should be optimised and frequently rehearsed. On rare occasions cardiopulmonary bypass may be required and the catheter laboratory should have sufficient space, medical gas outlets and electrical sockets etc to meet this demand. Anaesthetists should be aware of their radiation exposure in cardiac catheterisation laboratories and ensure they use all protective gowns and screens, and wear exposure monitoring badges if requested to do so.

3.4 Anaesthesia for electroconvulsive therapy (ECT)

Anaesthesia provided for ECT is frequently performed in remote locations and its conduct may directly influence the efficacy of treatment. Ideally, anaesthesia should be performed by a consultant; the guidance provided for anaesthetic provision in remote sites should be followed.¹ The unit should have been assessed and accredited by the ECT accreditation service (ECTAS for England and Wales, Scottish ECT Accreditation Network for Scotland). Anaesthetists must have a specialised knowledge of the effect of concurrent medication, anaesthetic agents and anaesthetic techniques on the conduct and efficacy of ECT, as well as the specific anaesthetic contraindications.³⁵

There must be a named consultant responsible for provision of the service in each anaesthetic department^{1,35} and a consultant must be responsible for determining the optimal location for provision of anaesthesia for patients of ASA III or above.¹ Contingency plans for transfer to an acute facility must also be in place.¹

Minimum standards specific to ECT include the provision of a treatment room and a recovery room.³⁵ Whilst an anaesthetic machine may not be required, there must be a flow-controlled oxygen supply, either by pipeline or cylinder with a reserve supply immediately available.³⁵ Equipment for managing the airway, including the difficult airway, emergency drugs and resuscitation equipment must all be available. Standards for monitoring and recovery are stipulated by the AAGBI and must be adhered to for all ECT cases.

It is recommended that patients refrain from driving for 24 hours after anaesthesia. However, the DVLA³⁶ has recommended that patients should cease to drive during the acute phase of a severe psychiatric illness because of possible cognitive impairment. This includes patients receiving a course of ECT.

3.5 Anaesthesia for direct current (DC) cardioversion

Patients requiring DC cardioversion may present as emergency or elective cases. The disturbance of physiological rhythm, the reduction in cardiac performance and the risk of embolic phenomena all place these patients at risk of serious complications when undergoing both anaesthesia and DC shock.

35 The ECT handbook (3rd Edition). *RCPsych*, London 2013 (<http://bit.ly/1fnopJD>).

36 At a glance guide to the current medical standards of fitness to drive. *DVLA*, Swansea 2013 (<http://bit.ly/1lfnGN7>).

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Precautions prior to embarking on DC cardioversion should include the immediate availability of emergency anaesthetic drugs, resuscitation and external pacing equipment.^{2,37} Resuscitation equipment should be checked and monitoring applied prior to induction of anaesthesia.^{2,37} Recent serum electrolytes, in particular potassium and preferably magnesium, as well as the patient's anticoagulation status and a recent ECG should all be checked prior to embarking on anaesthesia.^{16,37} A pre-procedure echocardiogram is likely to provide useful information.³⁸

The optimal anaesthetic technique is undergoing review and results from the Cochrane group are still pending at the time of this update.³⁹ Current evidence would indicate prolonged recovery times and post-procedural confusion following the use of midazolam and diazepam.^{39,40,41,42}

The anaesthetist should not be responsible for performing the cardioversion; an appropriately trained physician, cardiologist or supervised nurse specialist is responsible for this role.

3.6 Anaesthesia for radiotherapy

Anaesthesia may be required for radiotherapy to facilitate patient positioning and to alleviate pain. Due to the unique nature of the procedures involved in radiotherapy, the remoteness of the location and the lack of direct access to the patient, only anaesthetists familiar with the therapy should embark on anaesthesia for these patients.^{43,44}

Anaesthetists must be familiar with the adverse effects of high concentrations of oxygen in the presence of some anti-neoplastic agents and adjust their technique accordingly. Facilities for recovering patients may be unavailable, so that either the anaesthetist must be available until the patient is fully recovered, or transfer to the main theatre recovery area should be organised. Tumours of the lower body may be amenable to regional anaesthesia,⁴⁴ and so equipment and facilities to instigate, monitor and manage regional blockade must be available.

Paediatric cases warrant the presence of an experienced paediatric anaesthetist.

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- 37 Raising the standard: a compendium of audit recipes (3rd Edition) Section 6, Audit 6.5: Anaesthesia for cardioversion. RCoA, London 2012 (www.rcoa.ac.uk/node/8632).
- 38 Maltagliati A et al. Usefulness of transoesophageal echocardiography before cardioversion in patients with atrial fibrillation and different anticoagulant regimens. *Heart* 2006;**92**:933–938.
- 39 Khalaiwi KA et al. Anaesthesia for cardioversion (Protocol). *Cochrane Database of Systematic Reviews* 2007, Issue 1, Article Number: CD006326 (<http://bit.ly/1hfU139>).
- 40 Wood J, Ferguson C. Procedural sedation for cardioversion. *BestBets*, 2006 (<http://bit.ly/105PLU1>).
- 41 Canessa R et al. Anesthesia for elective cardioversion: A comparison of four anesthetic agents. *J Cardiothor Vasc Anesth* 2004;**5**:566–568.
- 42 Stoneham MD. Anaesthesia for cardioversion. *Anaesth* 1996;**51**:565–570.
- 43 Raising the standard: a compendium of audit recipes (3rd Edition) Section 6, Audit 6.3: Anaesthesia for radiotherapy. RCoA, London 2012 (www.rcoa.ac.uk/node/8632).
- 44 Benrath J et al. Anaesthesia for brachytherapy – 5 1/2 years of experience in 1622 procedures. *Br J Anaesth* 2006;**96**:195–200.

3.7 General anaesthesia and sedation for dental procedures

General anaesthesia for dentistry must be administered only by anaesthetists in a hospital setting; this stipulation resulted from a DH report reviewing general anaesthesia and conscious sedation in primary dental care,⁴⁵ which found that deaths were still occurring despite an earlier report which aimed to improve standards in dental surgeries. There are recent comprehensive guidelines for the management of children referred for dental extractions under general anaesthesia.⁴⁶

Dentists are allowed to administer conscious sedation in dental surgeries. There are clear guidelines on the standards that must be met to ensure patient safety in these circumstances.⁴⁷

3.8 Gastrointestinal procedures

Many of the initial concerns relating to the safety of patients receiving sedation and anaesthesia outside operating theatres related to gastrointestinal endoscopy.¹³ Despite marked improvements in procedures this is still a high risk area; the British Society of Gastroenterology states that there is no room for complacency.⁴⁸ Half of the claims from the American Society of Anaesthesiologists Closed Claims database (1970–2001)⁴⁹ relating to sedation outside the operating theatre, stem from procedures performed within the gastrointestinal suite. The causative mechanism of patient insult was inadequate oxygenation or ventilation.

Anaesthetists are not usually involved in the routine sedation of patients for endoscopy; indeed many centres now use nurse sedationists. The British Society of Gastroenterology guidelines should be followed.⁴⁸ Anaesthetic involvement may be requested for high risk patients including those with potential GI bleeding. In these circumstances full general anaesthesia with rapid sequence induction and intubation in an operating theatre may be the safest option.

In some countries sedation with propofol has been used for complex GI procedure such as endoscopic retrograde cholangiopancreatography. It is the view of the RCoA and the British Society of Gastroenterology that sedation for such complex procedures with propofol should be the responsibility of a dedicated and appropriately trained anaesthetist.⁵⁰ A review of anaesthetic considerations is provided by Garewal and colleagues.⁵¹

45 A conscious decision: a review of the use of general anaesthesia and conscious sedation in primary dental care. *DH*, London 2000 (<http://bit.ly/1fHntP1>).

46 Guidelines for the management of children referred for dental extractions under general anaesthesia. *APAGBI*, London 2011 (www.rcoa.ac.uk/node/2269).

47 Conscious sedation in the provision of dental care. Report of an expert group on sedation for dentistry. Standing Dental Advisory Committee. *DH*, London 2003 (<http://bit.ly/MtXzmk>).

48 Guidelines on safety and sedation during endoscopic procedures. *BSG*, London 2003 (<http://bit.ly/1hgoluj>).

49 Robbertze R et al. Closed claims review of anesthesia for procedures outside the operating room. *Curr Opin Anaesthesiol* 2006;**19**:436–442.

50 Guidance for the use of propofol sedation for adult patients undergoing endoscopic retrograde cholangiopancreatography (ERCP) and other complex upper GI endoscopic procedures. Joint Royal College of Anaesthetists and British Society of Gastroenterology working party. *RCoA*, London 2014 (www.rcoa.ac.uk/node/2266).

51 Anaesthetic considerations for endoscopic retrograde cholangio-pancreatography procedures. *Curr Opin Anesthesiol* 2013;**26**:475–480.

Chapter 8

GUIDELINES FOR THE PROVISION OF anaesthetic services

Anaesthesia services for resuscitation 2015

Authors

Dr J Nolan, Royal United Hospital, Bath
Dr J Soar, Southmead Hospital, Bristol

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for resuscitation 2015

Summary

- Early recognition of the deteriorating patient, escalation of care and prompt, effective treatment can prevent cardiac arrest,¹ unplanned intensive care unit admission and death. Implementation of a ‘track and trigger’ tool, such as the National Early Warning Score (NEWS), is fundamental to this strategy.
- Anaesthetists play a significant role in the resuscitation team and in the resuscitation training of doctors, nurses and paramedics.
- National standards for clinical practice and training in cardiopulmonary resuscitation have been published elsewhere.²
- The majority of in-house resuscitation training in the UK is undertaken by resuscitation officers (ROs) but the instructor body on a Resuscitation Council (UK) course will usually include anaesthetists.³
- All resuscitation attempts should be included in continuous audit as part of quality improvement.
- The resuscitation services in a hospital should be co-ordinated by a resuscitation committee that includes a senior anaesthetist.²

Introduction: the importance of anaesthesia services for resuscitation

- The incidence of in-hospital cardiac arrests attended by a resuscitation team is 1.5 per 1,000 admissions (data from the United Kingdom National Cardiac Arrest Audit). Survival is increased if the first monitored cardiac arrest rhythm is shockable, but this tends to occur in only about 17% of in-hospital arrests. Approximately 18% of in-hospital cardiac arrest patients survive to hospital discharge.⁴ One-third of cardiac arrest survivors admitted to ICU are discharged from hospital and survival rates are improving. Most survivors have a good neurological outcome.⁵
- A resuscitation attempt usually includes chest compressions and ventilation of the lungs, the delivery of electric shocks to restart the heart (defibrillation), and the injection of drugs.
- Anaesthetic departments make a considerable contribution to the resuscitation services in most hospitals. Anaesthetists are valuable members of the resuscitation team because they are highly skilled in most of the interventions used during a resuscitation attempt.³
- Anaesthetists are often involved in training other doctors and nurses in advanced life support (ALS) techniques for both adult and paediatric cardiac arrest.

1 Konrad D et al. Reducing in-hospital cardiac arrests and hospital mortality by introducing a medical emergency team. *Inten Care Med* 2010;**36**:100–106.

2 Quality standards for cardiopulmonary resuscitation practice and training. *RC (UK)*, London 2013 (www.resus.org.uk/pages/QSCPR_Main.htm).

3 Nolan J et al. Advanced life support (6th Edition). *RC (UK)*, London 2011 (www.resus.org.uk/pages/pub_ALS.htm).

4 Nolan JP et al. Incidence and outcome of in-hospital cardiac arrest in the United Kingdom National Cardiac Arrest Audit. *Resuscitation* 2014;**85**:987–992.

5 Nolan JP et al. Outcome following admission to UK intensive care units after cardiac arrest: a secondary analysis of the ICNARC Case Mix Programme Database. *Anaesth* 2007;**62**:1207–1216.

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- Anaesthetists are often involved in training clinical staff to recognise patients at risk of cardiac arrest and to initiate preventative treatment.
- Anaesthetists are skilled in airway management and will be involved in teaching these skills to hospital staff and to paramedics.
- The chair of the hospital resuscitation committee is often a consultant anaesthetist.

Levels of provision of service

1 Staffing requirements

- 1.1 In many UK hospitals the resuscitation team will include an anaesthetist or the resident doctor from the critical care unit. It is increasingly common for the critical care resident doctor to be an individual who has not undergone anaesthesia training and has not been trained in tracheal intubation. Each hospital must have an agreed plan for airway management during cardiac arrest. This may involve bag-mask ventilation for cardiac arrests of short duration, tracheal intubation if this is within the competence of members of the team responding to the cardiac arrest, or the use of supraglottic airway devices.⁶ If the airway role on the resuscitation team is undertaken by an individual who is not skilled in intubation there should be a skilled intubator (usually an anaesthetist) available on site to back up the resuscitation team.
- 1.2 If a resuscitation attempt is initially successful, the patient will usually require transfer to the critical care unit. This transfer will normally be undertaken by an anaesthetist or another doctor from the critical care unit.
- 1.3 The majority of in-house resuscitation training in the UK is undertaken by resuscitation officers (ROs) but the instructor body on a Resuscitation Council (UK) ALS course will usually include anaesthetists.³
- 1.4 Instructors need to maintain their knowledge and skills and need to teach regularly (three courses in two years) to maintain their instructor status.
- 1.5 The time needed for anaesthetists to teach on these courses should be taken into consideration as part of the job planning process. It is inappropriate for instructors to be expected to use their own study leave to deliver resuscitation training, which is a mandatory requirement for many hospital doctors.
- 1.6 One consultant anaesthetist should take a lead role in resuscitation – this individual should be a member of the trust resuscitation committee and is often the chair. In large hospitals, this role may carry a significant workload and should be supported with appropriate administrative time.

2 Equipment, support services and facilities

Equipment

- 2.1 Relatively little equipment is required by the resuscitation team.
- 2.2 The defibrillator-monitor is central to the resuscitation attempt and these must be located strategically to enable shock delivery within three minutes of a patient arrest anywhere in the hospital.⁷

6 Cardiac arrest procedures: time to intervene? *NCEPOD*, London 2012 (www.ncepod.org.uk/2012cap.htm).

7 Deakin CD et al. European Resuscitation Council guidelines for resuscitation. Section 4: adult advanced life support. *Resuscitation* 2010;**81**:1305–1352.

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- 2.3** Waveform capnography should be available to confirm tracheal tube placement. The end-tidal carbon dioxide values may also provide feedback on the quality of chest compressions but data confirming the reliability of this function are awaited.⁸
- 2.4** A comprehensive list of the equipment required for adult and paediatric resuscitation is given on the Resuscitation Council (UK) website (www.resus.org.uk).
- 2.5** Additional equipment (for example, transport monitor, ventilator) will be required for transferring the resuscitated patient to the critical care unit.
- 2.6** Equipment for training, including adult and paediatric manikins, airway management trainers, an ECG monitor and rhythm simulator and at least one defibrillator dedicated for training should be available. Training equipment, including defibrillators, should be the same as the equipment used in the clinical areas of the institution.²
- 2.7 Support services**
Every hospital should have at least one RO (or similar title, e.g. resuscitation services lead), who is responsible for co-ordinating the teaching and training of staff in resuscitation.
- 2.8** The role of the RO and the facilities required to deliver resuscitation training are detailed in ‘Cardiopulmonary resuscitation – standards for clinical practice and training’.²
- 2.9** Other members of the resuscitation team will usually include general medical trainees and ward nursing staff.
- 2.10 Facilities**
Resuscitation trainers must have access to a designated training room and all the relevant training equipment.

3 Areas of special requirement

3.1 Paediatric resuscitation

The typical causes of cardiac arrest in children are different from those of adults and there is some variation in the resuscitation techniques used in children and the newborn. Ideally, organisations should have a separate paediatric resuscitation team – an anaesthetist will be a key member. At least one member of a resuscitation team that may be expected to resuscitate children must have completed a national paediatric resuscitation course (EPLS/APLS) successfully. In addition, all staff with regular involvement in paediatric resuscitation must be encouraged to attend national paediatric resuscitation courses (e.g. EPLS, APLS, NLS). Anaesthetists comprise a significant proportion of the faculty on these courses.

3.2 Trauma resuscitation

Any hospital designated as a Major Trauma Centre (MTC) or a Trauma Unit (TU) must have a trauma team for the resuscitation of seriously injured patients (this is mandated in the trauma network designation criteria). Airway management can be particularly challenging in these patients and the anaesthetist has a vital role to play in the trauma team. Anaesthetists will also be responsible for intra- and inter-hospital transfer of injured and critically ill patients – this can involve considerable resources in terms of time and personnel. The implementation of trauma networks has increased the need for secondary transfer from a TU to an MTC. Anaesthetists who are expected to resuscitate patients with major injuries should have received Advanced Trauma Life Support (ATLS) or equivalent training. Senior anaesthetists are frequently involved in trauma training for doctors of all disciplines.

8 Safety statement: the use of capnography outside the operating theatre. *AAGBI*, London 2011 (<http://bit.ly/1cnjbNP>).

3.3 Prevention of in-hospital cardiac arrest

The majority of patients sustaining in-hospital cardiac arrest show signs of physiological deterioration in the hours leading up to the event. If these critically ill patients are recognised and treated promptly, many cardiac arrests could be prevented. Many hospitals have established rapid response systems in which experienced nurses and/or doctors are called to patients showing signs of deterioration. Anaesthetists/intensive care physicians are frequently members of these teams and are also involved in training doctors and nurses in the recognition and treatment of critically ill patients.

3.4 Ethics

Every hospital should have an ethical resuscitation policy. This is based usually on the document 'Decisions relating to cardiopulmonary resuscitation'.^{9,10} Anaesthetists/intensive care physicians usually make a significant contribution to the preparation of the local ethical resuscitation policy.

4 Training and education

- 4.1** All anaesthetists in training are expected to undertake specific training in resuscitation. For the majority, this means undertaking courses in Advanced Life Support (ALS), ATLS and APLS/EPLS, followed by annual updates. A variety of methods can be used to maintain resuscitation skills and knowledge (for example, life support courses, simulation training, in-house training, drills in theatre, 'rolling refreshers', e-learning). Obstetric anaesthetists should undergo specific training in resuscitation of the pregnant patient, for example, Advanced Life Support in Obstetrics (ALSO), Managing Obstetric Emergencies and Trauma (MOET) or equivalent local multi-professional courses, and should consider acquiring training in newborn life support (NLS). All anaesthetists should be aware of their organisation's 'do-not-attempt cardiopulmonary resuscitation' (DNACPR) policy especially in relation to peri-operative care.
- 4.2** Life support courses are normally funded through study leave budgets but funding for study leave is diminishing and it is not uncommon for trainees to fund these courses themselves. The provider certificates are valid for four years. Regular updating of resuscitation knowledge is required; this may be achieved by completing another course, attending a specific revalidation course or by in-house training.
- 4.3** Anaesthetists frequently teach on these life support courses – this represents a considerable workload for the average anaesthetic department and must be taken into account when planning requirements for permanent staff.
- 4.4** Most pre-hospital resuscitation in the UK is undertaken by paramedics. These individuals require training in intravenous cannulation and airway management. Paramedics are often taught these skills by anaesthetists during elective surgical lists.

9 Decisions relating to Cardiopulmonary Resuscitation (3rd edition). Guidance from the British Medical Association, the Resuscitation Council (UK), and the Royal College of Nursing (previously known as the 'Joint Statement'). *RC (UK)*, London 2014 (www.resus.org.uk/pages/dnacpr.htm).

10 Decisions about cardiopulmonary resuscitation. Model patient information leaflet (currently under review). BMA, RC(UK) and RCN. *RC(UK)*, London 2008 (www.resus.org.uk/pages/deccprmd.pdf).

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5 Research and audit

- 5.1** All resuscitation attempts should be included in continuous audit. There are international recommendations for the core data that require collection to enable meaningful audit of resuscitation practice.¹¹ Participation in the National Cardiac Arrest Audit (NCAA)¹² is recommended – this enables comparison of local cardiac arrest rates and outcomes with national data. NCAA is included in the Department of Health’s Quality Accounts as a recognised national audit. As members of the resuscitation team, anaesthetists will participate in resuscitation audit. The resuscitation committee is responsible for evaluating and presenting resuscitation audit data and the anaesthetic lead for resuscitation will feed the results of the audit back to the anaesthetic department.
- 5.2** Anaesthetists are encouraged to participate in resuscitation research and they are responsible for many of the UK studies published in this field.

6 Organisation and administration

- 6.1** The resuscitation services in a trust are co-ordinated by a resuscitation committee, which typically meets quarterly. The anaesthetic lead for resuscitation will be a key member of this committee and is often the chair. In large trusts this will represent a significant time commitment and should be recognised as SPA activity in job planning. Much of the day-to-day resuscitation training will be delivered by ROs but more advanced training, especially for the rapid response systems, is often delivered by anaesthetists.

7 Patient information

- 7.1** A model information leaflet that accompanies the ‘Decisions Relating to Cardiopulmonary Resuscitation’ document has been produced by the BMA, RC(UK) and the RCN.¹⁰ Many trusts have produced their own patient information leaflets based on the national document.

11 Jacobs I et al. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update and simplification of the Utstein templates for resuscitation registries. A statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation. *Resuscitation* 2004;**63**:233–249.

12 National Cardiac Arrest Audit (NCAA). ICNARC, London (<https://ncaa.icnarc.org/Home>).

Chapter 9

GUIDELINES FOR THE PROVISION OF anaesthetic services

Obstetric anaesthesia services 2015

Authors

Dr M C Mushambi, Leicester Royal Infirmary
Dr F S Plaat, Queen Charlottes and Chelsea Hospital,
London

In association with the Obstetric Anaesthetists'
Association (OAA)

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

www.rcoa.ac.uk/gpas2015
gpas@rcoa.ac.uk

Guidance on the provision of obstetric anaesthesia services 2015

Summary

- Many of the following points are drawn from the joint Obstetric Anaesthetists' Association (OAA) and Association of Anaesthetists of Great Britain and Ireland (AAGBI) 'Guidelines for Obstetric Anaesthesia Services' (2013).¹
- A duty anaesthetist must be immediately available for emergency work on the delivery suite 24 hours a day and there should be a clear line of communication from the duty anaesthetist to the supervising consultant at all times.^{1,2}
- Each obstetric unit should have a nominated consultant in charge of obstetric anaesthesia services with programmed activities (PAs) allocated for this, in addition to those for clinical 'sessions'. As a basic minimum for any consultant-led obstetric unit, there should be ten consultant anaesthetic sessions per week (two per day), and where elective lists are run daily this would mean at least 15 sessions per week.³ One 'session' is defined as equivalent to 1.25PAs.
- There should be a named consultant anaesthetist with responsibility for planned caesarean section lists. Separate provision of staffing and resources should be available to allow elective work to continue uninterrupted by emergency work.
- Each obstetric unit with an anaesthetic service should have a nominated consultant anaesthetist responsible for training in obstetric anaesthesia.
- A process should be in place for the formal assessment of trainees prior to allowing them to go 'on-call' for obstetric anaesthesia with distant supervision.²
- As part of revalidation, all anaesthetists involved in the delivery of obstetric services must ensure that their own knowledge and skills are kept up to date by undertaking appropriate continuing professional development activities.⁴
- Antenatal education: women should have access to information, in an appropriate language, about all types of analgesia and anaesthesia available, including information about related complications. Patient information leaflets are available at: www.oaa-anaes.ac.uk.
- Guidelines should be available to obstetricians and midwives on conditions requiring antenatal referral to the anaesthetist.
- There should be at least one fully equipped and fully staffed obstetric theatre within the delivery suite.⁵

1 Guidelines for obstetric anaesthetic services. OAA and AAGBI, London 2013 (<http://bit.ly/NzO9Xz>).

2 The Curriculum for a CCT in Anaesthetics (2nd Edition). RCoA, London 2010 (www.rcoa.ac.uk/node/1462).

3 Guidelines for obstetric anaesthetic services (Revised Edition). OAA and AAGBI, London 2005 (<http://bit.ly/NzNPYL>).

4 Continuing professional development: guidance for doctors in anaesthesia, intensive care and pain medicine. RCoA, London 2013 (www.rcoa.ac.uk/node/1922).

5 Staffing of obstetric theatres – a consensus statement. College of Operating Department Practitioners, Royal College of Midwives and Association for Perioperative Practice. CoDP, London 2009 (<http://bit.ly/1jM6Xhg>).

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- Parturients requiring anaesthesia have the right to the same standards of peri-operative care as other surgical patients. Skilled anaesthetic assistance and post-anaesthetic recovery care are of particular importance in obstetrics.
- Anaesthetists should help organise and participate in regular multidisciplinary ‘fire drills’ of emergency situations including major haemorrhage, eclampsia, failed intubation and maternal collapse and multidisciplinary courses.^{6,7}
- Appropriate facilities and trained staff should be available for the management of the sick obstetric patient.⁸
- Access to Level 3 critical care must be available for all obstetric patients and preferably available on site. Portable monitoring with facility for invasive monitoring must be available to facilitate safe transfer of obstetric patients to the ICU.
- Anaesthetists should have some managerial responsibility and should be involved in planning decisions that affect the delivery of maternity services.

Introduction: the importance of obstetric anaesthesia services

- Anaesthetists are involved in the care of over 60% of pregnant women.⁹
- There have been changes in staffing, training and working time legislation affecting obstetric anaesthetic services.^{10,11,12} Obstetric anaesthetic consultants are increasingly involved in the assessment of patients, teaching, training, administration, research and audit.^{12,13}
- There is a need for a dedicated obstetric anaesthesia service for all consultant-led obstetric units. The anaesthetic pre-assessment of high risk women necessitates the early involvement of senior anaesthetists and transfer to intensive care facilities for high risk cases.^{8,14,15} This is supported by the Clinical Negligence Scheme for Trusts (CNST).⁶

6 Clinical negligence scheme for trusts 2011/2012. Maternity clinical risk management standards. Version 1. *NHSLA*, London 2012 (<http://bit.ly/OSYleQ>).

7 O’Herlihy C. Saving mothers’ lives. Reviewing maternal deaths to make motherhood safer: 2006–2008. *BJOG* 2011;**118**:1404–1404.

8 Providing equity of critical care and maternity care for the critically ill pregnant or recently pregnant woman. *RCOA*, London 2011 (www.rcoa.ac.uk/node/1857).

9 Anaesthesia under examination: the efficiency and effectiveness of anaesthesia and pain relief services in England and Wales. Report for the National Audit Commission. *The Audit Commission*, London 1997 (<http://bit.ly/1jM7q3c>).

10 Hours of work of doctors in training: working arrangements of doctors and dentists in training. In: *Junior Doctors – the New Deal*. *NHS Management Executive*, London 1991.

11 The European Working Time Directive – UK notification of derogation for doctors in training. *DH*, London 2009 (<http://bit.ly/1jM84ot>).

12 Survey of obstetric anaesthetic workload. *OAA and AAGBI*, London 2011 (<http://bit.ly/1jM89RR>).

13 Wee MYK, Yentis SM, Thomas P. Obstetric anaesthetists’ workload. *Anaesth* 2002;**57**:484–500.

14 Why Mothers Die 1997–1999. The Confidential Enquiries into Maternal Deaths in the United Kingdom. *RCOG Press*, London 2002 (<http://bit.ly/1jM8jZE>).

15 Why Mothers Die 2000–2002. The Confidential Enquiries into Maternal Deaths in the United Kingdom. *RCOG Press*, London 2004 (<http://bit.ly/1jM8qUU>).

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- In the UK, the caesarean section rate, incidence of obesity, age of parturients and number of parturients with medical conditions are increasing.^{16,17,18}
- Anaesthetic delay can be a factor in some poor neonatal outcomes, stillbirths and infant deaths.^{19,20}
- There have been concerns about the staffing of isolated obstetric units, the level of experience of on-call anaesthetic staff, and the reduction of exposure to emergency general anaesthesia in obstetrics.^{15,21}

Levels of provision of service

1 Staffing requirements

The duty anaesthetist

- 1.1 The term 'duty anaesthetist' will henceforth be used to denote an anaesthetist who has been assessed as competent to undertake duties on the delivery suite under a specified degree of supervision.
- 1.2 The duty anaesthetist should be immediately available for the obstetric unit 24 hours per day. The duty anaesthetist should not be primarily responsible for elective obstetric work. There should be a clear line of communication from the duty anaesthetist to the supervising consultant at all times and consultant support and on-call availability are essential 24 hours per day.^{1,2}
- 1.3 In the busier units it may be necessary to have two duty anaesthetists available 24 hours per day, in addition to the supervising consultant.
- 1.4 In units that offer a 24-hour epidural service, the duty anaesthetist should be resident on site, i.e. not at a nearby hospital.
- 1.5 If the duty anaesthetist has other responsibilities, these should be of a nature that would allow the activity to be delayed or interrupted should obstetric work arise, to allow provision of analgesia, as well as anaesthesia, to parturients.
- 1.6 Although the difficulties of smaller units are appreciated, it is strongly recommended that the duty anaesthetist for the delivery suite should not be solely responsible for the ICU or cardiac arrests as that anaesthetist could be urgently required in two places simultaneously. Equally, if the duty anaesthetist covers general theatres, there must be another anaesthetist to take over immediately should they be needed on the delivery suite. The lead clinician should audit and monitor the feasibility of such arrangements.
- 1.7 Where duty anaesthetists work on a shift pattern, adequate time for formal handover between shifts must be built into the timetable. Ideally, the timetable of different professional groups should be compatible, for example anaesthetic and obstetric shifts should start and finish at the same time to allow multidisciplinary handover. The duty anaesthetist should participate in delivery suite ward rounds. See information from the Academy of Medical Royal Colleges (<http://bit.ly/1cnCc2P>).

16 The National Sentinel Caesarean Section Audit Report. RCOG Clinical Effectiveness Support Unit. *RCOG Press*, London 2001 (<http://bit.ly/1jM8x2P>).

17 Caesarean section guidelines (CG132). *NICE*, London 2011 (updated from 2004) (www.nice.org.uk/Guidance/cg132).

18 Maternal obesity in the UK: findings from a national project. *CMACE*, London 2010 (<http://bit.ly/1jM8Ryu>).

19 Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI). 7th Annual Report. *Maternal and Child Health Research Consortium*, London 2000.

20 Davies JM et al. Liability associated with obstetric anaesthesia. A closed claim analysis. *Anesthesiol* 2009;**110**:131–139.

21 Johnson RV et al. Training in obstetric general anaesthesia: a vanishing art? *Anaesth* 2000;**55**:179–183.

Consultant responsibilities

- 1.8** Each obstetric unit should have a nominated consultant in charge of obstetric anaesthesia services with programmed activities (PAs) allocated for this, in addition to those for direct patient care. The nominated consultant should be responsible for the organisation and audit of the service, for maintaining and raising standards, through provision of evidence-based guidelines, and for risk management.
- 1.9** The number of consultant sessions required should reflect the obstetric anaesthetic workload and not just the number of deliveries per annum. It needs to take into account the regional anaesthesia rate (which includes all procedures under regional anaesthesia and not just epidurals for labour analgesia) as well as other clinical activities such as clinics, HDU workload and procedures under general anaesthesia and non-clinical activities.²² As a basic minimum for any consultant-led obstetric unit, there should be ten consultant anaesthetic daytime sessions (1 session = 1.25 PAs on average) per week¹ and these should be spread evenly throughout the working week.
- 1.10** Extra consultant PAs/sessions should be available to units which are busier than average, tertiary referral units, which are likely to have a higher than average proportion of high risk women, units in which trainee anaesthetists work a full or partial shift system, where the provision of additional consultant PAs should be considered to allow training and supervision into the evening.^{23,24} The number of such additional hours should be increased where there is a high turnover of trainees, i.e. a three-month interval or more frequent. There should be at least one consultant PA available per week for antenatal referrals whether or not a formal clinic is run.
- 1.11** There should be a named consultant responsible for every elective caesarean section operating list. This consultant should not be rostered for any other timetabled activity. 100% of elective CS under GA should be used for teaching GA skills (see [Joy S, Wilson R. Airway and intubation problems during general anaesthesia for CS](#)).
- 1.12** Separate provision of staffing and resources should be available to allow elective work to continue uninterrupted by emergency work.
- 1.13** Anaesthesia for elective caesarean sections should only be performed by trainees in isolated units when there is a consultant anaesthetist available to provide local supervision.²
- 1.14** When a formal elective caesarean section list is covered by a consultant there should be a separate consultant available in the delivery suite.¹
- 1.15** The on-call consultant should not be more than half an hour away from the delivery suite at any time. The names of all consultants covering the delivery suite should be prominently displayed and contact numbers readily available.
- 1.16** It is part of the lead consultant obstetric anaesthetist's role to ensure there is an ongoing audit programme in place to audit complication rates.²⁵

22 Yentis SM, Robinson PN. Definitions in obstetric anaesthesia: how should we measure anaesthetic workload and what is 'epidural rate'? *Anaesth* 1999;**54**:958–962.

23 Working time directive 2009 and shift working – ways forward for anaesthetic services, training doctors and patient safety. RCoA, London 2007 (www.rcoa.ac.uk/node/3066).

24 Safer Childbirth. Minimum standards for the organisation and delivery of care in labour. Royal College of Anaesthetists, Royal College of Nursing, Royal College of Obstetricians and Gynaecologists and Royal College of Paediatrics and Child Health. RCoA, London 2007 (www.rcoa.ac.uk/node/2282).

25 Raising the standard: a compendium of audit recipes (3rd Edition). RCoA, London 2012 (www.rcoa.ac.uk/node/8640).

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Anaesthetic assistance

- 1.17** Parturients requiring anaesthesia have the right to the same standards of peri-operative care as all other surgical patients. Skilled anaesthetic assistance is of particular importance in obstetrics.
- 1.18** In the United Kingdom, anaesthetic assistance may be provided by an operating department practitioner or nurse (ODP/N) or a registered nurse. Whatever the background, the training for all anaesthetic assistants, including midwives, must comply fully with current national qualification standards. Employment of anaesthetic assistants without national accreditation is unacceptable.²⁶
- 1.19** The anaesthetic assistant should assist the anaesthetist on a regular basis, not only occasionally, to ensure maintenance of competence. Such a person thus employed should have no other duties in the operating department at that time, and the midwife attending the mother and baby cannot also assist the anaesthetist.
- 1.20 Post-anaesthetic recovery staff**
The training undergone by staff in recovery, whether these are midwives, nurses or ODP/Ns, must be to the level recommended for general recovery facilities.^{5,26,27} A midwife with no additional training is not adequately trained for recovery duties.
- 1.21 Other members of the team**
A trained adult and neonatal resuscitation team must be available.
- 1.22** There should be adequate secretarial support for the antenatal anaesthetic assessment clinic and other duties of the consultant obstetric anaesthetist – teaching, research, audit, appraisal activities and other administrative work.
- 1.23** There should be a suitably trained and named senior member of nursing, midwifery or ODP staff with overall responsibility for the safe running of obstetric theatres, who ensures that current standards in all aspects of theatre work are met. He or she must have considerable experience of working in theatre and must undertake the role on a regular basis. This individual should ensure all staff who work in theatre are appropriately trained and undergo regular appraisal and continuing professional development (CPD).

2 Equipment, support services and facilities

For the efficient functioning of the obstetric anaesthetic service, the following equipment, support services and facilities are essential. The standards of equipment and monitoring must be of the same standard as that of a non-obstetric anaesthetic service.

Equipment

- 2.1** Blood gas analysis (with facility to measure serum lactate) and the facility for rapid estimation of haemoglobin (for example HemoCue®) and blood sugar should be available on the delivery suite. In tertiary units, with a high risk population, it is recommended that there should be equipment to enable bedside estimation of coagulation such as thromboelastography (TEG) or thromboelastometry (ROTEM).²⁸
- 2.2** The delivery suite rooms must be equipped with monitoring equipment for the measurement of non-invasive blood pressure. There must also be readily available equipment for monitoring electrocardiogram (ECG), oxygen saturation, temperature and invasive haemodynamic monitoring if required.

26 Immediate post-anaesthesia recovery. *AAGBI*, London 2013 (<http://bit.ly/1jM9CaU>).

27 The anaesthesia team 3. *AAGBI*, London 2010 (<http://bit.ly/1dob8nT>).

28 Blood transfusion and the anaesthetist. Management of massive haemorrhage. *AAGBI*, London 2010 (<http://bit.ly/1jM9OXw>).

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- 2.3 All delivery suite rooms must have oxygen, suction equipment and access to resuscitation equipment.
- 2.4 Delivery suite rooms should have scavenging of waste anaesthetic gas to comply with COSHH and guidelines on workplace exposure limits on anaesthetic gas pollution.^{29,30}
- 2.5 A supply of O-rhesus negative blood should be available to the delivery suite at all times for emergency use. In addition, a system of rapid access to blood and blood products should be available in agreement with the hospital's Blood Transfusion Service (see major haemorrhage section below).
- 2.6 The standard of monitoring in the obstetric theatre must allow the conduct of safe anaesthesia for surgery as detailed by the AAGBI standards of monitoring.³¹
- 2.7 A blood warmer allowing the rapid transfusion of blood and fluids must be available. A Level 1 or equivalent rapid infusion device should be available for the management of major haemorrhage.
- 2.8 A cell salvage service should be available for massive blood loss and Jehovah's Witness parturients.³² And there should be staffed trained and experienced in using it.
- 2.9 Warming devices such as warm air blowers or heated mattresses should also be available to prevent inadvertent hypothermia.
- 2.10 A difficult intubation trolley with a variety of laryngoscopes including video laryngoscopes, tracheal tubes, laryngeal masks, including second generation supraglottic airway devices, and other aids for airway management must be available in theatre. The difficult intubation trolley should have a standard layout which is similar to trolleys in other parts of the hospital so that users will find the same equipment and layout in all sites.³³
- 2.11 Patient controlled analgesia (PCA) equipment and infusion devices must be available for post-operative pain relief as well as for labour pain.
- 2.12 The maximum weight that the operating table can support must be known and alternative provision made for women who exceed this. It is recommended that the obstetric operating table should be able to safely support a minimum weight of 160 kilograms in all positions.
- 2.13 Equipment to facilitate the care of the morbidly obese parturient including specialised electrically operated beds, aids such as commercially produced ramping pillows to assist patient positioning, weighing scales, sliding sheets and hoists, should be readily available and staff should receive training on how to use the specialist equipment.³⁴

29 Occupational exposure limits (EH40/96). Health and Safety Executive. HMSO, London 1996.

30 List of Workplace Exposure Limits (WELs) and other tables (HSC/04/06 Annexe C). HSE, London 2004 (<http://bit.ly/1vDGyWD>).

31 Recommendations for standards of monitoring during anaesthesia and recovery. AAGBI, London 2007 (<http://bit.ly/1jM9WWZ>).

32 Blood transfusion and the anaesthetist. Intra-operative cell salvage. AAGBI, London 2009 (<http://bit.ly/1jMa3Ca>).

33 Cook T, Woodall N, Frerk C. Major complications of airway management in the UK. Report and findings. The 4th National Audit project of The Royal College of Anaesthetists and the Difficult Airway Society. RCoA, London 2011 (www.rcoa.ac.uk/node/364).

34 Peri-operative management of the morbidly obese patient. AAGBI, London 2007 (<http://bit.ly/1jMaex9>).

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- 2.14 Ultrasound imaging equipment should be available for central vascular access, transversus abdominis plane (TAP) blocks and epidural procedures of parturients, as well as high risk and morbidly obese women.^{35,36}
- 2.15 Accurate clocks should be available in all delivery rooms and theatres for the recording of events and to comply with medico-legal requirements.³⁷
- 2.16 Resuscitation equipment including a defibrillator must be available on the delivery suite and should be checked regularly.¹

Support services

- 2.17 A system should be in place to ensure that women requiring antenatal referral to the anaesthetist are seen and assessed by a senior anaesthetist within a suitable time frame, preferably in early pregnancy. Ideally, this should be in the form of a multidisciplinary team management of these high risk women.
- 2.18 All women requiring caesarean section should, except in extreme emergency, be visited and assessed by an anaesthetist before arrival in the operating theatre. Ideally, women should be seen at least 24 hours prior to elective surgery where pre-assessment, provision of information including printed material, and consent for anaesthesia is obtained.
- 2.19 There should be arrangements or standing orders for prescription of pre-operative antacid prophylaxis and for laboratory investigations.
- 2.20 Haematology and biochemistry services must be available to provide rapid analysis of blood and other body fluids.
- 2.21 A local policy should be established with the haematology department to ensure blood and blood products are readily available for the management of major haemorrhage.²⁸ This should be updated regularly to follow the latest guidelines on the management of massive haemorrhage.^{38,39}
- 2.22 In order that blood can be made available within the time frames stipulated, the transfusion laboratory should be situated on the same site as the maternity unit.¹
- 2.23 There must be rapid availability of radiological services. In tertiary referral centres, 24-hour access to interventional radiology services is highly recommended.¹
- 2.24 Pharmacy services are required for the provision of necessary routine and emergency drugs.
- 2.25 The provision of sterile pre-mixed low dose local anaesthetic combined with opioid solutions for regional analgesia should be available, as well as other sterile opioid solutions used for patient controlled analgesia.
- 2.26 In order to minimise the risk of inadvertent intravenous administration of local anaesthetic and opiate solutions intended for epidural use, these must be stored separately from intravenous fluid.¹

35 Guidance on the use of ultrasound locating devices for placing central venous catheters (Technology Appraisal No 49). NICE, London 2002 (<http://bit.ly/ijMak7T>).

36 Ultrasound-guided catheterisation of the epidural space (IPG249). NICE, London 2008 (www.nice.org.uk/guidance/ipg249).

37 Sehgal A, Bamber J. Different clocks, different times. *Anaesth* 2003;58:398.

38 Sambasivan CN, Schreiber MA. Emerging therapies in traumatic haemorrhage control. *Curr Opin Crit Care* 2009;15:560–568.

39 Hess JR et al. Giving plasma at a 1:1 ratio with red cells in resuscitation: who might benefit? *Transfusion* 2008;48:1763–1765.

- 2.27 Intralipid, sugammadex and dantrolene must be kept on the delivery suite and their location should be clearly identified.
- 2.28 Physiotherapy services should be available 24 hours a day, 365 days a year, for patients requiring high dependency care.
- 2.29 All women who have received regional analgesia/anaesthesia or general anaesthesia for labour and delivery should be reviewed following delivery. Women must fulfil locally agreed discharge criteria before going home.

Facilities

- 2.30 There must be easy and safe access to the delivery suite from the main hospital at all times of the day.
- 2.31 There should be at least one fully equipped obstetric theatre within the delivery suite. The number of operating theatres required should depend on the number of deliveries and operative risk profile of the women delivering in the unit.
- 2.32 An operating theatre with appropriately trained staff must be readily available for women requiring emergency caesarean section.⁵ The standard of monitoring in all obstetric theatres must meet the minimum AAGBI monitoring standards.³¹
- 2.33 Adequate recovery room facilities, including the ability to monitor systemic blood pressure, ECG, oxygen saturation and end-tidal carbon dioxide, must be available within the delivery suite theatre complex.^{31,33}
- 2.34 Medical physics technicians are required to maintain, repair and calibrate anaesthetic machines, monitoring and infusion equipment.
- 2.35 All units should have facilities and equipment to provide high dependency care (Level 2) for high risk obstetric patients with appropriately trained staff or, if this is unavailable, women should be transferred to an HDU in the same hospital.⁸
- 2.36 All patients must be able to access Level 3 critical care if required; units without such provision on site must have an arrangement with a nominated Level 3 critical care unit and an agreed policy for the stabilisation and safe transfer of patients to this unit when required.^{1,8} Portable monitoring with facility for invasive monitoring must be available to facilitate safe transfer of obstetric patients to the ICU.⁴⁰
- 2.37 An anaesthetic office, in proximity to the delivery suite, should be available to the duty anaesthetic team. The room should have a computer with intra/internet access for the audit of the anaesthetic service, for accessing emails and e-learning facilities, and access to up-to-date information. A library of specialist reference books and/or journals and local multidisciplinary evidence-based guidelines must be available. The office space, facilities and furniture should comply with the standards recommended by the AAGBI guidelines.⁴¹
- 2.38 There should be a separate anaesthetic consultant's office available to allow teaching, assessment and appraisal and it should comply with AAGBI guidelines.⁴¹
- 2.39 A communal rest room in the delivery suite should be provided to enable staff of all specialties to meet. A seminar room(s) must be available for training, teaching and multidisciplinary meetings.

40 Interhospital transfer. AAGBI, London 2009 (<http://bit.ly/1jMaNqQ>).

41 Department of anaesthesia: secretariat and accommodation. AAGBI, London 1992 (<http://bit.ly/1jMaTi8>).

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- 2.40** All hospitals should ensure the availability of areas that allow those doctors working night shifts, to take rest breaks essential for the reduction of fatigue and improve safety.^{1,41,42,43} These areas should not be shared by more than one person at a time and allow the doctor to fully recline
- 2.41** Standards of accommodation for doctors in training must be adhered to.^{44,45} Where a consultant is required to be resident, appropriate on-call accommodation should be provided.
- 2.42** Hotel services must provide suitable on-call facilities including housekeeping for resident and non-resident anaesthetic staff. Refreshments must be available throughout the 24-hour period.
- 2.43 Guidelines**
All obstetric departments should provide and regularly update multidisciplinary guidelines to comply with CNST standards.⁶ A comprehensive list of recommended guidelines can be found in the OAA/AAGBI Guidelines for Obstetric Anaesthesia Services.¹

3 Areas of special requirement

Regional and opioid analgesia

- 3.1** Most consultant obstetric units should be able to provide regional analgesia on request at all times. Smaller units may be unable to supply dedicated cover at all times; women booking at such units should be made aware that epidural analgesia may not always be available.
- 3.2** The anaesthetist is responsible for ongoing regional analgesia in labour and must be able to assess the mother as required.
- 3.3** Midwifery care of a parturient receiving epidural analgesia in labour should comply with local guidelines. The midwife must be trained to an agreed standard in regional analgesia and be aware of potential complications and their management. The midwife should regularly care for parturients with regional analgesia and receive regular updates in training. If the level of midwifery staffing is considered inadequate, epidural block should not be provided.
- 3.4** There should be appropriate levels of medical and midwifery staff for the safe delivery of epidural analgesia for labour service. Units should be able to provide low dose regional analgesia.⁴⁶
- 3.5** Regional analgesia should not be used in labour unless an obstetric team is immediately available in the same hospital to treat emergencies.
- 3.6** There should be a locally agreed regional analgesia record and a protocol for the prescription and administration of epidural drugs.
- 3.7** The time from the anaesthetist being informed about an epidural until they are able to attend the mother should not normally exceed 30 minutes, and must be within one hour. This should be an auditable standard.²⁵

42 Fatigue and anaesthetists (currently under review). AAGBI, London 2013 (<http://bit.ly/1jMb8K5>).

43 Anaesthetic service accommodation in district general hospitals. A design guide. DHSS, London 1971.

44 Living and working conditions for hospital doctors in training. Circular HSS(TC8)1/2002. DHSS, London 2002 (<http://bit.ly/1jMbj8a>).

45 Fatigue and Anaesthetists (expanded web version). AAGBI, London 2005 (<http://bit.ly/1hUuISj>).

46 Comparative obstetric mobile epidural trial (COMET) study group UK. Effect of low-dose mobile versus traditional epidural techniques on mode of delivery: a randomised controlled trial. *Lancet* 2001;**358**:19–23.

3.8 Where remifentanyl PCA is provided as an alternative to regional analgesia, there should be agreed multidisciplinary guidelines and midwifery training as well as the supply of appropriate equipment and drugs to provide this service.

3.9 It is essential that midwives looking after women on remifentanyl PCA are trained and stay with the parturient continuously without any break in observation. Remifentanyl PCA should only be used in units where it is frequently and regularly used. Rapid reversal of respiratory depression/arrest and airway resuscitation equipment should be immediately available.

Emergency caesarean sections

3.10 There should be a clear line of communication between the duty anaesthetist, theatre staff and ODP/N once a decision is made to undertake an emergency caesarean section. The anaesthetist should be informed about the category of urgency of caesarean section and a modified WHO checklist should be used in theatre.^{47,48}

3.11 There should be clear guidelines available for whom to call if two emergencies occur simultaneously. Anaesthetists in other parts of the hospital may need to be summoned if the second anaesthetist is attending from home.

Maternal critical care

3.12 NICE guidance on the recognition and response to acute illness in adults in hospitals should be implemented.⁴⁹ The CEMACH report recommended the introduction of the modified early obstetric warning scores (MEOWS) in all obstetric in-patients to aid early recognition and treatment of the acutely ill parturient.⁵⁰ A graded response for patients identified as being at risk of clinical deterioration should be agreed and delivered locally.⁸

3.13 All units that care for high risk patients should be able to access Level 2 high dependency care on site. Where Level 2 care is provided on the maternity unit, appropriately trained staff should be available 24 hours a day to provide high dependency care. Midwives working in this setting should have additional training to equip them with the necessary critical care competencies.⁸

3.14 There should be a named consultant and obstetrician responsible for all Level 2 patients 24 hours a day.

3.15 If concerns arise regarding critical illness in an obstetric patient and the obstetric anaesthetist lacks appropriate intensive care skills, they should consult an intensive care colleague for specialist advice at an early stage.^{14,15}

3.16 Complaints

If complaints are made about aspects of care, a consultant anaesthetist should review and assess the mother's complaint, discussing her concerns and examining her where appropriate. This should be documented. Referral for further investigations may be required. Complaints should be handled according to local policies. The lead obstetric anaesthetist should be made aware of all patient complaints.

47 Lucas DN et al. Urgency of caesarean section: a new classification. *J Roy Soc Med* 2000;**93**:346–350.

48 Haynes AB et al. The safe surgery saves lives study group. A surgical safety checklist to reduce morbidity and mortality in a global population. *N Engl J Med* 2009;**360**:491–499.

49 Acutely ill patients in hospital (CG50). Recognition of and response to acute illness in adults in hospital. NICE, London 2007 (www.nice.org.uk/CG50).

50 Lewis G. (Ed) Saving mothers lives: reviewing maternal deaths to make motherhood safer 2003–2005. The 7th confidential enquiry into maternal deaths in the United Kingdom. CEMACH, London 2007.

4 Training and education

- 4.1** Each obstetric unit with an anaesthetic service should have a nominated consultant responsible for training in obstetric anaesthesia. Adequate PAs should be allocated for these responsibilities.¹
- 4.2** An appropriate training program should be in place for anaesthetic trainees according to their grade and the curriculum.^{2,51,52,53}
- 4.3** A process should be in place for the formal assessment of trainees prior to allowing them to go on-call for obstetric anaesthesia with distant supervision.^{2,51} This assessment applies to:
- ST1s and ST2s new to obstetric anaesthesia
 - more experienced trainees who are working in the UK for the first time
 - newly appointed STs who have not successfully completed a formal assessment.
- 4.4** The successful completion of the initial assessment of competence in obstetric anaesthesia (IACOA) is mandatory for all core trainees before they are considered safe to work in an obstetric unit without direct supervision.⁵¹
- 4.5** Simulation-based learning techniques should be used to assist anaesthetists to develop non-technical skills required to work safely and effectively within the multidisciplinary obstetric team.^{54,55}
- 4.6** There should be induction programmes for all new members of staff including locums. Locums should be assessed prior to undertaking unsupervised work.
- 4.7** As part of revalidation, all anaesthetists involved in the delivery of obstetric anaesthetic services must ensure that their own knowledge and skills are kept up to date by undertaking appropriate continuing professional development activities that reflect the needs of their 'whole' practice and their own learning needs.^{3,55} This includes both routine and out-of-hours clinical responsibility.^{3,55}
- 4.8** Any non-trainee anaesthetist who undertakes anaesthetic duties in the labour ward must have been assessed as competent to perform these duties in accordance with OAA and RCoA guidelines.^{1,51} Such a doctor must work regularly in the labour ward but must also regularly undertake non-obstetric anaesthetic work to ensure maintenance of a broad range of anaesthetic skills.
- 4.9** Assistance for the anaesthetist should be trained to the standards recommended by the AAGBI.²⁷
- 4.10** The recovery staff within a maternity unit should be trained to the same standard as that for all recovery nurses, whether they are ODPs or midwives.²⁶ Recovery skills should be regularly updated with time spent in a general recovery unit.
- 4.11** All staff working on the delivery suite should have regular resuscitation training, including the specific problems of pregnant patients.
- 4.12** Anaesthetists should contribute to the education and update of midwives, ODAs, ODPs, anaesthetic nurses, physicians' assistants (anaesthesia) and obstetricians, covering the scope and limitations of obstetric anaesthesia services.

51 The CCT in Anaesthetics (Annex B). Basic level training. RCoA, London 2010 (www.rcoa.ac.uk/node/1411).

52 The CCT in Anaesthetics (Annex C). Intermediate level training. RCoA, London 2010 (www.rcoa.ac.uk/node/1434).

53 The CCT in Anaesthetics (Annex D). Higher level training. RCoA London, 2010 (www.rcoa.ac.uk/node/1437).

54 Pratt S. Simulation in obstetrics anaesthesia. *Anaesth Analg* 2012;**114**:186–190.

55 Safe births: everybody's business. An independent enquiry into the safety of maternity services in England. *The Kings Fund*, London 2008 (<http://bit.ly/1jMd9WB>).

- 4.13 Anaesthetists should help organise and participate in regular multidisciplinary ‘fire drills’ of emergency situations including major haemorrhage, eclampsia, failed intubation and maternal collapse. They should also participate in multidisciplinary courses such as the PROMPT course.^{6,7}
- 4.14 Maintenance of standards of post-operative care requires continuous update, and staff should work in a theatre recovery unit on a regular basis.
- 4.15 All staff must be given regular access to CPD opportunities.⁵⁶

5 Research and audit

- 5.1 There should be an ongoing audit programme in place to audit anaesthetic complication rates (for example accidental dural puncture) and problems.²⁵
- 5.2 Delays in elective cases should be audited.²⁵
- 5.3 On-going audit of patient satisfaction with the obstetric anaesthetic service should be undertaken.²⁵
- 5.4 Research in obstetric anaesthesia and analgesia, particularly those recognised by the National Institute for Health Research and National Institute for Academic Anaesthesia, should be encouraged. Research should follow strict ethical standards as recommended by the GMC.⁵⁷

6 Organisation and administration

- 6.1 Care of the pregnant woman is delivered by teams rather than individuals. It has been shown that effective teamwork can increase safety while poor teamwork can jeopardise safety.^{50,55} It is, therefore, important that obstetric anaesthetists develop good working relationships and lines of communication with all other professionals, including those whose care may be needed for difficult cases. This includes midwives and obstetricians, as well as professionals from other disciplines such as intensive care, neurology, cardiology, haematology, radiology and other physicians and surgeons.
- 6.2 Team briefing and the WHO checklist should be used routinely on the labour ward to promote good communication and team working and reduce adverse incidents.^{47,48}
- 6.3 An obstetric anaesthetist should take part in regular multidisciplinary ‘labour ward forum’ meetings.²⁴
- 6.4 Units with high caesarean section rates should have elective caesarean section lists with dedicated obstetric, anaesthetic and theatre staff, to minimise disruption due to emergency work.
- 6.5 Anaesthetists must have some managerial responsibility and should be involved in planning decisions that affect the delivery of maternity services. Anaesthesia should be represented on the Maternity Services Liaison Committee, Delivery Suite Forum, Obstetric Multidisciplinary Guidelines Committee, Obstetric Risk Management Committee, Obstetric Directorate and any other bodies involved in the planning and delivery of such services.^{1,24}

56 The CPD Matrix. RCoA, London 2013 (www.rcoa.ac.uk/node/1923).

57 Good practice in research and consent to research. GMC, London 2010 (<http://bit.ly/1jMdsRa>).

7 Patient information

- 7.1 Women and purchasers of services should be informed of the level of availability of anaesthesia and regional analgesia in each unit. Printed information leaflets should be used to provide up-to-date information to women requesting an epidural and other procedures before the arrival of the anaesthetist as part of the consenting process.^{58, 59}
- 7.2 Antenatal education: when feasible, women should have access to information, in an appropriate language, about all types of analgesia and anaesthesia available, including information about related complications. Access to multi-lingual patient information sites and leaflets should be readily available.⁵⁸
- 7.3 There is no difference between the principle of obtaining consent for obstetric anaesthesia and any other medical treatment.⁵⁹ NAP5 identified that the obstetric patient undergoing rapid sequence induction for Caesarean section has at higher risk of accidental awareness during general anaesthesia (AAGA). The risk of AAGA as well as other risks such as failed intubations which are higher in the obstetric patient should be communicated appropriately to patients as part of the consent process.⁶⁰
- 7.4 The parturient is entitled to receive an explanation of the proposed procedure and its associated risks in appropriate language. Interpreters should be made available to women who do not speak English; when feasible these should not be family members.⁷
- 7.5 All explanations given to the parturient should be clearly documented in the notes.
- 7.6 The setting up of a patient advocate system should be encouraged.

58 Middle JV, Wee MYK. Informed consent for epidural analgesia: a survey of UK practice. *Anaesth* 2009;**64**(2):161–164.

59 Consent for anaesthesia 2. *AAGBI*, London 2006 (<http://bit.ly/1jMdJUG>).

60 Plaat F, Lucas N, Bogod DG. AAGA in obstetric anaesthesia. In: Accidental Awareness during General Anaesthesia in the United Kingdom and Ireland (pg 133–143). 5th National Audit Project (NAP5) of the Royal College of Anaesthetists and Association of Anaesthetists of Great Britain and Ireland 2014 (<http://bit.ly/1ztyQVx>).

Chapter 10

GUIDELINES FOR THE PROVISION OF anaesthetic services

Paediatric anaesthesia services 2015

Author(s)

Dr K A Wilkinson, Norfolk and Norwich University
Hospital

Dr L J Brennan, Addenbrooke's Hospital, Cambridge

Dr A-M Rollin, Epsom General Hospital, Surrey

**In association with the Association of Paediatric
Anaesthetists of Great Britain and Ireland (APAGBI)**

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Summary

- **Wherever and whenever children and young people undergo anaesthesia and surgery, their particular needs must be recognised and they must be managed in appropriate facilities and looked after by staff with relevant experience and ongoing training.^{1,2,3,4,5} For the purposes of this guidance, ‘children and young people’ refers to the age range birth to the 16th birthday.**
- The service should be led and organised by consultants who maintain competencies to anaesthetise children and young people.⁶
- The anaesthetist must at all times have a dedicated assistant who maintains competencies in the peri-operative care of children and young people.⁷
- In emergency cases when transfer is not feasible, the most appropriately experienced senior anaesthetist available should undertake anaesthesia for surgery, and support resuscitation and stabilisation of the sick or injured child as part of a multidisciplinary team.⁸
- Paediatric resuscitation equipment must be available wherever and whenever children are treated,⁹ and anaesthetists must maintain their skills in a team approach for resuscitation and stabilisation of the sick child.¹⁰
- Neonatal and paediatric high dependency and intensive care services should be available as appropriate for the type of planned surgery performed within a hospital.¹¹
- There should be an adequately staffed and resourced acute pain service that covers the needs of children.

1 Getting the right start. National service framework for children: standard for hospital services. *DH*, London 2003 (<http://bit.ly/1h9DThl>).

2 Delivering a healthy future. An action framework for children and young people’s health in Scotland. *Scottish Executive*, 2007 (<http://bit.ly/1h9DXNW>).

3 National service framework for children, young people and maternity services. *Welsh Assembly Government*, 2004 (<http://bit.ly/1h9EGyE>).

4 Standards for surgery in Children. Children’s surgical forum. *Roy Col Surg Engl*, London 2013 (<http://bit.ly/1h9ERdg>).

5 Report of the Children and Young People’s Health Outcomes Forum 2012 (<http://bit.ly/1h9FdRc>).

6 The CPD Matrix. *RCoA*, London 2013 (www.rcoa.ac.uk/node/1923).

7 The anaesthesia team (3rd Edition). *AAGBI*, London 2010 (<http://bit.ly/1dob8nT>).

8 The acutely or critically sick or injured child in the DGH – a team response. Report of a Working Party. *DH*, London 2005 (www.rcoa.ac.uk/node/635).

9 Quality standards for cardiopulmonary resuscitation practice and training. *RC (UK)*, London 2013 (www.resus.org.uk/pages/QSCPR_Main.htm).

10 Recommended paediatric resuscitation training for non training grade anaesthetists. *APAGBI*, London 2014 (www.rcoa.ac.uk/node/19034).

11 Standards for care of critically ill children (4th Edition). *PICS*, London 2010 (<http://bit.ly/1h9GGHl>).

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- Non-specialist and specialist centres caring for children should participate in multidisciplinary networks for surgery and anaesthesia. Networks will agree standards of care and formulate care pathways for common elective and emergency surgery.^{12,13,14,15,16}
- Children and young people, along with their parents and carers, should be involved in all aspects of their care whenever possible.¹⁷ This includes decisions regarding the management of their anaesthesia and analgesia.

Introduction: the importance of paediatric anaesthesia services

- Children and young people under 16 years comprise about 20% of the UK population.¹⁸ Many will require anaesthesia to allow treatment for a variety of surgical conditions, much of which will be elective and relatively straightforward and performed in non-specialist centres, usually in fit infants and children. Babies and children increasingly may require anaesthesia or sedation for non surgical procedures involving radiology, cardiac catheterisation, endoscopy, joint injection or chemotherapy. In total there are approximately 0.5 million anaesthetics delivered to children and young people in the UK.¹⁹
- Children with significant acute or chronic medical problems, those undergoing complex procedures (including cardiothoracic and neurosurgery), neonates and small infants are usually referred to specialist children's units.^{20,21,22,23}
- Non-specialist centres should generally have arrangements for managing and treating simple surgical emergencies in children; in addition, they should be able to resuscitate and stabilise seriously ill babies and children of all ages prior to transfer for surgery and/or intensive care.⁶ Babies and children have different requirements. They are not just small adults, and there are marked developmental changes within the paediatric age range. After puberty, anatomical and physiological characteristics approach those of adults. At all ages, children and young people have distinct emotional and social requirements.

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- 12 Ensuring the provision of general paediatric surgery in the district general hospital. Guidance for commissioners and service providers. Children's Surgical forum. *R Col Surg Eng*, London 2010 (<http://bit.ly/1h9GWpz>).
- 13 Surgery in children. Are we there yet? A review of organisational and clinical aspects of children's surgery. *NCEPOD*, London 2011 (www.ncepod.org.uk/2011sic.htm).
- 14 General surgery in childhood. National delivery plan for children and young people. *Specialist Services in Scotland*, 2008 (www.specialchildrenservices.scot.nhs.uk).
- 15 Children and young persons specialised services project (CYPSSP). All Wales anaesthesia and surgery standards for children and young people's specialised healthcare services. *Welsh Government*, 2009 (<http://bit.ly/1h9like>).
- 16 Improving services for general paediatric surgery-policy and standards of care for general paediatric surgery in Northern Ireland. *Health, Social Services and Public Safety*, 2010 (<http://bit.ly/1h9IrUL>).
- 17 Hogg C, Cooper C. Meeting the needs of children and young people undergoing surgery through the eyes of children, young people and carers. *Action for Sick Children*, Stockport 2004 (<http://actionforsickchildren.org.uk>).
- 18 Matheson J. The UK population – how does it compare? *Population Trends* 2012;No.142 (<http://bit.ly/1h9IOPa>).
- 19 Chapter 27, Activity Survey. Accidental awareness during general anaesthesia in the United Kingdom and Ireland. The 5th National Audit Project for the Royal College of Anaesthetists and Association of Anaesthetists of Great Britain and Ireland. *RCoA*, London 2014 (<http://bit.ly/1pkjc4Q>).
- 20 National programme of care and Clinical Reference Groups. Women and Children – Group Eo2 Paediatric Surgery. *NHSE*, London 2013 (<http://bit.ly/1h9IUq7>).
- 21 General Surgery for Childhood. National Steering Group for Specialist Children's Services. *Scottish Executive*, 2009 (<http://bit.ly/1h9J9Bp>).
- 22 All Wales Universal Standards for Children and Young People's Specialised Healthcare Services. *NHS Wales*, 2008 (<http://bit.ly/1h9JhRD>).
- 23 Improving services for general paediatric surgery-policy and standards of care for general paediatric surgery. *DHSSPSNI*, Northern Ireland 2010 (<http://bit.ly/1h9JpjW>).
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- Babies, and pre-pubertal children under the age of eight to 12 years, have particular anatomical and physiological differences. Doses of drugs and fluids need to be more precisely calculated, and anaesthetic equipment for smaller children differs from that used in older children and adults.
- Anaesthesia for children should be undertaken or supervised by consultants who have undergone appropriate training. In the UK, all anaesthetists with a CCT or equivalent will have obtained higher paediatric anaesthetic training. As a minimum, they should be competent to provide peri-operative care for common elective and emergency surgical conditions in children aged three years and older. There will be consultants who have acquired more advanced competencies thus allowing provision of a more extensive anaesthetic service, and those competencies should be maintained. Unless there is no requirement to anaesthetise children, it is expected that competence and confidence to anaesthetise children will need to be sustained through direct care, CPD and/or refresher courses, and should be considered within annual appraisal and revalidation.
- In all centres where children are admitted for surgery there should be a nominated consultant who is responsible for policies and procedures relating to emergency and elective anaesthesia of children. This consultant should be involved in the delivery of the service.
- There should be locally agreed guidelines that specify which cases can generally be managed on site and which will require transfer to a more specialised unit. Emergency life-threatening situations will dictate when it may be necessary to consider providing initial management locally. These arrangements should be part of defined clinical pathways, organised and commissioned within a surgical and anaesthesia network for children.

Levels of provision of service

1 Staffing requirements

- 1.1 Children should be anaesthetised by consultants who maintain competencies for safe paediatric anaesthesia practice. Children may also be anaesthetised by staff grade or associate specialist anaesthetists (SAS) or specialty doctors (SDs), provided that they fulfil the same criteria and are working with a nominated supervising consultant anaesthetist. When trainees anaesthetise children, they should be supervised by a consultant. They may be supervised by an SAS/SD with appropriate experience but there must be an identified consultant with overall responsibility.
- 1.2 The level of supervision of a trainee will vary according to their competence, and take into account patient age, co-morbidity, and the location and complexity of the procedure or surgery. A locally agreed policy should specifically advise on the circumstances when in-theatre consultant supervision is required. In all cases consultant advice should be readily available. If clinical supervision of a trainee is provided by an SAS/SD, the trainee must have unimpeded access to a consultant.
- 1.3 When a child undergoes anaesthesia, the anaesthetist should be assisted by staff (operating department practitioners/assistants/anaesthetic nurses) who have had paediatric training and experience, and who have maintained these skills.
- 1.4 In the period immediately after anaesthesia the child should be managed in a recovery ward or post-anaesthesia care unit on a one to one basis, by designated staff with up-to-date paediatric competencies, particularly resuscitation. A registered children's nurse should be directly involved with the organisation of the service and training in this area. A member of staff with advanced training in life support for children should always be present.

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- 1.5** Ideally, children should be nursed on a ward where there are at least two registered children's nurses on duty for every shift.²⁴ It is accepted that there will be fewer staff in remote and rural areas,²⁵ and that competencies are the most important factor.
- 1.6** If children undergo surgery and anaesthesia on a site without in-patient paediatric beds there should be ready access to a named paediatric consultant with acute care responsibilities at all times.⁴

2 Equipment, support services and facilities

Equipment

- 2.1** A full range of monitoring devices and paediatric anaesthetic equipment should be readily available in theatres, and all other areas where children are anaesthetised and recovered.²⁶ Equipment must be appropriate for use in babies and children of all sizes and ages and include:
- airway management and monitoring equipment including capnography
 - paediatric pulse oximetry sensors and blood pressure cuffs
 - vascular access equipment, including intraosseous needles
 - burettes and syringe pumps to allow rapid and accurate fluid and drug delivery
 - fluid and external warming devices
 - temperature probes
 - ultrasound devices (for central venous and nerve identification).^{27,28}
- 2.2** Resuscitation drugs and equipment, including an appropriate defibrillator, should be readily available wherever children are anaesthetised.
- 2.3** Anaesthetic machines should incorporate ventilators which have the flexibility to be used over the entire size and age range, provide accurate pressure control and PEEP.
- 2.4** There should be accurate thermostatic control of the operating theatre to permit rapid change of temperature to at least 23°C. Whilst this temperature is recommended within NICE guidance for adults,²⁹ in practice the theatre temperature should be capable of regulation up to 26–28°C if necessary when neonatal surgery is performed. Patient temperature should be routinely measured when external means of warming are employed, except when surgery is very short.
- 2.5** If intravenous fluids are required in babies (after the neonatal period) and children in the peri-operative period, they should generally be isotonic³⁰ and administered in a way that allows rapid and accurate delivery. Baseline plasma sodium/potassium should be measured at the outset and at least every 24 hours thereafter whilst an IVI is still in place. When babies and children undergo prolonged surgery, when they require an extended period of fasting, or have a low weight/body mass, blood glucose should also be estimated in the peri-operative period and intravenous dextrose supplementation considered.

24 Healthcare standards in caring for neonates, children and young people. RCN, London 2011 (<http://bit.ly/1h9JOCZ>).

25 National steering group for specialist children's services. Extract from remote and rural report. *National delivery plan for specialist children services*, Scotland 2007 (<http://bit.ly/1h9K4C4>).

26 Standards of monitoring during anaesthesia and recovery (4th Edition). AAGBI, London 2007 (<http://bit.ly/1jM9WWZ>).

27 Central venous catheters – ultrasound locating devices (TA49). NICE, London 2002 (www.nice.org.uk/Guidance/TA49).

28 Ultrasound-guided regional nerve block (IPG285). NICE, London 2009 (www.nice.org.uk/Guidance/IPG285).

29 Keeping patients warm before, after and during an operation (CG65). NICE, London 2008 (<http://bit.ly/1h9LZq6>).

30 Reducing the risks of hyponatraemia when administering intravenous fluids to children. Patient Safety Alert 22. NPSA, London 2006 (<http://bit.ly/1h9MgcC>).

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- 2.6 Fluid warming should always be available and used when volumes administered are large relative to patient size and/or when fluid administration could result in an unwanted reduction in patient temperature.

Support services

- 2.7 Paediatric high dependency and intensive care facilities should be available and delivered within a network of care that supports major/complex surgery, and critically ill or injured babies and children.
- 2.8 Although it is acknowledged that critical care facilities for children are not available in all hospitals where children are anaesthetised, there should be the facilities and expertise to initiate intensive care prior to transfer/retrieval to a designated regional PICU/HDU facility. This may involve short term use of adult/general ICU facilities.³¹ On-site ICU and HDU services should be appropriate to the type of surgery performed, the age and co-morbidity of patients and post-operative analgesic requirements.
- 2.9 Children undergoing anaesthesia and surgery as day cases or in-patients will benefit from the input of play specialists who can help in the preparation of the child for surgery.
- 2.10 Children undergoing surgery benefit from a pre-assessment service to identify relevant co-morbidities and the timely provision of information regarding the conduct of anaesthesia and pain relief. This will include the range of options for induction of anaesthesia emphasizing that the ultimate decision making should be made on the day according to the needs and safety of the child and as judged by the attending anaesthetist. Common side effects and significant risks should be mentioned appropriate to the child, the planned anaesthetic and analgesia and the surgery/procedure, e.g. blood transfusion, regional blockade and emergence delirium. Families should also be provided with written or web based resources which provide information specific to anaesthesia³¹ and contact details for the anaesthetic team provided should they have further questions.
- 2.11 On-site haematology, chemical pathology, radiology and blood transfusion services should meet the requirements of infants and children, for example, small blood samples, reduced use of radiation. Radiology services should adopt a networked approach with expertise being readily available and images transferred electronically if required.³² The use of routine pre-operative blood testing should be kept to a minimum unless there are specific clinical indications.³³ Equipment for point of care testing of haemoglobin, blood gases and glucose should be readily available.
- 2.12 There should be pharmacy staff with specialist paediatric knowledge available to provide advice and ensure safe and effective management of drugs in children. Copies of The British National Formulary for Children,³⁴ as well as national or evidence-based local guidelines for management of pain, nausea and vomiting and post-operative fluids should be readily available in theatres and ward areas. Protocols for common anaesthetic emergencies (anaphylaxis, malignant hyperthermia, airway obstruction and local anaesthetic toxicity) should be readily available and appropriate for children.

31 Your child's general anaesthetic. RCoA, AAGBI and APAGBI patient information. RCoA, London 2014 (www.rcoa.ac.uk/node/1849).

32 Delivering quality imaging services for children. A report of the national imaging board. DH, London 2010 (<http://bit.ly/1h9MvEH>).

33 The use of routine pre-operative tests for elective surgery (CG3). NICE, London 2003 (reviewed June 2010) (<http://bit.ly/1cNgcOZ>).

34 British National Formulary for Children 2014–2015 (www.bnf.org/bnf/org_450055.htm).

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- 2.13** There should be a fully resourced acute pain service (APS) that covers the needs of children.³⁵ Analgesia guidance appropriate for children³⁶ should be readily available and pain scoring using validated tools appropriate to developmental age should be performed routinely on any child who undergoes a surgical procedure. Particular care should be taken with all drug and infusion calculations.³⁷ All patients who have had major surgery should be assessed regularly and a member of the acute pain service should attend the paediatric wards. Nursing staff in wards and the recovery areas should undergo regular training in drug doses for children, and care of opioid and epidural infusions when used.
- 2.14** Multi-modal analgesia for children should be available in all settings, with paracetamol and NSAIDs generally providing the mainstay of simple painkillers for both hospital and home use after minor surgery. Opioids may be required for more severe pain and for 'rescue' analgesia, particularly if paracetamol or NSAIDs are contraindicated. They should be used with caution in children with obstructive sleep apnoea,^{38,39} and in other groups who may have problems with central control of respiration.
- 2.15** Paracetamol dose should be carefully considered if required for a prolonged duration. Intravenous paracetamol should be administered and prescribed in doses consistent with current recommendations.⁴⁰
- 2.16** Parental education on use of analgesia after surgery and discharge from hospital is vital, and simple, clear written instructions should be provided.
- 2.17** Particular care is required when infants and children undergo investigations or surgical procedures under sedation alone. Recommended published guidance for the conduct of paediatric sedation should be used.^{41,42}

Facilities

- 2.18** Children should be separated from, and not managed directly alongside adults, whether in the operating department (including reception and recovery areas), in-patient wards, day ward or critical care unit.
- 2.19** Theatre design, the appearance of the anaesthetic and recovery areas and working practices should reflect the emotional and physical needs of children. If there are genuine problems, such as the need to use older buildings or the need for children to be cared for within a facility that is essential to any aspects of their care, efforts should be made to comply with the overall requirement for separation from adult patients. The features of the environment should also be safe for children.

35 Guidance on the provision of anaesthesia services for acute pain management. *RCoA*, London 2014 (www.rcoa.ac.uk/node/14674).

36 Good practice in post-operative and procedural pain (2nd Edition). *APAGBI*, London 2012 (<http://bit.ly/1cNh4D4>).

37 Paediatric Prescribing Tool. Top Tips. *RCPCH*, London 2012 (<http://bit.ly/1cNheKK>).

38 Codeine-restricted as an analgesic in children and adolescents after European Safety Review. Drug Safety Update, Issue 11, Vol 6. *MHRA*, London 2013 (<http://bit.ly/1cNhx8n>).

39 Joint statement for the use of codeine in children by the Royal College of Paediatrics and Child Health, Neonatal Paediatric Pharmacists Group, Royal College of Anaesthetists and Association of Paediatric Anaesthetists of Great Britain and Ireland. *RCPCH*, London 2013 (<http://bit.ly/1pDsIkK>).

40 Intravenous Paracetamol. *RCoA/AAGBI Safe Anaesthesia Liaison Group Safety Notification*. *RCoA*, London 2013 (www.rcoa.ac.uk/node/12854).

41 Sedation for diagnostic and therapeutic procedures in children and young people (CG112). *NICE*, London 2010 (www.nice.org.uk/CG112).

42 Safe Sedation Practice for Healthcare Procedures. Standards and Guidance. *AcMRC*, London 2013 (www.rcoa.ac.uk/node/15182).

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- 2.20 Recovery areas for children should be separate or screened from those used by adults and provided with paediatric airway and recovery equipment. Parents and carers should be allowed ready access to the recovery area, and easy communication with recovery staff facilitated (for example through a paging device).
- 2.21 In the general intensive care unit and emergency department there should be a separate area for children together with the necessary resuscitation equipment, and guidelines for care of the sick child.^{9,11}
- 2.22 Services and facilities should take account of the specific needs of adolescents, where these are different from those of children and adults.^{43,44}
- 2.23 Resident accommodation should be available for parents of children who require overnight admission to hospital.

3 Areas of special requirement

Emergency department and intensive care: care of the critically ill baby and child

- 3.1 Arrangements for the immediate care of critically ill patients should be in place in any hospital that manages children. This need can arise suddenly and unpredictably in the accident and emergency department, the operating theatre or in-patient wards. In-house arrangements are therefore required for providing emergency treatment, stabilising critically ill babies and children, and initiating intensive care prior to their transfer to a paediatric or neonatal intensive care unit (PICU or NICU).
- 3.2 In all emergency departments receiving babies and children, neonatal and paediatric resuscitation equipment, medications (including anaesthetic drugs) and fluids should be available to prepare an infant or child for PICU transfer.^{11,45} Equipment should include a suitable ventilator, infusion devices and full monitoring, including capnography.
- 3.3 Babies and children may require admission to critical care facilities as a planned part of their care, for example after surgery, or because of trauma or an acute illness or because of extreme prematurity or illness at birth. Paediatric and neonatal intensive care is provided in designated units, staffed by doctors and nurses with specialised training. Babies and children who are likely to require intensive care following an operation should therefore undergo their surgery in a hospital/unit with a designated PICU or NICU.⁴⁶
- 3.4 There should be hospital protocols for management of critically ill children. These include the management of acute respiratory, cardiovascular or neurological emergencies, trauma, poisoning and major burns. Clinical management of these children in both specialist and non-specialist units will require close co-operation and multidisciplinary teamwork between nurses, paediatricians, surgeons, anaesthetists, intensivists and other relevant clinicians. Local guidelines should be clear on the roles and responsibilities of the members of the multidisciplinary team, including anaesthetic services.¹¹ It is important that further stabilisation and management are not left within the sole remit of the anaesthetist.⁸

43 National steering group for specialist children's services. Report of the age appropriate care working group. *National delivery plan for specialist children services*, Scotland 2009 (<http://bit.ly/1cNimOq>).

44 Bridging the gaps: health care for adolescents. *RCPCH*, London 2003 (<http://bit.ly/1cNji50>).

45 Standards for children and young people in the emergency care settings (3rd Edition). Developed by the Intercollegiate Committee for Standards for Children and Young People in Emergency Care Settings. *RCPCH*, London 2012 (<http://bit.ly/1cNjHoo>).

46 Toolkit for high quality neonatal services (Gateway reference 12753). *DH*, London 2009 (<http://bit.ly/1cNnVww>).

- 3.5** Sick children may require short-term admission to a general critical care facility while awaiting the arrival of the PICU retrieval team. There may also be occasions when a child requires a very short period of intensive care that does not necessitate transfer to a PICU. This is acceptable provided there is a suitable facility within the hospital, there are staff with the appropriate competencies and the episode will last only a few hours. In the event of unusual circumstances, e.g. pandemic flu, units must have a contingency for longer periods of intensive care delivery. There should be a nominated lead consultant and nurse within general critical care units who are responsible for the policies and procedures for babies and children when admitted.¹¹
- 3.6** Hospitals admitting children should be part of a fully funded critical care network. Specialist centres with PICU facilities within the network have a responsibility to provide ongoing education. They also have a clear responsibility to provide clinical advice and help in locating a suitable PICU bed once a referral has been made.
- 3.7** Transfer of critically ill children to specialist centres is generally undertaken by paediatric emergency transfer teams. In some circumstances it may be necessary for the referring hospital to provide an emergency transfer of a sick child, who is intubated and ventilated. This may occur particularly in the case of a child who presents at a non-specialist centre with an acute neurosurgical emergency (for example, an expanding intracranial haematoma or blocked ventriculo peritoneal (VP) shunt). In these circumstances an appropriate senior anaesthetist will need to accompany the child.⁴⁷ In order to prepare for this possibility there should be:
- a designated consultant with responsibility for transfers who provides and updates a written policy for emergency transfers of intubated children
 - portable monitors, transfer equipment (including a portable ventilator) and drugs should be readily available
 - relevant written guidelines must be available with telephone numbers of the receiving unit

The on-call consultant has a duty to deploy staff appropriately. Patients being transferred should normally be accompanied by a doctor with relevant competencies in the care of a critically ill child and transfer of intubated patients, including airway management skills. They should be accompanied by a suitably trained assistant.

Day care surgery and anaesthesia

- 3.8** Day surgery is particularly appropriate for children, provided the operation is not complex or prolonged and the child is well with either no or only mild, well controlled co-morbidity. Even children with relatively complex needs, for example cerebral palsy, cystic fibrosis, can be managed as day cases provided they are stable with minimal cardio-respiratory problems, and surgery is minor.⁴⁸
- 3.9** Children should have their day surgery delivered to the same standards as in-patient care, but with additional consideration of measures to promote early discharge. This should be irrespective of whether they are managed in a dedicated paediatric unit or have specific time allocated in a mixed adult/paediatric unit.
- 3.10** The lower age limit for day surgery will depend on the facilities and experience of staff and the medical condition of the infant. Ex-preterm babies should generally not be considered for day surgery unless they are medically fit and have reached 55 to 60 weeks post-conceptual age. Risks should be discussed on an individual basis.

47 Joint statement from Society of British Neurological Surgeons and Royal College of Anaesthetists on the provision of emergency paediatric neurosurgical services. RCoA, London 2010 (www.rcoa.ac.uk/node/773).

48 Issues in paediatric day surgery. *BADS*, London 2007 (<http://bit.ly/1cNomGV>).

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- 3.11** Parents and children should be provided with good quality pre-operative information which includes fasting guidelines and what to do if the child becomes unwell before the operation date. Post-operative analgesia requirements should be anticipated, and discussed at the pre-assessment visit.
- 3.12** There should be clear discharge criteria following day case surgery. Discharge criteria should be detailed and carefully worded to facilitate ongoing care by parents. A local policy on analgesia for home use should be in place, with either provision of medications or advice to parents/carers to purchase suitable simple analgesics before admission. In both instances there must be clear instructions to parents about their regular use in the correct dose and for a suitable duration. Parents should be given written instructions on administration of analgesia and know who to contact if problems arise.

4 Training and education

- 4.1** Anaesthetists who care for children should have received appropriate training⁴⁹ and should ensure that their competency in anaesthesia and resuscitation is adequate for the management of the children they serve.
- 4.2** Consultants with a substantial commitment to paediatric anaesthesia, including full-time paediatric anaesthetists, are usually appointed to posts in specialist children's hospitals or paediatric units within larger university hospitals. They will normally have satisfied the higher and advanced level competency-based training requirements of the RCoA⁵⁰ or equivalent. It is recognised that anaesthetists involved in highly specialised areas such as paediatric cardiac and neurosurgery will require additional training that is individually tailored to their needs.
- 4.3** Some consultants are appointed to posts with a designated sub-specialty interest in paediatric anaesthesia in non-specialist centres. They should normally acquire the competencies listed for higher training in paediatric anaesthesia or equivalent.
- 4.4** Specialist and non-specialist paediatric anaesthetists should have advanced training in life support for children, and should maintain these competencies by regular annual training which is ideally multidisciplinary and scenario-based.¹⁰
- 4.5** In all centres admitting children, one consultant should be appointed as lead consultant for paediatric anaesthesia. Typically they might undertake at least one paediatric list each week and will be responsible for co-ordinating and overseeing anaesthetic services for children, with particular reference to teaching and training, audit, equipment, guidelines, pain management, sedation and resuscitation.
- 4.6** All anaesthetists should undertake Level 2 training in safeguarding/child protection⁵¹ and must maintain this level of competence by regular annual updates of current policy and practice and case discussion.⁵² At least one consultant in each department should take the lead in safeguarding/child protection⁵³ and undertake and maintain core Level 3 competencies. They should advise on and co-ordinate training within their department, but do not have responsibility to decide upon management of individual clinical cases.

49 Curriculum for a CCT in anaesthetics. RCoA, London 2010 (www.rcoa.ac.uk/node/230).

50 CCT in Anaesthetics. Higher and advanced levels (Annex D and E). RCoA, London 2010 (www.rcoa.ac.uk/node/1437 and www.rcoa.ac.uk/node/1438).

51 Protecting children and young people – the responsibilities of all doctors. GMC, London 2012 (<http://bit.ly/1cNoXZk>).

52 Safeguarding children and young people: roles and competencies for health care staff (third edition). Intercollegiate document published by RCPCH on behalf of all contributing organisations. RCoA, London 2014 (www.rcoa.ac.uk/node/16273).

53 Lead anaesthetist for child protection/safeguarding. RCoA and APAGBI, London 2010 (www.rcoa.ac.uk/node/7126).

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- 4.7** All anaesthetists who work with children should maintain appropriate clinical skills. In paediatric anaesthesia as in all areas of practice, anaesthetists must recognise and work within the limits of their professional competence. Some anaesthetists working in non-specialist centres will not have regular children's lists but may have both daytime and out-of-hours responsibility to provide care for children requiring emergency surgery. There should be arrangements for undertaking regular supernumerary attachments to lists or secondments to specialist centres. The Certificate of Fitness for Honorary Practice⁵⁴ may facilitate such placements and provides a relatively simple system for updates in specialist centres. Paediatric simulator work may also be useful in helping to maintain paediatric knowledge and skills. There should be evidence of appropriate and relevant paediatric CPD in the five-year revalidation cycle.⁵⁵
- 4.8** In centres without an on-site PICU, anaesthetic involvement will also be required in the management of critically ill children who frequently require intubation, resuscitation and initiation of intensive care before the arrival of the retrieval team or direct transfer to PICU. Whilst all career grade anaesthetists will have received paediatric training, several years may have elapsed since this was obtained and exposure to very sick children may have been limited. Therefore, all anaesthetists should maintain paediatric resuscitation skills unless they work in a unit which does not have open access for children.
- 4.9** There must be funded arrangements for all consultants and career grade staff who have any responsibility to provide anaesthesia for children to participate in relevant CPD which relates to paediatric anaesthesia and resuscitation, and to the level of specialty practice.
- 4.10** The establishment of regional networks for paediatric anaesthesia should facilitate joint CPD and refresher training in paediatric anaesthesia and resuscitation. Where appropriate, joint appointments may be considered allowing designated anaesthetists from non-specialist centres a regular commitment within a specialist centre in order to maintain and develop skills.

5 Audit, quality improvement and research

- 5.1** Audit plays an important role in the quality assurance process and in measuring performance. Simple quality indicators such as unplanned in-patient admission following day case surgery or to intensive care following surgery can easily be measured and reasons documented. This information should be collated and analysed and can be compared usefully within regional networks. A number of suggested audit topics, specifically relating to paediatric anaesthesia are set out in the RCoA document [Raising the Standard: a compendium of audit recipes](#).⁵⁶
- Quality improvement projects⁵⁷ in relevant areas of paediatric anaesthetic practice should be agreed and implemented.
- 5.2** Regional networks should provide agreed quality standards for the surgical care of babies and children, and units should be encouraged to participate in regular collation of data relating to these standards. Participation in national audit should also be encouraged.⁵⁸

54 Certificate of Fitness for Honorary Practice. *NHSE*, London 2013 (<http://bit.ly/1cNpxGr>).

55 Continuing professional development: guidance for doctors in anaesthesia, intensive care and pain medicine. *RCoA*, London 2013 (www.rcoa.ac.uk/node/1922).

56 Raising the standard: a compendium of audit recipes (3rd Edition). *RCoA*, London 2012 (www.rcoa.ac.uk/node/8640).

57 Quality improvement in anaesthesia. Raising the standard: a compendium of audit recipes (3rd Edition). *RCoA*, London 2012 (www.rcoa.ac.uk/node/8626).

58 Good medical practice. *GMC*, London 2013 (<http://bit.ly/1cNq7UM>).

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- 5.3** Multidisciplinary audit and morbidity and mortality meetings relating to paediatric surgery and anaesthesia should be held regularly. Peri-operative death in babies and children is rare. When a post-operative death occurs within 30 days of surgery a multidisciplinary meeting should be convened and a note made in the clinical record.⁴
- 5.4** Audit activity should include the regular analysis and multidisciplinary review of untoward incidents. Serious events and near misses need to be thoroughly investigated and reported to the relevant national agency, in line with national requirements.
- 5.5** There should be ongoing audit of all children transferred between hospitals for surgery, and this should be monitored by the referring hospital's paediatric surgical committee (see 6.3). Delays should be critically examined by the regional network.
- 5.6** Anaesthetic research in children should be facilitated when possible, and should follow strict ethical standards.⁵⁹
- 5.7 Patient safety**
Anaesthetists who care for children and young people should be familiar with relevant patient safety issues.⁶⁰

In particular it is important that a WHO checklist is performed before and during surgical and radiological procedures in children, and that it is appropriate for use.

Such a checklist should include issues particularly pertinent to the paediatric age group, e.g. flushing of IV cannulae prior to discharge to the recovery/post anaesthesia care unit.⁶¹

6 Organisation and administration

Regional networks for surgery and anaesthesia should be in place and be maintained by commissioning groups.⁶²

- 6.1** Networks should agree standards of care and develop policies and agreed care pathways based on the complexity of procedure, age and co-morbidity, as well as clinical urgency. Policies should relate to local service provision and geography and be developed in consultation with representative groups within the network.
- 6.2** Surgical and anaesthetic networks should work with those networks established for care of the critically ill child and provide links between departments of paediatrics, surgery, anaesthesia and critical care in non-specialist centres and the corresponding specialist paediatric centres. This should facilitate provision of advice (when required) and the production of evidence-based protocols and guidelines. Arrangements should be in place with the regional specialist paediatric unit(s) for the transfer of sick infants and children.

59 Guidelines for the ethical conduct of research in children. *Arch Dis Child* 2000;**82**:177–182.

60 Safety in Anaesthesia. RCoA, London (www.rcoa.ac.uk/node/588).

61 Patient Safety Update – January 2012 to March 2012. *SALG*, 2012 (www.rcoa.ac.uk/node/6282).

62 Commissioning guide: provision of general children's surgery. British Association of Paediatric Surgeons, Association of Paediatric Anaesthetists of Great Britain and Ireland, Royal College of General Practitioners, Royal College of Nursing and Royal College of Surgeons of England. *Roy Col Surg Engl*, London 2014 (<http://bit.ly/1stos7S>).

- 6.3** Hospitals should define the extent of elective and emergency surgical provision for children and the thresholds for transfer to other centres. An appropriately constituted committee consisting of a paediatrician, anaesthetist, surgeon, senior children's nurse and other relevant health professionals and managers should formulate and review these policies. The committee should be responsible for the overall management, governance, and quality improvement of anaesthetic and surgical services for children and should report directly to the hospital board. A representative from this committee should also liaise with the regional network lead for surgery and anaesthesia and provide input to regional audit, standards and care pathways.
- 6.4** When children are admitted for surgery their care should generally be supervised jointly by a surgeon and paediatrician. In specialist centres, care may be by specialist paediatric surgeons.
- 6.5** Children undergoing surgery should generally be placed on designated children's operating lists, ideally in a separate children's theatre area. When this is not possible, children should be given priority by placing them at the beginning of a mixed list of elective or emergency cases, thus minimising fasting times.
- 6.6** All patients should be assessed before their operations by an anaesthetist. Parents and carers, as well as the child, should be given the opportunity to ask questions.
- 6.7** There should be systems in place to minimise prescription and drug administration errors. There should be awareness of using off-label and unlicensed drugs for children. Copies of the British National Formulary for Children or equivalent should be available (see 2.12).
- 6.8** Parents and carers should be involved in the care process. This includes physical and psychological preparation for surgery. A child-centred approach should be employed at all times whenever possible, allowing:
- physical separation between adults and children in the operating department, recovery area, day unit, wards and accident and emergency department
 - provision for parents and carers to accompany children to the anaesthetic room and they should generally be able to remain for induction of anaesthesia except in special circumstances, for example, some neonates and small infants, anticipated difficult intubation. Parents and carers should also be able to gain easy access to the recovery area.

7 Patient information and consent

- 7.1** Before the admission of a child for elective surgery, parents should receive written information together with a contact telephone number should they have further questions. Information about anaesthesia and analgesia should be based on, or make reference to, that provided in 'Information for Parents and Children' available from the RCoA website (www.rcoa.ac.uk/patientinfo). Whilst advice on the availability of other local or national web based resources may be provided it is important that this is clear and consistent and families should not be over-burdened with information.
- 7.2** Children should also receive information before admission appropriate to their age and level of understanding. Information can be provided at face to face meetings with nurses and play therapists and enhanced with booklets,⁶³ web links or videos. Anaesthetists should make it clear that they are willing to speak with young people on their own on request.

63 RCoA and APAGBI information for children and parents. RCoA, London 2010 (www.rcoa.ac.uk/node/429).

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- 7.3** Young people should be made aware of the need for clinicians to establish pregnancy status before surgery or procedures involving anaesthesia. Where appropriate this will generally result in relevant confidential questioning on admission. Whilst obtaining and documenting this information is primarily the responsibility of the operating surgeon/cardiologist or paediatrician, anaesthetists may also feel it necessary to check that such checks have been performed.⁶⁴
- 7.4** Anaesthetists should be aware of legislation and good practice guidance⁶⁵ relevant to children and according to the location in the UK.^{66,67,68,69} These documents refer to the rights of the child, child protection processes and consent.
- 7.5** Although separate written consent for anaesthesia is not mandatory in the UK, there should be discussions with the child and/or parent about methods of induction, and provision of post-operative pain relief including the use of suppositories. Where special techniques such as epidural blockade, invasive monitoring and blood transfusions are anticipated there should normally be written evidence that this has been discussed with the child/young person (as appropriate) and parents/carers.
- 7.6** In infants and younger children, consent for medical and surgical treatment is obtained from the parent or legal guardian. In England and Wales young people aged 16 and over can consent independently to medical treatment. However, there are children and young people under the age of 16 who have sufficient maturity and understanding to contribute to a decision about their surgery and anaesthesia and consent forms allow their signature to be included. Whilst in England children and young people under the age of 18 years cannot legally refuse life-saving treatment, their views should be very seriously considered and legal/ethical advice sought if there is time to do so and doubt exists. In Scotland, children and young people may consent and refuse treatment independently when they are deemed to have capacity.⁶⁷ Additional parental consent is not required.
- 7.7** It is important to be aware of who has parental responsibility⁷⁰ when discussions take place. This is particularly the case when family arrangements are complex or unclear, e.g. the child is under the care of grandparents, in foster care or are otherwise looked after. Parental responsibility should be established in advance of admission and appropriate consent procedures followed, involving the court and/or social care as appropriate. For planned procedures if there is doubt about parental responsibility advice should be sought from senior hospital medico-legal advisors and/or defence organizations.

64 Pre-procedure pregnancy checking for under 16s – guidance for clinicians. *RCPC*, London 2012 (www.rcpch.ac.uk/pregnancychecks).

65 0–18 years: guidance for all doctors. *GMC*, London 2007 (<http://bit.ly/1cNqZsz>).

66 The Family Proceedings Courts (Children Act 1989) (Amendment) Rules 2004 (<http://bit.ly/1h9UVvA>).

67 Age of Legal Capacity (Scotland) Act 1991 (<http://bit.ly/1h9V7uU>).

68 Children (Scotland) Act 1995 (<http://bit.ly/1h9Ve9O>).

69 Northern Ireland Child Care law – the rough guide. *DHSSPSNI*, 2004 (<http://bit.ly/1h9Voy6>).

70 Parental rights and responsibilities. *UK Government*, London 2014 (<http://bit.ly/1meLdQE>).

Chapter 12

GUIDELINES FOR THE PROVISION OF anaesthetic services

Anaesthesia services for head and neck surgery 2015

Author

Dr A G W Chalmers, Queen Victoria Hospital,
West Sussex

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for head and neck surgery 2015

Summary

- Patients undergoing urgent head and neck procedures to relieve a compromised airway resulting from trauma, tumours or after surgery must have quick access to a dedicated emergency theatre at all times.^{1,2}
- Upper airway problems are common, and head and neck services should be provided by anaesthetists competent in the advanced management of the difficult airway.³
- Anaesthetists should always work with appropriately trained and skilled assistants, and have access to a range of difficult airway apparatus including fiberoptic intubation equipment and trans-cricothyroid jet ventilation.^{3,4}
- Access to a critical care facility must be available when required.⁵
- The treatment of neonates, young children with significant co-morbidity, and children with complex surgical conditions, should only take place in units with specialist paediatric facilities.⁶
- Patients undergoing elective head and neck surgery should be pre-assessed pre-operatively by appropriately trained staff, and dedicated anaesthetic pre-assessment sessions should be available for patients undergoing complex head and neck surgery, and those with potentially difficult airways.^{7,8}

Introduction: the importance of head and neck anaesthesia services

- Head and neck surgery includes a wide spectrum of surgical interventions, ranging from short day case procedures to very long and complex operations.⁹
- The requirements for providing anaesthesia services for routine head and neck surgery, such as tonsillectomy, will be different to those required to provide anaesthesia for major or complex surgery. There should be recognition that routine head and neck surgery may include patients with complex and difficult airways due to disease or previous treatment.
- Anaesthesia for surgery of the head and neck is likely to include the disciplines of ear, nose and throat, maxillofacial and dental surgery. In some instances, such as surgery on the base of skull and for craniofacial surgery, formal integration with a neurosurgical and plastic surgical service may be required. Due to the broad scope of patients requiring anaesthesia for head and neck surgery, multidisciplinary team working is essential.

1 Who operates when? II. *NCEPOD*, London 2003 (www.ncepod.org.uk/2003wow.htm).

2 Operating theatres: review of national findings. *The Audit Commission*, London 2002 (<http://bit.ly/1bWXRfr>).

3 The UK Difficult Airway Society guidelines. *DAS*, London 2007 (<http://bit.ly/1Afw45b>).

4 The anaesthesia team 3. *AAGBI*, London 2010 (<http://bit.ly/1m043nw>).

5 Changing the way we operate. *NCEPOD*, London 2001 (www.ncepod.org.uk/2001cwo.htm).

6 Guidance on the provision of paediatric anaesthesia services. *RCoA*, London 2015 (www.rcoa.ac.uk/node/17853).

7 Pre-operative assessment and patient preparation – the role of the anaesthetist. *AAGBI*, London 2010 (<http://bit.ly/1hpooXa>).

8 Head and neck cancer: multidisciplinary management guidelines. *ENTUK*, London 2011 (<http://bit.ly/1loCFq6>).

9 Improving outcomes in head and neck cancers. The manual. *NICE*, London 2004 (<http://bit.ly/UrSTSh>).

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- The patient population undergoing head and neck surgery ranges from neonates and young children to the elderly.¹⁰
- Patients requiring major head and neck surgery frequently have extensive and debilitating co-morbid problems and may need repeated admissions for treatment.⁹
- Conditions that require head and neck surgery affect patients of all ages, and a significant proportion are children. The treatment of neonates, young children with significant co-morbidity and children with complex surgical conditions should only take place in units with specialist paediatric facilities. Simple procedures such as teeth extraction, the removal of tonsils or adenoid tissue and the insertion of grommets are frequently carried out on children in a general hospital setting.
- The indications for head and neck surgery vary widely from minor infective and inflammatory disorders to extensive malignant disease. In the latter case, surgical excision and reconstruction, often using free tissue transfer, requires complex peri-operative anaesthetic management. This kind of surgery often takes time not easily accommodated within the time constraints of a normal operating list.
- Cancers of the upper digestive tract form the majority of head and neck oncology, and these patients are typically older and commonly have serious co-existing cardiovascular and respiratory disease, reflecting the social risk factors for their malignancy.
- Adequate facilities should be available for pre-operative assessment.
- Appropriately trained pre-assessment staff should undertake pre-assessment. Dedicated anaesthetic sessions should be available for the pre-operative assessment of complex or high risk patients.^{7,8}
- Patients undergoing long and complex surgery and those with significant underlying medical problems will need the provision of post-operative intensive or high dependency care.
- Many patients with intra-oral malignancy, craniofacial disorders and traumatic facial injuries present with a predicted difficult intubation. This aspect of the service mandates that the full range of human and other resources necessary to manage difficult airways, including fiberoptic intubation equipment, are always available.
- It is common for head and neck surgery to encroach upon the airway or to require changing of the airway during surgery. It is therefore essential that there is close liaison and good teamwork between surgeons, anaesthetists and operating department practitioners (ODPs).
- Patients presenting with impending airway obstruction may need emergency surgery. The ability to provide this service dictates that a dedicated, appropriately staffed and equipped theatre be available 24 hours a day.¹¹
- All community dental work requiring general anaesthesia is now carried out in a hospital setting. There are estimated to be 65,000 children and young people with severe learning disabilities in the UK, and a significant proportion of those needing dental treatment will be referred for general anaesthesia.
- A significant proportion of head and neck surgery is of a routine nature and much of the service is ideally provided for by a dedicated day case facility. Routine surgery can include patients with complex or difficult airways, and therefore appropriately trained anaesthetists should be available to provide anaesthesia for these patients. Appropriate equipment, such as advanced airway equipment, should also be available for these day case lists.

10 Hospital episode statistics 2002–2003. *DH*, London (www.hscic.gov.uk/hes).

11 Then and now. *NCEPOD*, London 2000 (www.ncepod.org.uk/2000tan.htm).

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Levels of provision of service

1 Staffing requirements

- 1.1 Anaesthesia for head and neck surgery should be consultant led. One or more named consultants with an interest in head and neck surgery should be responsible for directly or indirectly overseeing all major head and neck operations.¹² All other regular sessions should have a named consultant or staff/associate specialist assigned to them with appropriate skills.
- 1.2 A Clinical Lead for Head and Neck Anaesthesia should be appointed in each hospital providing anaesthesia services for head and neck cancer surgery.⁸
- 1.3 Where scheduled operations cannot be accommodated within normal list times, consideration should be given to anaesthetic teamwork, allowing for appropriate rest periods, both during and following such procedures.
- 1.4 Anaesthetists must always be supported by dedicated, appropriately skilled assistants, and the recovery facilities should be staffed during all operating hours and have appropriate anaesthetic support, until the patient meets agreed discharge criteria.
- 1.5 There should be adequate levels of appropriately experienced medical and non-medical staff to provide 24-hour cover for emergency head and neck surgery.
- 1.6 Where a paediatric service is being provided, all of the medical and assisting non-medical staff, including recovery room staff, must have relevant and recent training in paediatric anaesthesia and resuscitation.

2 Equipment, support services and facilities

- 2.1 There should be a full range of equipment relating to the management of the difficult airway available within the head and neck theatre suite. In particular, equipment for fibreoptic intubation and trans-cricothyroid jet ventilation must always be available. Suitable theatre-based sterilisation equipment should allow for the quick turnaround of fibreoptic endoscopes.
- 2.2 An adequate range of tracheostomy tubes including adjustable flange tubes with inner tubes must be stocked.¹³
- 2.3 All anaesthetic departments should have an explicit policy for the management of difficult or failed intubation (for example, formal adoption of the Difficult Airway Society guidelines as departmental policy) and clear written guidelines for the management of other airway problems.¹⁴
- 2.4 The use of lasers during head and neck surgery is common, and therefore training and safety equipment including laser-protected endotracheal tubes, goggles and theatre door screening need to be provided.
- 2.5 Patients returning to the ward, who have had a tracheostomy or other airway surgery, should be cared for in designated post-operative observation areas, by adequate levels of nursing staff who are skilled in the care of the surgical airway. The location of this area should also facilitate the quick return to theatre should the need arise.

12 BAHNO Standards 2009. *BAHNO*, West Sussex 2009 (<http://bit.ly/WPmaYr>).

13 On the right trach? A review of the care received by patients who underwent a tracheostomy. *NCEPOD*, London 2014 (www.ncepod.org.uk/2014tc.htm).

14 Cook T, Woodall N, Frerk C. 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). *Br J Anaesth* 2011;**106**:617–631.

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- 2.6 Patients who have undergone complex head and neck surgery may require transfer to an appropriate level of critical care facility. Additional equipment necessary to achieve this safely, including portable non-invasive and invasive monitoring, emergency transfer packs and portable ventilators, may also be required.
- 2.7 Adequate facilities should be available for the pre-operative anaesthetic assessment of all patients undergoing head and neck surgery.
- 2.8 Patients with suspected or known head and neck cancer should be pre-assessed by an experienced head and neck anaesthetist. Pre-operative nasendoscopy and imaging should be available to aid identification of the difficult airway.⁸
- 2.9 Adequate administrative support should be available, for example to obtain previous anaesthetic records from other hospitals.

3 Areas of special requirement

- 3.1 When providing head and neck anaesthetic services for children, there will be a number of special requirements as covered in the guidance on the provision of paediatric services (see [Guidance on the provision of paediatric anaesthesia services](#)).
- 3.2 The community dental service will need to cater for patients with learning disabilities undergoing general anaesthesia for dental procedures. This vulnerable group of patients require access, communication and peri-operative care appropriate for their individual needs. (Further information about anaesthesia for community dentistry is available in [Guidance on the provision of services for anaesthetic care in the non-theatre environment](#)).
- 3.3 Particular emphasis should be placed on the need for specialist post-operative ward care. Wherever possible, patients who have had airway-related surgery should be looked after in the early post-operative period on dedicated wards with adequate levels of medical and nursing staff who are familiar with the recognition and management of related airway problems.
- 3.4 Where major head and neck surgery is carried out there may be a regular requirement for elective post-operative high dependency and intensive care. This should be available in the same hospital for those trusts providing complex reconstructive procedures.¹²

4 Training and education

- 4.1 Patients requiring head and neck procedures should be managed by anaesthetists who have had an appropriate level of training in this field, and who have acquired the relevant knowledge and skills needed to care for patients undergoing para-airway surgery.
- 4.2 In order to maintain the necessary repertoire of skills, consultant anaesthetists providing a head and neck service should have a regular commitment to the specialty, and adequate time must be made for them to participate in a range of relevant continuing medical education activities.
- 4.3 Head and neck surgery provides an excellent opportunity for the formal and systematic training of anaesthetists in the use of advanced methods for airway management, including fiberoptic intubation techniques. Where possible, additional equipment such as monitors, video recorders and airway simulators should be made available to facilitate this important aspect of anaesthetic education.
- 4.4 All Trusts should have a protocol and mandatory training for tracheostomy care. Head and neck anaesthetists are ideally placed to support education in this area.¹³

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5 Research and audit

- 5.1 In addition to routine audit and the reporting of critical incidents, any morbidity relating to airway management should be presented at departmental clinical governance meetings, and documented for audit purposes.
- 5.2 Head and neck anaesthetists should actively engage and contribute to regional and national head and neck outcome databases and audit.

6 Organisation and administration

- 6.1 There should be at least one three-session day per week dedicated for head and neck surgery in the host trust for those providing head and neck cancer and complex non cancer surgery.¹²
- 6.2 A pre-operative assessment clinic with the facility to arrange pre-admission anaesthetic consultation for those patients with complex airway problems or severe co-morbidity should exist.
- 6.3 Where necessary, integration with other surgical specialties, such as neurosurgery and plastic surgery, may be needed to formalise joint operating lists.
- 6.4 The ability of anaesthetists with other specialist interests, such as neuroanaesthesia and intensive care medicine, to contribute towards the provision, planning and implementation of the service should be recognised.
- 6.5 Any daytime emergency lists should be organised and staffed by senior anaesthetists and surgeons working to a fixed sessional pattern who have no conflicting clinical commitments.
- 6.6 Where major elective head and neck surgery requiring post-operative critical care is undertaken, the funding for and provision of these beds must be planned to meet the demands of the service, so that unnecessary cancellations can be minimised and the use of theatre resources optimised.
- 6.7 When very long operations are scheduled on a regular basis, it will be necessary to arrange the funding and resources to support long duration lists.

7 Patient information

- 7.1 It is not uncommon in head and neck anaesthesia to use techniques such as inhalational induction, transcrioid or transtracheal cannulation and awake fiberoptic intubation. When such techniques are planned, it is especially important to fully inform patients of exactly what to expect.
- 7.2 Specific information regarding what to expect in the immediate post-operative period is also particularly relevant to head and neck surgery. Examples would include the need to breathe through the mouth in nasal surgery, the inability to open the mouth when wires are used for dental occlusion, and blurred vision following the administration of topical eye preparations. Such procedure specific explanations should ideally be supported by written information.
- 7.3 As part of a 'difficult airway follow up', patients should be informed in writing about any airway problem encountered and be advised to bring it to the attention of anaesthetists during any future pre-operative assessment.

Further reading

- Valuing people: a new strategy for learning disability for the 21st century. A White Paper. *DH*, London 2001 (<http://bit.ly/1t3iJux>).
- Getting the right start: national service framework for children, young people and maternity services: standard for hospital services. *DH*, London 2003 (<http://bit.ly/1xb5dD1>).

Chapter 13

GUIDELINES FOR THE PROVISION OF anaesthetic services

Ophthalmic anaesthesia services 2015

Author

Dr A H Presland, Moorfields Eye Hospital, London

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Summary

- There should be a named lead clinician responsible for ophthalmic anaesthesia services.
- Patients receiving intravenous sedation must have an anaesthetist immediately available in the theatre suite.
- On local anaesthetic lists without an anaesthetist present, patients must be monitored by trained professionals during establishment of local anaesthesia and throughout the operative procedure.
- In isolated units with no anaesthetist or formal cardiac arrest team immediately available, the resuscitation team should be ILS trained.
- Patients do not need to be starved for cataract surgery under local anaesthesia or when hypnotic or sedative drugs are used in low doses to produce only anxiolysis. Patients do need to be starved when deeper planes of sedation are employed, or when using infusions.
- Local anaesthetic blocks should be performed only by an indemnified practitioner who has been specifically trained. Sharp needle blocks should only be performed by doctors. Training should be provided for trainees and new staff and overseen by an expert.
- Pre-admission anaesthetic assessment by appropriately trained staff is highly desirable because of the high proportion of day case patients, and significant incidence of medical co-morbidity.
- Attention should be paid to current guidelines for day case anaesthesia.
- Paediatric patients should have their procedures where possible as day cases.
- Paediatric patients should be on designated paediatric lists where possible, and anaesthetised by an appropriately trained and experienced anaesthetist.
- Children under five years old should normally be anaesthetised by a consultant or under the direct supervision of a consultant.
- The systemically sick must be anaesthetised in an appropriate environment, with arrangements in place to gain prompt access to in-patient medical and critical care if required.
- Departments should have guidelines covering the prioritising of patients requiring urgent procedures based on surgical need and medical fitness for anaesthesia. Most procedures can wait to be done in routine hours.

Introduction: the importance of anaesthesia services for ophthalmic surgery

- Ophthalmic surgery is undertaken within multidisciplinary general hospitals, in isolated units and in large single specialty centres. All environments require appropriate staffing levels, skill mix and facilities.
- Anaesthesia for ophthalmic surgery is a recognised sub-specialty of anaesthetic practice.
- Anaesthetic services are provided for a wide age range of patients, from neonates to the very elderly.
- Many patients are elderly and have co-morbidities.¹
- Ophthalmic surgery is often required for ocular manifestations of systemic disease and there is a relatively high incidence of patients with uncommon medical conditions.
- There is an increasing trend towards day case services and use of local anaesthesia (LA) for ophthalmic procedures. Local anaesthesia can be provided topically (by use of eye drops), by sharp needle technique (peribulbar and retrobulbar blocks) and blunt needle techniques (sub Tenon's).

Levels of provision of service

1 Staffing requirements

- 1.1** All intraocular surgery performed under local anaesthetic (LA) should be carried out in a facility which is appropriately staffed and equipped for resuscitation.²
- 1.2** Lists under LA alone do not necessarily require the immediate presence of an anaesthetist in the theatre suite. If no anaesthetist is present, an appropriately trained anaesthetic nurse, ophthalmic theatre nurse or operating department practitioner (ODP) must be present to monitor the patient during establishment of local anaesthesia and throughout the operative procedure. This should be their sole responsibility.²
- 1.3** Dedicated skilled assistance for the anaesthetist must be provided in every situation where general anaesthesia or sedation is employed.³
- 1.4** In isolated units where no anaesthetist or formal cardiac arrest team is immediately available, the team should be ILS trained with at least one member trained to ALS standards to ensure appropriate team leadership skills are immediately available.
- 1.5** If in-patients are cared for in isolated/single specialty units there must be appropriate medical cover and nursing care to suit the medical needs of the patients.⁴
- 1.6 Physicians' Assistants (Anaesthesia) (PA(A))**
It remains the responsibility of those leading departments of anaesthesia, together with their constituent consultants, to ensure that PA(A)s work under the supervision of a consultant anaesthetist at all times as required by the RCoA.⁵ A named consultant must have overall responsibility for the care of the patient at all times.

1 Peri-operative care of the Elderly. *AAGBI*, London 2014 (<http://bit.ly/1rG5ZYf>).

2 Local anaesthesia for ophthalmic surgery. Joint guidelines from the Royal College of Anaesthetists and the Royal College of Ophthalmologists. *RCoA*, London 2012 (www.rcoa.ac.uk/node/2272).

3 The anaesthesia team 3. *AAGBI*, London 2010 (<http://bit.ly/1m043nw>).

4 Good practice. A guide for departments of anaesthesia, critical care and pain management. *RCoA* and *AAGBI*, London 2006 (www.rcoa.ac.uk/node/1470).

5 PA(A) supervision and limitation of scope of practice (May 2011 revision). *RCoA*, London 2011 (www.rcoa.ac.uk/node/1927).

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- 1.7 It is recommended that PA(A)s have a period of induction and a programme of continuing professional development led by a local clinical lead.⁶

2 Equipment, support services and facilities

Equipment

- 2.1 All intraocular surgery performed under LA should be carried out in a facility which is appropriately equipped for resuscitation. Oxygen and suction must be available.²
- 2.2 Minimum anaesthesia monitoring standards should be adhered to.^{2,3}
- 2.3 All anaesthetic equipment and monitoring should conform to the current standards and should be regularly checked, maintained and in good working order.^{7,8}
- 2.4 Appropriate facilities for monitoring in the post-operative period must be available.^{7,9}

Support services

2.5 Pre-admission assessment

Pre-admission anaesthetic assessment is highly desirable.^{1,10} Patients are often elderly and have co-morbidities requiring optimisation prior to surgery. There is a relatively high incidence of uncommon conditions that may need forward planning or correspondence with other units. Pre-admission assessment also plays a part in allocating patients appropriately to LA or general anaesthetic techniques and selecting patients for day care. This process requires careful assessment by appropriately trained staff underpinned by guidelines on patient selection.¹¹

Facilities

- 2.6 Isolated units must have appropriate facilities for the care they aim to provide.
- 2.7 Ophthalmic surgery under both general and local anaesthesia is often provided as a day case service and the facilities available should be compliant with the current day case recommendations.^{12,13,14}
- 2.8 Facilities and staffing in the operating facility must allow for physical infirmity of patients. There should be comfortable patient access to the theatre suite and equipment should be available to adjust patient position for maximum comfort and surgical access. Staff should be adequately trained to safely help patients on and off operating tables with care and dignity.

6 Continuing Professional Development Guidance. *APA(A)*, London 2012 (<http://bit.ly/1dCYOuv>).

7 Recommendations for standards of monitoring during anaesthesia and recovery (4th Edition). *AAGBI*, London 2007 (<http://bit.ly/1gbB7aS>).

8 Safe management of anaesthetic related equipment. *AAGBI Safety Guideline. AAGBI*, London 2009 (<http://bit.ly/1f5TEcb>).

9 Immediate post-anaesthesia recovery. *AAGBI*, London 2013 (<http://bit.ly/1eU6yIz>).

10 Pre-operative assessment and patient preparation – the role of the anaesthetist 2. *AAGBI Safety Guideline. AAGBI*, London 2010 (<http://bit.ly/1hpooXa>).

11 Guidance on the provision of anaesthesia services for pre-operative assessment and preparation. *RCOA*, London 2014 (www.rcoa.ac.uk/node/14666).

12 Day case and short stay surgery 2. *AAGBI*, London 2011 (<http://bit.ly/1gw19ph>).

13 The British Association of Day Surgery (www.daysurgeryuk.org).

14 Day surgery: operational guide. Waiting, booking and choice. *DH*, London 2002 (<http://bit.ly/1bDYtsl>).

Guidelines and protocols

- 2.9** There must be a robust procedure for checking the laterality of the eye to be operated on prior to local anaesthetic block or general anaesthesia. This should include the eye being marked by the responsible surgical team prior to admission to the surgical suite. The WHO checklist and RCoA/ NPSA ‘Stop before you block’ protocols should be adhered to.^{15, 16}
- 2.10** Guidelines or protocols should exist on the following:²
- patient selection for day case procedures
 - patient selection for procedures under LA
 - sedation of patients for ophthalmic procedures
 - scheduling of urgent procedures in and out-of-hours.

3 Areas of special requirement

3.1 Children

Children should be anaesthetised where possible on a day case basis.¹⁴ An appropriately trained and experienced anaesthetist should anaesthetise children.¹⁷ There should be designated paediatric operating lists exclusively for children where possible. Children under five years old must be anaesthetised by, or under the direct supervision of, a consultant.¹⁷

Procedures performed with only local anaesthesia

- 3.2** Cataract surgery should be performed under LA where possible. When choosing a local anaesthetic technique, attention must be paid to the physical and mental condition of the patient. They must be able to lie comfortably on the operating table for the anticipated duration of the block and operating procedure.²
- 3.3** A trained surgeon or anaesthetist must administer needle-based blocks and IV access should be established prior to attempting the block. Only sub Tenon’s and topical anaesthesia do not require intravenous access.²
- 3.4** All modes of local anaesthesia may result in complications.¹⁸ Practitioners should be aware of this when using local anaesthetic techniques and ensure they know how to avoid, recognise and manage complications when they do occur.²

Procedures requiring sedation

- 3.5** All patients receiving intravenous sedation require an anaesthetist to be immediately available in the theatre suite.³ Patients do not need to be starved when sedative drugs are used in low doses to produce simple anxiolysis.^{2,19}
- 3.6** Great care should be taken when using infusions or combinations of sedative drugs, as sedation levels may change rapidly and unpredictably. The use of sedative infusions requires the presence of an anaesthetist in the operating theatre at all times. Patients do need to be starved when deeper planes of sedation are employed.²

15 WHO surgical safety checklist and implementation manual. WHO, 2008 (<http://bit.ly/1fHMDZm>).

16 Stop before you block. RCoA, London 2011 (www.rcoa.ac.uk/node/346).

17 Guidance on the provision of paediatric anaesthesia services. RCoA, London 2015 (www.rcoa.ac.uk/node/17853).

18 Eke T, Thompson JR. Serious complications of local anaesthesia for cataract surgery: a one year national survey in the United Kingdom. *Br J Ophthalmol* 2007;**91**(4):470–475.

19 Arora N, Ali P. Pre-operative fasting of cataract patients planned for local anaesthesia: are we following guidelines? The Newsletter of the British Ophthalmic Anaesthesia Society, 2007 (pg.24) (<http://bit.ly/1rhCieF>).

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Patients with systemic illness

- 3.7** Patients requiring anaesthesia who are systemically unwell should be optimised as far as reasonably practicable beforehand.²⁰ It is extremely rare for ophthalmic surgery to be so urgent that remedial measures may not be taken. Arrangements for appropriate peri-operative medical care must be made, with specialist input from other services as required.
- 3.8** Protocols must be in place for the transfer of patients in isolated units who become sick unexpectedly. They should be moved safely and rapidly to a facility which provides an appropriate higher level of care.^{2,21}

4 Training and education

- 4.1** Structured training in regional orbital blocks should be provided to all inexperienced practitioners. This should include the applied knowledge of anatomy, and recognising and minimising the risk of complications.²
- 4.2** An expert in orbital regional anaesthesia should assess a trainee practitioner's competence before they are permitted to block patients without being directly supervised.²¹
- 4.3** All trainee anaesthetists should undergo competency-based assessment, appropriate to their level of training, on the knowledge, skills, attitudes and behaviour required for safe and effective ophthalmic anaesthesia.²²
- 4.4** All anaesthetists working in ophthalmic services should have access to continuing educational and professional development facilities for advancing their knowledge and practical skills associated with ophthalmic anaesthesia.²³
- 4.5** All ophthalmic theatre nurses, anaesthetic nurses and ODPs must have up-to-date basic life support training and ophthalmic nurses should be trained in cardiopulmonary resuscitation.²

5 Research and audit

- 5.1** Research in ophthalmic anaesthesia should be encouraged and time set aside for this activity.
- 5.2** Ophthalmic anaesthesia should be included in departmental audit programmes, including on- going audit of complications and adverse events.²

6 Organisation and administration

- 6.1** In multidisciplinary units there should be a named lead clinician responsible for ophthalmic anaesthesia services.² In single specialty centres, the anaesthetic department should adopt the generic standards described throughout this document. This should include a lead paediatric anaesthetist if children are treated. The service should be consultant led.
- 6.2** Many procedures do not have to be performed out-of-hours.²⁰ Anaesthetists and surgeons together should devise departmental protocols for the handling of patients requiring urgent procedures, to allow prioritisation from both surgical and anaesthetic perspectives. The condition of the eye, American Society of Anesthesiologists (ASA) grade and age of patients need to be considered when arranging out-of-hours surgery. This is particularly important in isolated units.

20 Who operates when? II. *NCEPOD*, London 2003 (www.ncepod.org.uk/2003wow.htm).

21 Interhospital transfer. *AAGBI Safety Guideline*. *AAGBI*, London 2009 (<http://bit.ly/1gMDofV>).

22 The CCT in Anaesthesia. *RCOA*, London 2010 (www.rcoa.ac.uk/node/581).

23 Good medical practice. *GMC*, London 2013 (<http://bit.ly/11DfrXk>).

7 Patient information

- 7.1** Patient information covering procedures for the day of admission and details of local or general anaesthetic techniques must be available prior to admission. It should be available in large print or Braille if required. There is information available on the websites of both the [Royal College of Anaesthetists](#) and the [Royal College of Ophthalmologists](#) which patients may find useful.

Chapter 14

GUIDELINES FOR THE PROVISION OF anaesthetic services

Services for neuroanaesthesia and neurocritical care 2015

Author

Dr I E Tweedie, The Walton Centre, Liverpool

In association with the Neuroanaesthesia Society of Great Britain and Ireland (NASGBI)

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

www.rcoa.ac.uk/gpas2015
gpas@rcoa.ac.uk

Guidance on the provision of services for neuroanaesthesia and neurocritical care 2015

Summary

- Neuroanaesthesia should only take place in a designated neuroscience centre.
- There should be sufficient numbers of clinical programmed activities in consultants' job plans to provide cover for all elective neurosurgical operating lists and interventional neuroradiology sessions, and also to provide adequate emergency cover.¹
- Staffing levels in the operating theatre should be sufficient to allow neuroanaesthetists to work in teams during long and complex operations.²
- There should be a designated consultant lead for critical care/neurocritical care and sufficient consultant sessions to provide daytime and out-of-hours cover.³
- There should be sufficient numbers of critical care beds for neurosurgery to allow timely access for patients from within an agreed geographical area. Management of critically ill patients outside the critical care unit should take place only in exceptional circumstances.³
- The care of head-injured patients is an integral part of neuroanaesthesia and neurocritical care. Units accepting head-injured patients must have specific arrangements in place, including evidence-based protocols, appropriately trained staff and sufficient resource to allow timely access for those requiring life-saving surgery.^{3,4,5,6}
- Protocols, appropriate facilities and audit processes should be in place for transfer of critically ill neuroscience patients between hospitals, and within neuroscience units.^{7,8}
- Specific consideration should be given to the provision of anaesthetic services for paediatric imaging and neurosurgery, although life-saving emergency procedures may need to be performed in an adult unit prior to transfer.^{9,10}
- The provision in neurocritical care of specialist nurses for advice on organ donation ensures it is considered in all end-of-life decisions, as well as providing bereavement counselling and support.¹¹

1 Guidance on the 2003 (new) contract and job planning for consultant anaesthetists. *AAGBI*, London 2005 (<http://bit.ly/1nZYdmE>).

2 Fatigue and the anaesthetist (expanded web version). *AAGBI*, London 2005 (<http://bit.ly/1omZJ7j>).

3 Neuroscience critical care report – progress in developing services (Gateway Ref: 3236). *DH*, London 2004 (<http://bit.ly/1pjXUEG>).

4 Report of the working party on the management of patients with head injuries. *R Coll Surg Engl*, London 1999 (<http://bit.ly/1kf6SXX>).

5 Guidance for nurse staffing in critical care. *RCN*, London 2003 (<http://bit.ly/1rhSZql>).

6 Head injury: triage, assessment, investigations and early management of head injury in infants, children and adults (Clinical Guideline 56). Developed by the National Collaborating Centre for Acute Care (partial update of Clinical Guideline 4). *NICE*, London 2007 (<http://bit.ly/WQoITi>).

7 Recommendations for transfer of patients with brain injury. *AAGBI*, London 2006 (<http://bit.ly/1lDt6NX>).

8 Guidelines for the transport of the critically ill adult (3rd Edition). *ICS*, London 2011 (<http://bit.ly/1kXecFZ>).

9 Children's neurosurgical specification standards. *NHS Specialised Services*, 2011 (<http://bit.ly/1rRqsev>).

10 Joint statement from the Society of British Neurological Surgeons and the Royal College of Anaesthetists regarding the provision of emergency paediatric neurosurgical services. *RCoA*, London 2010 (www.rcoa.ac.uk/node/1946).

11 Organs for transplant: a report from the Organ Donation Taskforce. *DH*, London 2008 (<http://bit.ly/1t3YI7a>).

Introduction: the importance of neuroanaesthesia and neurocritical care services

- Anaesthesia for neurosurgery (neuroanaesthesia) is based in recognised neuroscience centres, which allow the grouping together of the interrelated specialties required to support neurosurgery. These centres, whether they are in specialist, teaching or district general hospitals, should provide neurosurgical, neurological, neuroradiological, neurocritical care and other supporting specialist and general services necessary for the management of patients with neurological disease.
- The provision of adequate numbers of neurocritical care beds is a prerequisite for the delivery of such specialist services.³
- The centralisation of neuroscience practice is essential to ensure critical mass for delivery of efficient and high quality clinical care. The pace of development, and the scope of procedures being undertaken in neurosurgery and interventional neuroradiology, continues to increase the specialist nature of neuroanaesthesia and neurocritical care.
- The clinical service should provide:
 - anaesthesia for neurosurgery – intracranial, complex spinal and associated surgery
 - anaesthesia for neuroradiology – diagnostic and interventional procedures including MRI

In units where there is a co-located neurocritical care unit, the department may be also be responsible for providing clinical service cover to:

- neurocritical care – pre- and post-operative management of complex elective cases and the management of critically ill patients, such as those with severe head injury, intracranial haemorrhage, severe neurological disease and those who develop systemic complications secondary to their neurological condition.

Levels of provision of service

1 Staffing requirements

Neuroanaesthesia

- 1.1 The organisation of cover for neuroanaesthesia and where appropriate neurocritical care requires a specific group of consultant anaesthetists (neuroanaesthetists/intensivists) who may be part of, or closely affiliated with, a general department of anaesthesia and intensive care. A neuroanaesthesia service requires adequate provision of consultant programmed activities to support elective and emergency workload.¹
- 1.2 There should be immediate availability of a resident anaesthetist for 24 hours each day, to manage post-operative and emergency patients. In neuroscience units with a substantial caseload, this will require the provision of a resident anaesthetist dedicated to this group of patients. Out-of-hours, consultants should be available for immediate telephone advice and be able to attend the hospital within 30 minutes.
- 1.3 There should be sufficient programmed activities to ensure consultant cover of all neurosurgical operating lists and interventional neuroradiology sessions. Adequate arrangements for cross covering annual and study leave should be incorporated into consultants' job plans. Adequate consultant cover is also required to provide general anaesthesia and sedation for diagnostic radiology sessions, including CT and MRI scans.

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1.4 Consultants working in neuroanaesthesia should have sufficient regular programmed activities within this field to ensure that their specific skills and experience are maintained. A minimum of two or more sessions per week is likely to be required to fulfil this requirement. Evidence of case mix and relevant CPD to maintain skills in those areas will be required for appraisal and revalidation.

1.5 Allocation of a single neuroanaesthetist to an operating list with long neurosurgical cases is insufficient and a team of anaesthetists should service long and complex operations.² Comprehensive handover arrangements must be in place to ensure continuity of care during long cases.

Neurocritical care

1.6 The Royal College of Nursing suggests that the nurse:patient ratio for a patient requiring Level 3 and Level 2 care should be 1:1 and 1:2 respectively, but the actual nursing establishment to support neurocritical care services may be higher.⁵ It may not be possible to leave Level 2 patients with neurological disorders alone even when they are physiologically normal, and an allowance to cover the need for closer supervision of such patients should be made when calculating the nursing establishment.

1.7 Allied health professionals are key members of the multi-professional team and a sufficient establishment is crucial to the delivery of high quality neurocritical care services and early rehabilitation input.

1.8 Consultants responsible for the care of neuroscience patients requiring critical care support should have the training, knowledge, skills and experience needed to treat this group of patients, irrespective of whether the services are provided in a dedicated neurocritical care unit or within the context of a general intensive care unit. There should be a designated lead consultant for neurocritical care (or director of neurocritical care if a separate unit) and this consultant should have programmed activities allocated to this function.

1.9 Although the management of patients requiring neurocritical care is closely shared with the neurosurgical team, a minimum of ten daytime clinical consultant programmed activities is required to cover a small neurocritical care unit (four to eight beds). In larger units it may be necessary for two consultants to be available during weekdays for all or part of the day.

1.10 However, the consultant establishment for neurocritical care should be reviewed locally so that it reflects local conditions, including the skill mix of other members of the multi-professional team. It has been recommended that, in large and busy units, there may be a requirement for up to 30 consultant programmed activities per week.³

1.11 In large units it may be appropriate to allocate consultant programmed activities to provide support to patients throughout the hospital via an outreach service.

1.12 There should be a resident doctor with appropriate skills and competencies immediately available for neurocritical care 24 hours each day.

1.13 Staffing levels must be sufficient to enable an appropriately qualified and experienced doctor and trained assistant to accompany critically ill patients during transfer between neurocritical care and operating theatres, CT and MRI scanners and angiography suites. New initiatives, such as becoming part of a Major Trauma Centre, may require additional staffing.

2 Equipment, support services and facilities

Equipment

- 2.1 There is a high incidence of difficult intubation in neurosurgical units carrying out complex cervical spinal surgery. Specific equipment to manage the difficult airway, including the provision of sufficient numbers of fiberoptic laryngoscopes, should be available.
- 2.2 Equipment should be available for the safe administration of total intravenous as well as inhalational anaesthesia. BIS or CFAM should be available.
- 2.3 Those units conducting functional neurosurgery or surgery for correction of scoliosis should have the appropriate equipment for intra-operative neurophysiological testing.
- 2.4 With the increasing incidence of obesity in the population, appropriate sized mattresses and fixings should be available for positioning those patients for neurosurgery.
- 2.5 The monitoring of patient temperature and the equipment needed to manipulate it should be available.

Support services

- 2.6 The demand for critical care beds in neuroscience centres is high and the actual number and configuration of Level 3 and Level 2 beds should be determined locally. However, capacity should be sufficient to allow access by critically ill patients in an appropriate time scale, e.g. within four hours for those who require life-saving surgery. The Society of British Neurological

Surgeons recommends the provision of ten designated Level 2 and Level 3 beds per million population for neurosurgical patients, and the Association of British Neurologists additionally estimates that between five to seven neurocritical care beds per million population are required to support the care of neurology patients.³

- 2.7 A 24-hour acute pain service should be available for post-operative neurosurgical patients.
- 2.8 Post-operative recovery facilities, with appropriately trained staff and equipment should be available out of normal working hours to all emergency neurosurgical patients undergoing surgery and who do not require critical care.¹²
- 2.9 Twenty-four hours a day neuroradiology support should be provided for interpretation of neuroimaging. Online review of CT scans from referring hospitals and within the neuroscience centre should be available locally, and consideration should be given to the provision of remote access for all consultants who provide cover to neurocritical care out of hours.
- 2.10 There should be on-site laboratory provision, or point of care testing, for arterial blood gases, serum electrolytes and activated clotting time and/or thromboelastography, to allow safe management of patients in the operating theatre during endovascular procedures and on the neurocritical care unit.
- 2.11 Rapid access to other biochemical and haematological investigations, blood transfusion and cerebrospinal fluid (CSF) microscopy should also be provided.
- 2.12 Expert neuropathological expertise should be available on request, with the ability to carry out 'frozen section' examinations on site.

¹² Immediate Post-anaesthesia Recovery 2013. *Anaesth* 2013;**68**:288–297.

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- 2.13 On-site neurophysiological support should be available seven days per week to support the management of patients in ICU requiring continuous EEG monitoring to manage their treatment.¹³
- 2.14 Pre-admission clinics for elective neurosurgery should be available with input from the department of neuroanaesthesia.
- 2.15 For stand-alone neuroscience centres, local arrangements should be in place for specialist opinion and review of patients by other disciplines. Named consultants should be identified in 'core' specialties to facilitate such liaison. There should be same day availability of cardiac echo investigations (including transoesophageal echo) and ultrasound scanning. To avoid the transfer of critically ill patients, this should be provided at the bedside for patients on the neurocritical care unit.
- 2.16 Each unit should have a specialist nurse for organ donation embedded to ensure that it is considered in end-of-life care, and to provide bereavement counselling and support.¹¹

Guidelines

- 2.17 Neurocritical care outcome can be improved by the delivery of management guidelines based on expert consensus. All members of the neurocritical care multi-professional team should input to the development of local protocols, which should cover all the common pathologies managed by that unit. Protocols for the management of severe head injury are particularly important and guidance for management in the acute phase should be developed in collaboration with clinicians from referring hospitals.
- 2.18 Local guidelines should be agreed between clinicians in the neuroscience unit and referring hospitals for transfer and repatriation of patients, and audited as a routine.
- 2.19 **Facilities**
Critically ill patients often require transfer to and from the operating theatre, CT and MRI scanners and angiography suites. Theatres, ICU and radiological facilities should therefore be in the closest possible proximity and preferably on the same floor. Adequate provision should be made for monitoring patients during such transfer. Local guidance should be developed for the intra-hospital transfer of critically ill neuroscience patients, based on guidance from the Intensive Care Society.⁸

3 Areas of special requirement

Children

- 3.1 Whether in a dedicated paediatric neurosurgical unit or not, every child requiring elective neurosurgery should have care delivered by an anaesthetist or anaesthetists who possess the relevant competencies as demanded by the patient's age, disease and co-morbidities. New appointees to consultant posts with a significant or whole-time interest in paediatric neuroanaesthesia should have successfully completed 'Advanced Level' training in paediatric anaesthesia as defined in the CCT in anaesthesia (August 2010).
- 3.2 In a true emergency situation involving a child requiring urgent neurosurgery for a deteriorating condition admitted to an 'adult-only' neurosurgical service, the most appropriate surgeon, anaesthetist and intensivist available would be expected to provide life-saving care including emergency resuscitation and surgery.¹⁰
- 3.3 All children under the age of 16 requiring neurocritical care should be managed in a paediatric intensive care unit.

13 Claasen J et al. Recommendations on the use of EEG monitoring in critically ill patients: consensus statement from the neurointensive care section of the ESICM. *Intensive Care Med* 2013;**39**:1337–1351.

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- 3.4 Detailed guidance for the management of children has been issued and applies equally to those requiring neurosurgical intervention (see [Guidance on the provision of paediatric anaesthesia services](#)).

4 Training and education

- 4.1 The specialist nature of neuroanaesthesia dictates that it is a consultant-delivered specialty. Trainees have an initial exposure to the specialty in a clinical attachment during years ST3 or ST4 of intermediate level training. Following the principle of spiral learning, a further clinical attachment occurs during higher or advanced training (ST5–ST7) with longer attachments for those wishing to follow a career in the specialty. Because of the limited time that trainees spend in the specialty, schools of anaesthesia should develop structured training programmes to cover all core topics. Successful completion is based on workplace-based assessments of the skills and knowledge required. Trainees should, therefore, also be encouraged to attend other training opportunities within the neuroscience unit, such as grand rounds, radiology and pathology case conferences and mortality and morbidity meetings.
- 4.2 Fellowship posts should be identified to allow additional training for those who wish to follow a career in neuroanaesthesia or neurocritical care. These should be suitable for trainees who wish to take time out of training programmes or for those who are post-CCT. Such posts should provide similar or enhanced levels of teaching, training and access to study leave as regular training posts.

5 Research and audit

- 5.1 Departments of neuroanaesthesia and neurocritical care should be encouraged to develop research interests, even if not part of an academic department. Research collaboration with other neuroscience disciplines is good practice. Taking part in national anaesthesia and critical care projects such as the RAIN study is to be encouraged.
- 5.2 Audit programmes should be developed locally but should include continuous audit of transfer of brain-injured patients, neurocritical care capacity and demand, rates of unplanned admission and readmission to ICU and caseload of trainees. Collaborative audit with the other neuroscience disciplines should also be encouraged, and some M and M meetings should be joint with neurosurgeons. In general, local practice should be audited against national and expert consensus guidelines.

6 Organisation and administration

- 6.1 Much of neurosurgery involves acute work with a high degree of urgency. The provision of associated services must recognise this need and inappropriate delay cannot be allowed to occur due to the lack of key personnel or facilities. Laboratory services, neuroradiology and availability of operating theatre time must all be organised to cope with these demands.
- 6.2 Departments of neuroanaesthesia and neurocritical care, even if part of a large general department, must be provided with adequate secretarial and administrative support. Consultants with lead responsibility for neuroanaesthesia and neurocritical care should have programmed activities allocated to this function. Appropriate levels of administrative support, including data collection and analysis, should be available for neurocritical care.
- 6.3 Consultants in neuroanaesthesia and neurocritical care should be involved in the planning of neuroscience services at a local and regional level.
- 6.4 A lead consultant responsible for patient transfer should be identified both in the neuroscience unit and in referring hospitals.

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7 Patient information

- 7.1 Each department should provide written information specific to neurosurgical procedures, including relevant risks. Information for relatives of patients requiring neurocritical care should also be available, including contact details of relevant charities and helplines.

Chapter 15

GUIDELINES FOR THE PROVISION OF anaesthetic services

Vascular anaesthesia services 2015

Authors

Dr J P Thompson, Leicester Royal Infirmary
Professor G R Danjoux, James Cook University
Hospital, Middlesbrough
Dr A Pichel, Manchester Royal Infirmary

In association with the Vascular Anaesthesia Society of
Great Britain and Ireland (VASGBI)

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

www.rcoa.ac.uk/gpas2015
gpas@rcoa.ac.uk

Summary

- Vascular surgical services are recognised as having a high priority in the UK and outcomes are being monitored. National Quality Improvement Programmes have been introduced with the explicit remit of improving mortality from aortic aneurysm repair,¹ and lower limb amputation.²
- Anaesthesia for all patients undergoing major vascular surgery should be provided by a consultant experienced in vascular anaesthesia.
- Anaesthetists undertaking major vascular surgical cases should be supported by adequately trained assistants,³ who work regularly in the vascular theatres.
- Vascular anaesthetists should have some managerial responsibility and should be involved in planning decisions that affect the delivery of vascular services.
- Adequate Level 2 and Level 3 critical care facilities must be available on site for all patients undergoing major vascular surgery.^{1,4,5}
- Anaesthetists should be fully involved in decision-making for patients undergoing major vascular surgery. This includes access to facilities for adequate pre-operative assessment. Ideally, this should be within the setting of a formal pre-operative assessment clinic, which should be adequately staffed, supported and have allocated sessional programmed activities.⁴
- Provision should be made for those who may cover vascular emergencies, but do not have regular sessions in vascular anaesthesia, to spend time in a supernumerary capacity with a consultant anaesthetist who has a regular vascular commitment.
- Units undertaking major vascular anaesthesia should nominate a named lead clinician to assist dialogue and relationships with vascular surgeons, radiologists, and other appropriate specialists. Departments should facilitate joint audit and management meetings between these parties.
- Multi-disciplinary team decision-making should be undertaken to allow planned, appropriate management of all high risk cases. Where regional or national guidance exists this should be followed.^{1,2}

1 National abdominal aortic aneurysm quality improvement programme: interim report. *VSGBI*, London 2011 (<http://bit.ly/1un2xpK>).

2 Quality improvement framework for amputation guidance. *VSGBI*, London 2012 (www.vascularsociety.org.uk).

3 The anaesthesia team 3. *AAGBI*, London 2010 (<http://bit.ly/1mo43nw>).

4 Abdominal aortic aneurysm: a service in need of surgery? *NCEPOD*, London 2005 (www.ncepod.org.uk/2005aaa.htm).

5 Provision of services for patients with vascular disease. *VSGBI*, London 2012 (www.vascularsociety.org.uk).

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- Patients undergoing major vascular surgery should have access to a multidisciplinary, acute pain management service.^{6,7,8}
- Facilities should be available to conserve blood (for example, cell salvage or acute normovolaemic haemodilution)⁹ and be supported by the facilities to manage major haemorrhage.¹⁰
- Local guidelines should ensure the appropriate administration of blood and coagulation products immediately if required.^{11,12,13,14,15}

Introduction: the importance of vascular anaesthesia services

- Vascular anaesthesia encompasses a number of operations ranging from short day case procedures (such as varicose vein surgery) to prolonged complex major arterial surgery. The majority of patients requiring major arterial surgery are elderly, with a high incidence of cardiovascular and respiratory disease.^{16,17,18,19}
- Because of these factors, pre-operative evaluation of patients presenting for vascular surgery presents many challenges.
- The vascular anaesthetist has particular expertise in pre-operative risk assessment, and formal anaesthetic assessment should be part of the decision-making process for patients contemplating high risk major vascular surgery.

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- 6 Pain management services: good practice. *RCoA and The Pain Soc*, London 2003 (archived – copy available on request from The Faculty of Pain Medicine).
 - 7 Report of the working party on pain after surgery. *R Col Surg Eng and Coll Anaesth*, London 1990 (www.rcoa.ac.uk/node/2218).
 - 8 Practice guidelines for acute pain management in the perioperative setting: a report by the American Society of Anesthesiologists task force on pain management. Acute pain section. *Anesthesiol* 2004;**100**:1573–1581.
 - 9 Torella F et al. Acute normovolemic hemodilution and intra-operative cell salvage in aortic surgery. *J Vasc Surg* 2002;**36**:31–34.
 - 10 Better blood transfusion. Safe and appropriate use of blood (HSC 2007/001). *DH*, London 2007 (<http://bit.ly/1LDHrdi>).
 - 11 Hardy JF, de Moerloose P, Samama CM. Massive transfusion and coagulopathy: pathophysiology and implications for clinical management. *Can J Anaes* 2006;**53**(6 Suppl):S40–S58.
 - 12 British committee for standards in haematology, blood transfusion task force. Guidelines for the use of fresh-frozen plasma, cryoprecipitate and cryosupernatant. *Br J Haematol* 2004;**126**:11–28.
 - 13 Mallett SV et al. Reducing red blood cell transfusion in elective surgical patients: the role of audit and practice guidelines. *Anaesth* 2000;**55**:1013–1019.
 - 14 Erber WN, Perry DJ. Plasma and plasma products in the treatment of massive haemorrhage. *Best Pract Res Clin Haematol* 2006;**19**:97–112.
 - 15 Stainsby D, MacLennan S, Hamilton PJ. Management of massive blood loss: a template guideline. *Br J Anaesth* 2000;**85**:487–491.
 - 16 Hertzner NR et al. Coronary artery disease in peripheral vascular patients: a classification of 1000 coronary angiograms and results of surgical management. *Ann Surg* 1984;**199**:223–233.
 - 17 Hertzner NR et al. Late results of coronary bypass in patients with peripheral vascular disease, II: five-year survival according to sex, hypertension and diabetes. *Cleve Clinic J Med* 1987;**54**:15–23.
 - 18 Mangano DT. Perioperative cardiac morbidity. *Anesthesiol* 1990;**72**:153–184.
 - 19 Fleisher LA et al. ACCF/AHA focused on perioperative beta blockade incorporated into the ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for non-cardiac surgery. *J Am Coll Cardiol* 2009;**54**:113–118.
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- There is evidence that outcome after major arterial surgery is related to the caseload of both surgeons and anaesthetists. It has been suggested that individual anaesthetists should not be caring for very small numbers of patients undergoing major elective and emergency aortic or carotid surgery. Anaesthetic departments should review the allocation of vascular cases in order to ensure optimal concentration of experience and expertise.⁴
- Major vascular surgery includes a significant urgent and emergency workload. The ability to provide emergency cover means that facilities and expertise should be available 24 hours per day. Staffing and resources should also be planned and funded to allow for unpredictable changes in service requirements for urgent vascular procedures.
- Aortic surgery carries high risks of morbidity and mortality,^{18,19} which are greater after emergency than elective procedures.² Patients undergoing open aortic surgery require post-operative Level 2 or Level 3 critical care, and these facilities must be available before
- Elective surgery is contemplated. If elective aortic aneurysm surgery is cancelled because of a lack of critical care resources or ward beds, the patient may be exposed to risk of aneurysm rupture.^{20,21} It has been recommended that surgery should be undertaken within eight weeks of the decision to operate.^{1,4}
- The increasing use of complex endovascular stent grafts in patients assessed as high risk for open aortic surgery has added a new level of complexity to decision making for patients with complex aortic pathology (e.g. juxta-renal, supra-renal and thoraco-abdominal aortic aneurysms). Vascular anaesthetists should be cognisant of the available options for such patients and be involved in the decision-making for their treatment.
- Following published evidence that outcome from abdominal aortic aneurysm (AAA) surgery was significantly worse in the UK than comparable countries, a national Abdominal Aortic Aneurysm Quality Improvement Programme (AAAQIP) was introduced to encourage standards of best practice and reduce national mortality.¹ The most recently published report has confirmed that standardisation of care through the AAAQIP has resulted in mortality outcomes superior to those initially targeted by 2013 (2.4% versus 3.5% respectively).²²
- Delay in performing carotid endarterectomy also increases the risk of death or disabling stroke, particularly in symptomatic patients. Current evidence suggests surgery should be performed within two weeks of initial symptoms.²³
- Access to diagnostic radiological services may be accorded a lower priority than access for patients with suspected cancer.⁴ Treatment delays for major vascular surgery may lead to death or permanent disability, therefore patients with vascular disease should be accorded a similar priority to other groups of patients.
- Minor vascular procedures may be straightforward but some procedures such as thoracic or thoraco-abdominal aortic surgery may involve collaboration with cardiac surgeons or involve the use of extracorporeal circulation. These uncommon or especially high risk procedures should only be performed in specialist centres with the experience, skills and facilities to manage them successfully.

20 UK small aneurysm trial participants. Risk factors for aneurysm rupture in patients kept under ultrasound surveillance. *Ann Surg* 1999;**230**:289–297.

21 Bown MJ et al. A meta-analysis of 50 years of ruptured abdominal aortic aneurysm repair. *Br J Surg* 2002;**89**:714–730.

22 Outcomes after elective repair of infra-renal abdominal aortic aneurysm. A report from the *Vascular Society*, London 2012 (<http://bit.ly/WQlxoN>).

23 Rothwell PM et al. For the Carotid Endarterectomy Trialists collaboration. Endarterectomy for symptomatic carotid stenosis in relation to clinical subgroups and timing of surgery. *Lancet* 2004;**363**:915–924.

- Increasing numbers of vascular procedures are undertaken by radiologists.^{24,25} However, the risks of anaesthesia in such frail patients remain and may be compounded by an unfamiliar or remote environment.
- Lower limb amputation is required in a significant proportion of patients who undergo peripheral vascular reconstruction for acute or chronic limb ischaemia. Mortality and morbidity are very high after major amputation.²⁶ To reduce the risks it is recommended that major amputation surgery should be performed within routine working hours with care provided by experienced clinicians.²

Levels of provision of service

1 Staffing requirements

- 1.1** Vascular surgery is performed in many hospitals in the UK, ranging from District general to specialist units in large teaching hospitals. Recent evidence suggests that larger volume units achieve better outcomes following AAA and other major arterial surgery. As a result there is national pressure to concentrate vascular services in larger centres.⁵ The Vascular Society recommends that centres undertaking AAA surgery should perform a minimum of 100 elective interventions (open and endovascular repair) in each three year period.¹ Data entry to the National Vascular Registry is mandatory for both standard and complex aortic intervention. There are data fields directly relating to perioperative anaesthetic care (i.e. pre-op assessment, MDT, anaesthesia techniques and analgesia). It is essential that the vascular anaesthetist ensures the accuracy of data submitted.
- 1.2** Vascular anaesthesia is increasingly recognised as a sub-specialty within its own right, and has its own specialist society.²⁷ The skills and knowledge required by all anaesthetists involved in the care of vascular surgical patients overlap with those in other areas of sub-specialisation. Risk assessment and optimisation of co-existent medical conditions in the high risk patient prior to major surgery is an integral component of this skill set. In the peri-operative period the vascular anaesthetist requires appropriate skill and knowledge with regards to; invasive cardiovascular monitoring, cardioactive or vasoactive drugs, strategies for peri-operative organ protection (renal, myocardial and cerebral), the management of major haemorrhage and the maintenance of normothermia.
- 1.3** Additional skills required in specialist units include expertise in spinal cord protection, visceral perfusion and one-lung ventilation. In units designated as complex endovascular centres, additional programmed time should be provided to vascular anaesthetists delivering this service to allow them to engage with the complex MDT, provide training to allied specialties and to provide adequately staffed preoperative assessment clinics. The pre-operative assessment and decisions regarding the risks of vascular surgery are often complex, time-consuming and require detailed discussions with the patient and other colleagues. It is inappropriate that these decisions are devolved to trainees, and vascular anaesthetists involved in regular pre-operative risk assessment require the appropriate time and facilities to undertake and support these activities (see section 2.1 below).

24 EVAR trial participants. Endovascular aneurysm repair versus open repair in patients with abdominal aortic aneurysm (EVAR trial 1): randomised controlled trial. *Lancet* 2005;**365**:2179–2186.

25 Cronenwett JL. Endovascular aneurysm repair: important mid-term results. *Lancet* 2005;**365**:2156–2158.

26 Ploeg AJ et al. Contemporary series of morbidity and mortality after lower limb amputation. *Eur J Vasc Endovasc Surg* 2005;**29**:633–637.

27 The Vascular Anaesthesia Society of Great Britain and Ireland (www.vasgbi.com).

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- 1.4 The workload generated by urgent and elective vascular pre-operative assessment referrals should be acknowledged by appropriate recognition in terms of consultant programmed activities (PAs) within a department, whether or not a formal clinic operates.
- 1.5 A vascular anaesthetist should be nominated as lead clinician for vascular anaesthesia. This role should include close collaboration with the wider vascular team and other specialists (for example, radiologists, cardiologists, renal and respiratory physicians), attendance at vascular multidisciplinary meetings,¹ promotion of local evidence-based guidelines and co-ordination of joint audit and research.
- 1.6 An anaesthetist who understands the implications for vascular anaesthesia should be a member of the hospital or trust transfusion committee.
- 1.7 Anaesthesia for major vascular surgery of moderate complexity can be performed by experienced trainees under the supervision of a consultant. However, trainees who are not directly supervised should not undertake major vascular cases in medically unfit patients or where surgery or anaesthesia are complex; there should be a named consultant anaesthetist responsible for every major vascular surgical case. These considerations also apply to vascular patients who require major lower limb amputation after unsuccessful interventions at limb salvage or reperfusion.
- 1.8 When major arterial surgery is performed, the anaesthetist must be assisted by a fully trained anaesthetic assistant who has specific training and experience in vascular anaesthetic practice.
- 1.9 Additional trained theatre staff are required where cell salvage techniques are utilised.²⁸
- 1.10 Adequate numbers of trained critical care staff must be available before undertaking major aortic surgery in patients who will require Level 2 or 3 care.
- 1.11 For more minor procedures, patients may be initially managed after surgery in a recovery unit or post-anaesthesia care unit. Appropriate numbers of trained staff must be available to manage these patients on a one-to-one basis; staff should be trained in the use of invasive cardiovascular monitoring. Facilities to provide continued Level 1 care should be available on a 24-hour basis.
- 1.12 Appropriate numbers of medical, nursing and other staff should be available to facilitate transfer of emergency patients to alternative or more specialised vascular units if required.
- 1.13 Where vascular surgical procedures are performed in the radiology department, requirements in terms of anaesthetic assistance and post-operative nursing are identical to those of patients undergoing vascular surgery in the operating theatre suite.

2 Equipment, support services and facilities

The following equipment, support services and facilities are required for the efficient and safe functioning of the vascular anaesthesia service.

Pre-operative assessment facilities

- 2.1 A vascular pre-operative assessment clinic provides the ideal environment for risk assessment, patient referral and optimisation in advance of surgery. Regular sessional time and programmed activities should be made available to adequately fulfil these requirements.
- 2.2 The clinic should be consultant led with adequate nursing, secretarial support and adequate office space.

28 Blood transfusion and the anaesthetist: intra-operative cell salvage. AAGBI Safety Guideline. AAGBI, London 2009 (<http://bit.ly/1nGJ4HM>).

- 2.3** The clinic should be supported by immediate access to baseline investigations such as blood tests, electrocardiography (ECG) and chest radiology (CXR).
- 2.4** Funding should be made available for the purchase of simple clinical equipment, which may influence risk analysis during the clinic visit. This includes pulse oximetry, spirometry and blood gas analysis.
- 2.5** Appropriate time should be allocated to individual patients for risk assessment and informed discussion of complex issues relating to patient care.
- 2.6** Clinicians involved in vascular pre-operative assessment should have ready access to senior colleagues in other specialties such as cardiology, respiratory medicine or radiology, who can facilitate specialised or invasive investigations and provide specialist input for certain cases. These referrals should be prioritised so that undue delays to surgery are avoided. Locally drawn up referral criteria will facilitate this process.
- 2.7** Where vascular services are centralised, many patients may live at distant locations. Transport facilities should be available for patient convenience.
- 2.8 Equipment**
Major vascular surgery often requires the use of large amounts of ancillary equipment usually not required by other surgical specialties. These include radiological equipment, rapid blood transfusion devices, cell salvage devices, additional monitoring and infusion devices, and occasionally extra-corporeal circulation devices. Vascular theatres should be of adequate size to safely utilise this equipment, with additional storage capacity.
- 2.9** Sufficient space should be available where patients are anaesthetised to perform invasive monitoring and regional anaesthesia techniques in a safe and sterile manner.
- 2.10** A portable ultrasound machine should be available to facilitate safe placement of invasive lines used for monitoring purposes.
- 2.11** If anaesthesia is induced in an anaesthetic room, then the monitoring should be of similar specification and condition to that used in the operating theatre.
- 2.12** All theatres where aortic surgery is performed should have the capability to perform cell salvage and/or normovolaemic haemodilution.⁹ Essential equipment includes a rapid fluid infusion device, fluid and patient warming devices, and infusion pumps.
- 2.13** Facilities and equipment to perform one-lung ventilation must be available when thoracoscopic or thoraco-abdominal procedures are performed.
- 2.14** Equipment must be available nearby for rapid blood gas analysis, tests of coagulation and the measurement of haematocrit and blood glucose. The provision of near-patient biochemistry testing is highly desirable.¹²
- 2.15 Dedicated endovascular aortic repair (EVAR) facilities**
There is an increasing trend for endovascular aortic surgery to be performed in the radiology suite, because high quality imaging equipment is static and located there. It is essential that where EVAR procedures are performed such facilities should be of theatre specification; to facilitate safe provision of anaesthesia, surgical cut-down and conversion to open repair, should the need arise.
- 2.16** The Medical Devices and Healthcare Regulatory Agency (MHRA) has recommended that the standards of anaesthesia facilities, equipment, near-patient testing and assistance should be equivalent to those for conventional operating theatres, including post-operative recovery.²⁹

29 Delivering an endovascular aneurysm repair (EVAR) service. Joint working group to produce guidance on delivering an endovascular aneurysm repair (EVAR) service. *MHRA*, London 2010 (<http://bit.ly/1pgMx33>).

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- 2.17** These facilities should ideally be sited within or directly adjacent to the existing theatre complex.
- 2.18** However, it is recommended that all complex endovascular procedures should ideally be carried out in a dedicated hybrid endovascular operating theatre.
- 2.19** **Support services**
On-site pharmacy services are required for the provision of necessary routine and emergency drugs, including sterile pre-mixed drug solutions for regional analgesia and patient controlled analgesia.
- 2.20** Acute pain management services should be available for all patients undergoing major vascular surgery with the facilities for both post-operative patient controlled analgesia and epidural analgesia services in the ward setting. Sufficient equipment and support must be available for all patients requiring such post-operative pain relief at all times.
- 2.21** Recovery from major vascular surgery may be prolonged, and units must be supported by suitable rehabilitation services, including physiotherapy, occupational therapy and prosthetics services.
- 2.22** Physiotherapy services should be available 24 hours a day.
- 2.23** As with all anaesthesia services, medical engineering technicians are required to maintain, repair and calibrate anaesthetic machines, monitoring, measurement and infusion equipment.
- 2.24** Haematology and biochemistry services must be available to provide rapid analysis of blood and other body fluids and to make blood and blood products for transfusion available without delay, according to clinical need.
- 2.25** Facilities should be available for the rapid and appropriate provision of blood and blood products for all major vascular cases. Hospitals should ensure that personnel directly involved in the distribution and administration of blood and blood components are qualified and are provided with timely, relevant and updated training.^{10,30}
- 2.26** Protocols and guidelines should be drawn up locally for the management of major haemorrhage so that necessary blood products and drugs are available without delay.^{11,13,14,15} This should be facilitated through the trust or hospital transfusion committee.

3 Areas of special requirement

Pre-operative assessment

- 3.1** The pre-operative evaluation of patients presenting for vascular surgery presents particular challenges because of the incidence of co-existing disease, in particular cardiorespiratory disease, diabetes and renal disease.¹⁹ All patients undergoing elective major vascular surgery should be seen well in advance of planned surgery to enable appropriate risk analysis.

³⁰ The Blood Safety and Quality Regulations 2005. *The Office of Public Sector Information* (<http://bit.ly/Usboag>).

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- 3.2** Determination of a patient's functional capacity is important to aid risk assessment,^{19,31} but this may be difficult if exercise tolerance is limited by peripheral vascular insufficiency, respiratory or other disease. Risk stratification based on clinical history may help guide management.³² Guidelines should be drawn up based on best available evidence for further investigation, referral, optimisation and management.
- 3.3** It has been recommended that where facilities are available, pre-operative cardiopulmonary exercise testing should be used to help establish functional capacity and aid risk stratification. An increasing evidence-base is now available to support its use in both the vascular^{33,34} and non-vascular setting where available.³⁵
- 3.4** The aims of pre-operative vascular assessment should be; to assist risk assessment and the decision to perform surgery, to establish the best surgical options for an individual (for example deciding between open and endovascular surgery), to allow optimisation of co-existing medical conditions, to permit consideration and institution of secondary prevention measures, and to allow timing of surgery and required facilities to be planned. In order to fully achieve these aims, a properly resourced multidisciplinary pre-operative assessment clinic is required.
- 3.5** Clinicians involved in vascular pre-operative assessment should have ready access to other specialists and tools for non-invasive risk assessment. Local expertise and facilities vary, and the precise type of assessment tool used is probably less important than the local expertise.^{36,37}
- 3.6** Short- and long-term outcome in vascular patients can be improved by certain lifestyle changes (cessation of smoking, weight reduction, regular exercise) and pharmaceutical therapies.^{38,39,40} The pre-operative assessment clinic should be used as an opportunity to implement these, and should therefore be operated by senior clinicians able to assess the need for such interventions, with access to appropriate support services (pharmacy, dietetics, smoking cessation services).

31 Chassot P-G, Delabys A, Spahn DR. Preoperative evaluation of patients with, or at risk of, coronary artery disease undergoing noncardiac surgery. *Br J Anaesth* 2002;**89**:747–759.

32 2014 AHA/ACC Guideline on Perioperative Cardiac Evaluation and Management of Patients Undergoing Non-Cardiac Surgery. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Published on line 1 August 2014. *J Am Coll Cardiol* 2014 (doi:10.1016/j.jacc.2014.07.944).

33 Hartley RA et al. Preoperative cardiopulmonary exercise testing and risk of early mortality following abdominal aortic aneurysm repair. *Br J Surg* 2012;**99**(11):1539–1546.

34 Prentis JM et al. Submaximal exercise testing predicts perioperative hospitalization after aortic aneurysm repair. *J Vasc Surg* 2012;**56**(6):1564–1570.

35 Hennis PJ, Meale PM, Grocott MPW. Cardiopulmonary exercise testing for the evaluation of perioperative risk in non-cardiopulmonary surgery. *Postgrad Med J* 2011;**87**:550–557.

36 Mantha S et al. Relative effectiveness of four preoperative tests for predicting adverse cardiac outcomes after vascular surgery: a meta-analysis. *Anesth Analg* 1994;**79**:422–433.

37 Fleisher LA. Perioperative management of the cardiac patient undergoing noncardiac surgery. In Barash PG (ed). *Cardiol Clin* 1995;**13**(2):149–161.

38 Sucko et al. Statin therapy after infrainguinal bypass surgery for critical limb ischaemia is associated with improved 5 year survival. *J Vasc Surg* 2014 (doi:10.1016/j.jvs.2014.05.093) (Epub ahead of print).

39 De Martino et al. Perioperative management with antiplatelet and statin medication is associated with reduced mortality following vascular surgery. *J Vasc Surg* 2014;**59**(6):1615–1621.

40 Gray C et al. Statins promote residual aneurysm sac regression following endovascular aortic aneurysm repair. *Vasc Endovascular Surg* 2014;**48**(2):111–115.

Peri-operative monitoring

- 3.7** Patients undergoing major vascular surgery may suffer major blood loss or fluid shift. Usually, peri-operative invasive cardiovascular monitoring is indicated, and appropriate facilities, equipment and expertise should be available in all cases. Cardiovascular instability and myocardial ischaemia are common during major vascular procedures and are associated with a worse outcome.^{41,42} Specific 5-lead ST segment ECG monitoring and non-invasive cardiac output monitoring should be available routinely^{19,37} and other monitoring modalities (transoesophageal echocardiography) may be required for certain cases. Transoesophageal echocardiography may be useful in the identification of thoracic aortic pathology, successful deployment of thoracic stent grafts and in the detection of early complications.
- 3.8** Surgery may be prolonged and lead to heat loss. Peri-operative hypothermia has a number of adverse physiological effects and is associated with worse outcome in the short- and long- term.⁴³ Hypothermia is usually preventable by manipulation of the ambient temperature in conjunction with the use of appropriate patient and fluid warming devices.
- 3.9** The considerations regarding monitoring, expertise, trained assistance, and hypothermia are important wherever the location of the vascular intervention. This is particularly relevant when procedures are performed in a radiology suite, as the environment may be unfamiliar. It is important that all facilities required for peri-procedural care are of the same standard as the operating theatre environment. This includes recovery facilities and post-operative care.

Post-operative facilities

- 3.10** Units should possess adequate critical care facilities to provide appropriate Level 2 or Level 3 care. It should be ensured that the identified level of care is available in advance of commencing individual major vascular cases.
- 3.11** Some patients undergoing vascular surgery such as aortic surgery or procedures associated with the use of radiological contrast media or large blood loss are at increased risk of post-operative acute kidney injury.⁴⁴ Post-operative renal failure is associated with a poor prognosis. Facilities to provide renal replacement therapy on site are highly desirable. Where this is not possible, staffing, relationships and guidelines should be in place to facilitate transfer to a unit where renal support can be provided.
- 3.12** Units performing major vascular surgery should incorporate a fully staffed and functional acute pain management team, with the facility to provide post-operative epidural analgesia services in the ward setting.
- 3.13** Post-operative pain services must be continuously audited and evaluated.
- 3.14** Recovery from major vascular surgery may be prolonged, and units must be supported by suitable rehabilitation services, including physiotherapy, occupational therapy and prosthetics services.

41 McCann RL. Silent myocardial ischemia in patients undergoing peripheral vascular surgery. *J Vasc Surg* 1989;**9**:583–587.

42 Landsberg G et al. Importance of long-duration postoperative ST-segment depression in cardiac morbidity after vascular surgery. *Lancet* 1993;**341**:715–719.

43 Inadvertent perioperative hypothermia. The management of inadvertent perioperative hypothermia in adults. *NICE*, London 2008 (www.nice.org.uk/guidance/CG65).

44 Sear JW. Kidney dysfunction in the postoperative period. *Br J Anaesth* 2005;**95**:20–32.

4 Training and education

- 4.1 Anaesthetists with an appropriate level of training should manage patients undergoing major elective vascular surgery.
- 4.2 In order to maintain the necessary knowledge and skills, consultant vascular anaesthetists should have a regular commitment to the specialty, and adequate time must be made for them to participate in relevant multidisciplinary meetings and continuing professional development (CPD) activities. This should include the facility and resources to visit other centres of excellence in order to exchange ideas and develop new skills where appropriate.
- 4.3 Much of the knowledge, skills and attitudes required to successfully manage high risk patients undergoing major vascular surgery are not specific to the sub-specialty. However, it is recognised that the outcome following major vascular surgery may be better if provided by those with a specialist interest.⁴ Whilst all senior anaesthetists should have appropriate experience of relevant areas, such as in the management of major haemorrhage or use of invasive monitoring and vasoactive drugs, this may not reflect their current practice. Some such individuals do not have a regular vascular anaesthesia commitment, but may be expected to provide emergency cover, particularly out of hours. Funded arrangements must be in place to enable all consultants and career grade staff providing occasional vascular anaesthesia cover to participate in appropriate CPD, including occasional accompanied sessions with vascular anaesthesia colleagues. Notwithstanding this, all anaesthetists must recognise and work within the limits of their professional competence.
- 4.4 An appropriate training programme should be in place for trainee anaesthetists according to their grade. This programme should develop understanding of the widespread nature of cardiovascular disease, as well as peri-operative management. The RCoA revised training curriculum (2010) provides explicit detail of the requirements.⁴⁵
- 4.5 All vascular anaesthetists should be able to undertake appropriate pre-operative clinical risk assessment based on a sound knowledge of the individual patient's pathophysiology, available clinical evidence, and local outcome data.
- 4.6 Those providing assistance for the anaesthetist should be trained to the standards recommended by the AAGBI.³

5 Research and audit

- 5.1 All departments undertaking major vascular surgical cases should organise regular interdisciplinary audit meetings with vascular surgeons and radiologists in addition to departmental clinical governance meetings.¹
- 5.2 Multidisciplinary team meetings provide the ideal forum for agreeing a planned team-based strategy for the management for high risk cases, e.g. patients with abdominal aortic aneurysmal disease. Where regional or national guidance is available, e.g. AAAQIP, it is recommended that this is followed.^{1,2}
- 5.3 In addition to auditing adverse events and patient outcome, departments should audit delays or cancellations in major elective vascular surgery.
- 5.4 Individual consultants are encouraged to contribute to UK national audit database (National Vascular Registry), which incorporates a section dedicated to 'anaesthesia' as developed between the Vascular Anaesthesia Society of Great Britain and Ireland and partnership organisations. The systems needed to provide the necessary data should be available and supported.

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- 5.5 Departments should facilitate the collection of data required for anaesthetists undertaking major vascular cases to keep a personal logbook.

6 Organisation and administration

- 6.1 Secretarial and administrative support should be available to facilitate patient referrals for preoperative assessment, within and outside the confines of a formal pre-operative assessment clinic.
- 6.2 Cancellation of patients requiring major elective vascular surgery can have serious physical, as well as psychological, consequences for the patient. Departments should provide elective vascular theatres with appropriately trained staff; senior vascular surgeons and anaesthetists should be available to provide a service that reliably covers the needs for planned surgery throughout the year. Funding and provisions should be made to honour these commitments with adequately trained individuals to cover for sickness, annual and professional or other leave.
- 6.3 Patients requiring major vascular surgery frequently require Level 2 or Level 3 care post-operatively. The funding and provision of critical care beds must be planned to meet the demands of the service and avoid unnecessary cancellations. Appropriate planning can also improve the use of theatre resources. Patients may present with conditions requiring urgent surgery, which is often best performed on the next available daytime list. Departments should ensure that theatre time is identified and that senior anaesthetists are available to facilitate the above recommendations.
- 6.4 Daytime vascular urgent or emergency lists should be organised and staffed by senior anaesthetists and surgeons working to a fixed sessional pattern and who have no conflicting clinical commitments. There is evidence that outcome after lower limb amputation surgery is better when surgery is undertaken within normal working hours.²
- 6.5 Individuals should not be pressurised into undertaking major vascular cases if any of these resources or expertise are not available.
- 6.6 When very long surgical procedures are scheduled on a regular basis, it will be necessary to arrange the funding and resources to support long duration lists.

7 Patient information

- 7.1 Patients undergoing major vascular surgery are at significant risk of major complications, including death.¹⁹ All patients should be able to come to an informed decision about the relative risks and possible benefits of any planned surgical intervention. It is recommended that a specialist in vascular anaesthesia be involved both in assessing an individual patient's general medical condition and fitness for surgery, and in the decision to perform surgery. This is particularly important in the highest-risk cases, and if surgery is declined by any of the parties involved.
- 7.2 All major complications should be explained to the patient, in an appropriate setting and in a language they can understand. Explanations should include the consequences of these complications (for example, renal failure requiring dialysis, stroke causing disability).
- 7.3 Options for post-operative pain relief and their risks should be discussed with the patient by the anaesthetist.

- 7.4** These discussions should occur well in advance of planned surgery to allow reflection and informed decision-making. All such discussions should be documented, although it is still necessary to give relevant explanations at the time of the procedure.
- 7.5** Departments should be able to provide written information leaflets explaining the planned procedure and the possible risks.
- 7.6** The above evaluations and discussions are ideally held in the context of a pre-operative assessment clinic, and the facilities to support this should be provided.

Chapter 16

GUIDELINES FOR THE PROVISION OF anaesthetic services

Anaesthesia services for trauma and orthopaedic surgery 2015

Author

Dr P Oakley, University Hospital of North Staffordshire

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Guidance on the provision of anaesthesia services for trauma and orthopaedic surgery 2015

Summary

- There should be appropriately staffed and equipped operating theatres and a hybrid care suite for radiological or surgical interventions immediately available for injured patients who need life-saving interventions.^{1,2,3}
- All major trauma centres (MTCs) and trauma units (TUs) that receive acutely injured patients should have a defined response to major trauma that includes the prompt assembly of a multidisciplinary trauma team in the emergency department. An anaesthetist with appropriate skills and training to deal with major trauma should be involved in the immediate management of such cases.^{1,2}
- High volume MTCs should provide dedicated consultants in trauma resuscitation and anaesthesia⁴ to respond to major trauma calls in the emergency department, and provide a seamless transition to intraoperative care.
- Anaesthetists have an important role to play in pre-hospital care as members of enhanced care teams,^{2,5} treating patients at the scene and transferring them to or between hospitals. Anaesthetic departments in MTCs (and TUs) should support this role in a limited number of individuals.
- Trained assistance must be available for the anaesthetist in all locations where anaesthesia is conducted, including the emergency department and the imaging suite, as well as in the operating theatre.⁶
- Children undergoing surgical care require all facilities and staffing required for paediatric practice.^{7,8} Members of the team conducting anaesthesia for children must be trained and skilled in paediatric anaesthesia and resuscitation.
- Specialised equipment for difficult airways must be readily available in all areas where trauma patients are anaesthetised. Anaesthetists and assistants providing anaesthesia for these patients must be competent in difficult airway management.

1 Trauma: who cares? A report of the National Confidential Enquiry into Patient Outcome and Death. *NCEPOD*, London 2007 (www.ncepod.org.uk/2007t.htm).

2 Regional networks for major trauma. Advice from NHS Clinical Advisory Group on Major Trauma Workforce 2011 (<http://bit.ly/1nK9LQZ>).

3 Damage control resuscitation: history, theory and technique. *Can J Surg* 2014;**57**(1):55-60.

4 Oakley P, Dawes R, Thomas R. The consultant in trauma resuscitation and anaesthesia. *Br J Anaes* 2014;**113**(2):207-210.

5 Pre-hospital anaesthesia. AAGBI Safety Guideline. AAGBI, London 2009 (<http://bit.ly/1tONmBv>).

6 The anaesthesia team 3 (May 2010; supplementary statement September 2012). AAGBI, London (<http://bit.ly/1rL4poC>).

7 Management of children with major trauma. Advice from the NHS Clinical Advisory Group on Paediatric Trauma 2011 (<http://bit.ly/1utI2Yu>).

8 Guidance on the provision of paediatric anaesthesia services. RCoA, London 2015 (www.rcoa.ac.uk/node/17853).

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- Patients with hip fractures should normally have these surgically corrected within 24 hours of admission to hospital.^{9,10,11} A system should be in place to ‘fast-track’ them from the emergency department through other areas to theatre. Preoperative assessment and optimisation should be a priority to prevent delay in surgery. Experienced anaesthetists and orthogeriatricians should work together to ensure delays do not occur.
- Flexible management of trauma lists, exclusive daytime trauma lists or additional evening and weekend sessions in dedicated, fully staffed and suitably equipped operating theatres will improve efficiency of dealing with trauma during the normal working day and reduce the need to operate out of hours. Plans should be in place to move to full seven-day working.^{12,13}
- Healthcare providers have responsibilities to ensure the health and safety of their employees and others, and to control and manage the risk of infection, blood spray and exposure to radiation.

Introduction: the importance of anaesthesia services for trauma and orthopaedic surgery

- Trauma and orthopaedic surgery encompasses a wide range of emergency and elective work in patients of all ages presenting with minor injuries, congenital abnormalities, high-energy trauma, fractures in the elderly due to falls or fragility, or degenerative joint conditions.
- Immediate, life-saving surgery may be needed for trauma patients. Others need operations within a few hours to meet standards associated with an improved outcome. Many can be scheduled for the next available list or next day.
- Prompt surgical intervention in stable patients can reduce their length of stay.

Hip fracture surgery

- Hip fracture is the most common condition requiring emergency orthopaedic surgery in the UK. Most patients are aged over 65 years. Many elderly patients have co-existing illnesses and confusional states that need preoperative assessment and treatment by orthogeriatricians, as well as anaesthetists. The 30-day mortality remains high.
- Preoperative treatment must be timely and realistic. Prolonged delays increase the risk of chest infections in those who are immobile after injury. Early surgery helps to provide pain relief and promote mobilisation. Efficient planning and running of operating lists are of critical importance in avoiding delay. The entire pathway should be managed within a formal hip fracture programme.

9 Hip fracture in the older person (BOAST 1, 2007); Spinal clearance (BOAST 2, 2008); Pelvic ring fractures and dislocations; acetabular fractures (BOAST 3, 2008); Severe lower limb fractures (BOAST 4, 2009). *BOA*, London (<http://bit.ly/WIAVNd>).

10 The care of patients with fragility fracture: the ‘Blue Book’ (with British Geriatrics Society). *BOA*, London 2007 (<http://bit.ly/1nKefpc>).

11 The management of hip fracture in adults (CG124). *NICE*, London 2011 (www.nice.org.uk/guidance/CG124).

12 NHS Services, Seven Days a Week Forum. Summary of initial findings. *NHS England*, London 2013 (<http://bit.ly/1xWyVAs>).

13 Seven Day NHS Care: A position statement from the British Orthopaedic Association. *BOA*, London 2012 (<http://bit.ly/1xWyZAv>).

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Major trauma

- General anaesthesia is usually necessary for emergency operations for major trauma.
- Airway and ventilatory support is often required in the initial management of a severely injured patient in the emergency department and requires competent anaesthetists, anaesthetic assistance and appropriate equipment.¹
- There is a high incidence of airway management difficulty requiring difficult airway equipment due to direct or indirect trauma to the airway, bleeding into or soiling of the airway, and actual or suspected cervical spine injury.
- Immediate, abbreviated, life-saving surgery may be necessary to control major bleeding and deal with contamination from disruption of internal organs. Simultaneous surgery may be required for separate injuries to limit operative time. Senior anaesthetic involvement is essential.
- A high index of suspicion of other life-threatening injuries must be maintained when treating patients with serious bone injuries. Multidisciplinary care is an essential pre-requisite at all stages of their treatment.
- Some major trauma patients require anaesthetic skills in the field. Anaesthetists have an important role on pre-hospital enhanced care teams, treating patients at the scene and transporting them to hospital or between hospitals. Many will broaden their training within the new specialty of pre-hospital emergency medicine.
- While enhanced care teams² are increasingly carrying out inter-hospital transfer from TUs to MTCs, there will be occasions when transfer must be provided by the initial receiving hospital. Trained anaesthetic staff, assistance and equipment are essential in the provision of such transfers.^{14,15}

Joint replacement surgery

- Patients undergoing major joint replacement are often elderly, with co-existing medical conditions and are prone to deep venous thrombosis. This can make anaesthesia more difficult, requiring experienced anaesthetic input.
- As the life expectancy of the population increases, more patients present for revision of major joint replacements. These operations are more difficult than primary joint replacement, take longer and are associated with greater blood loss. Appropriate planning for such cases is essential for a successful outcome.

Orthopaedic surgery in children

- Children requiring orthopaedic surgery have underlying congenital or acquired conditions that may prove challenging. Neurological conditions may be associated with difficulty in communication and positioning. Such children may be more susceptible to the sedative effects of anaesthetic agents and prone to aspiration. Other children may have anatomical abnormalities that affect the airway and breathing, for example kyphoscoliosis.

Levels of provision of service

1 Staffing requirements

- 1.1** Anaesthesia for trauma and orthopaedic surgery should be consultant led. All regular sessions should have a named anaesthetist assigned who is skilled and experienced in the provision of this service. When the assigned anaesthetist is not a consultant, there must be unimpeded access to a consultant anaesthetist for advice and a pre-defined means

14 Transfer of patients with brain injury. AAGBI, London 2006 (<http://bit.ly/1lDt6NX>).

15 Interhospital transfer. AAGBI Safety Guideline. AAGBI Safety Guideline. AAGBI, London 2009 (<http://bit.ly/1gMDofV>).

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of providing immediate assistance in the event of an unexpected acute problem. There should be a named consultant who is responsible for a trainee who is managing a case without direct supervision. The pre-assessment service for elective patients should also be consultant led.

- 1.2** In MTCs, there should be a consultant in trauma resuscitation and anaesthesia (or other consultant anaesthetist with ongoing training and experience in major trauma care) who is free to attend major trauma calls in the emergency department. This role may be combined with other responsibilities that can be deferred in the event of a trauma call e.g. managing planned access to the emergency (E-1) operating theatre, providing advice and immediate (but not continuing) assistance to trainee anaesthetists, and reviewing analgesia and physiological stability in recently admitted major trauma patients.
- 1.3** The definitive care of complex spinal and pelvic injuries requires specialist spinal (orthopaedic or neurosurgical) and pelvic surgery. The anaesthetist managing such cases should have undergone training in the management of these cases and their associated complications.
- 1.4** Trained anaesthetic assistance must be present at all times in all clinical areas where anaesthetics are administered,⁶ including the emergency and radiology departments.
- 1.5** The use of intravenous and inhalational agents to provide analgesia and sedation for procedures undertaken in the emergency department (e.g. manipulation and reduction of fractures and dislocations or simple wound management) must be managed according to guidance from the Royal College of Anaesthetists and the College of Emergency Medicine.¹⁶ Similar requirements apply in other settings outside the operating theatre and when using other routes of administration (e.g. intranasal). Careful monitoring of cardiorespiratory function and conscious level is essential. Appropriate assistance must be available, especially when using intravenous anaesthetic agents in sedative doses. Anaesthetists in training and non-anaesthetists administering the sedation-analgesia without direct supervision must have been assessed as competent in this skill.
- 1.6** Theatre staff should be available who are appropriately skilled and experienced in the various surgical subspecialty procedures required in patients with multiple injuries.
- 1.7** There must always be an adequate number of staff to ensure safe transfer and positioning of anaesthetised patients, both at the start and end of surgery and anaesthesia.
- 1.8** An enhanced care team (ECT) that includes medical personnel (Level 8 practitioners) with anaesthetic skills should be available constantly to provide direct pre-hospital care to the major trauma patient.² The ECT may attend the scene by land or by helicopter and accompany severely injured patients to the receiving hospital and transfer them between hospitals.
- 1.9** Anaesthetists who provide pre-hospital care in the field should be accredited to do so. Many anaesthetists will broaden their training within the new specialty of pre-hospital emergency medicine. Anaesthetic departments in MTCs and TUs should appoint consultants with an interest in pre-hospital care.
- 1.10** In hospitals receiving patients with major trauma (MTCs and TUs), there must be adequate levels of appropriately experienced medical and non-medical staff to provide a 24-hour emergency service.

16 Safe Sedation of Adults in the Emergency Department. Report and Recommendations by The Royal College of Anaesthetists and The College of Emergency Medicine Working Party on Sedation, Anaesthesia and Airway Management in the Emergency Department. *RCoA*, London 2012 (www.rcoa.ac.uk/node/10214).

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- 1.11 The reception of major trauma patients in the emergency department of an MTC or TU should be provided 24/7 by a multidisciplinary team, including an anaesthetist of ST4 level or above and sufficiently trained to deal with airway problems and initiate damage control resuscitation¹⁷ of the trauma patient. MTCs, should look to provide consultants in trauma resuscitation and anaesthesia to attend major trauma calls 24/7.
- 1.12 The management of critically injured patients should be consultant-delivered. Anaesthesia for the emergency control of major traumatic haemorrhage and other damage limiting interventions in the operating theatre or radiology intervention suite, should be provided by a consultant anaesthetist.
- 1.13 In a high-volume setting, MTCs should plan to deliver an immediate response to a trauma call using dedicated consultants in trauma resuscitation and anaesthesia. They can provide resuscitation skills in the ED and a seamless transition to intraoperative care.
- 1.14 Trauma patients presenting to a TU, or inadvertently to a local emergency hospital (LEH) that is not accredited to receive major trauma patients, may need to transfer to a tertiary referral centre. ECTs should become the principal escorts for secondary transfer to an MTC. However, TUs must maintain the capability to transfer major trauma patients safely in time-limited situations, as the ECT may be committed elsewhere and not available immediately. When a team from the initial hospital transfers a patient, arrangements should be in place to provide safe management of ongoing clinical problems while they are absent.
- 1.15 In hospitals in which trainee anaesthetists work a full or partial shift system, consideration should be given to providing additional consultant programmed activities to allow training and supervision to take place in the evening.

2 Equipment, support services and facilities

Operating theatre equipment

- 2.1 There should be an emergency E-1 operating theatre that is rapidly available at all times for life-saving surgery in major trauma patients. The available equipment should be suitable for a full range of emergency procedures in major trauma patients. Use of this theatre for non-immediate (non-E-1) cases must be tightly controlled so that it can be made available promptly. If the theatre is occupied by an ongoing E-1 case, there should be a constantly updated backup plan to obtain an appropriate alternative theatre for a further E-1 case.
- 2.2 In addition to an E-1 theatre, there should be a rapidly accessible imaging suite for interventional radiology to control haemorrhage. This must be a hybrid care suite that allows a full range of surgical interventions as well as radiological assessment and intervention. This should allow resuscitation with angiography, percutaneous techniques and operative repair (RAPTOR), including arterial embolisation, balloon catheter tamponade and temporary intravascular shunts (TIVS).³
- 2.3 Major joint replacements and surgery involving bone implants or internal fixation should be carried out in an operating theatre with multiple air changes per hour (not necessarily laminar flow) to reduce risks of wound infection. Other infection control systems should be supported by the whole operating team.
- 2.4 There must be adequate protection from blood spray for all working in the operating theatre.

¹⁷ Holcomb JB et al. Damage control resuscitation: directly addressing the early coagulopathy of trauma. *Journal of Trauma* 2007;**62**:307–310.

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- 2.5 An appropriate range of equipment should be available for the safe positioning and transfer of patients. Staff should be trained in the correct use of such equipment. Hospitals receiving major trauma patients must have a trauma theatre equipped with a radiolucent operating table that allows all fluoroscopic imaging of all body parts without repositioning the patient. This should be an operating table specifically designed for spinal, thoracic, pelvic and lower limb trauma.
- 2.6 Reliable, well-maintained tourniquets and inflation devices of suitable sizes should be available for upper and lower limb surgery requiring a bloodless field.
- 2.7 Warming devices for patients should be readily available for use in the anaesthetic room, operating theatre, recovery unit and emergency department.
- 2.8 A high-performance, blood warming system with a ready supply of disposables should be rapidly available to allow rapid infusion of blood and other products or fluids.
- 2.9 A cell salvage system,^{18,19} using a centrifuge device or a simpler ultrafiltration device, with a ready supply of disposables and staff trained in its use should be available for major trauma with ongoing haemorrhage and for other patients undergoing orthopaedic procedures associated with a risk of life-threatening blood loss.

Facilities

- 2.10 In MTCs and TUs, the resuscitation room receiving bays should be large enough to allow simultaneous emergency procedures by trauma team members. Equipment for a wide range of procedures, including difficult intubation, chest decompression and drainage, and immediate thoracotomy, should be immediately available.
- 2.11 Hospitals that receive patients with major trauma should have an emergency operating theatre and a radiology intervention suite situated sufficiently close to the emergency department to allow rapid transfer.
- 2.12 Near-patient testing for haemoglobin, arterial blood gases, lactate, calcium, potassium and blood sugar should be available during surgery for patients with major trauma and those undergoing orthopaedic procedures associated with a risk of major haemorrhage.
- 2.13 There should be immediate access to a thromboelastography device (TEG or ROTEM) to assess the need for further platelets, fibrinogen and other clotting factors. These facilities should also be available in the emergency department, recovery room and critical care unit.
- 2.14 Group O-rhesus negative blood should be available in or adjacent to the theatre suite at all times for emergency use. Type-specific and fully cross-matched blood should be made available to the operating theatre within 15 and 40 minutes respectively of an appropriate request. There should be a defined policy for providing a series of 'shock packs' containing blood, plasma and platelets in appropriate proportions for patients with major ongoing bleeding.^{20,21,22} In MTCs and other large acute hospitals with a high turnover of plasma supplies, pre-thawed plasma should be immediately available to avoid the delay of thawing fresh frozen plasma. Alternative plasma preparations that do not require thawing may become available in the near future.

18 Blood transfusion and the anaesthetist – intraoperative cell salvage. AAGBI Safety Guideline. AAGBI, London 2009 (<http://bit.ly/1nGJ4HM>).

19 Samolyk KA, Beckmann SR, Bissinger RC. A new practical technique to reduce allogenic blood exposure and hospital costs while preserving clotting factors after cardiopulmonary bypass: the Hemobag. *Perfusion* 2005;**20**(6):343–349.

20 Blood transfusion and the anaesthetist – blood component therapy. AAGBI, London 2005 (<http://bit.ly/1rUvcOu>).

21 Blood transfusion and the anaesthetist – management of massive haemorrhage. AAGBI, London 2010 (<http://bit.ly/1cQbDxm>).

22 Blood transfusion and the anaesthetist – red cell transfusion 2. AAGBI, London 2008 (<http://bit.ly/1f5X924>).

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- 2.15** Other transfusion products to improve coagulation should be available rapidly when indicated, according to a locally agreed major haemorrhage protocol.²¹ In the dynamic situation of major haemorrhage, it is appropriate to administer such products using senior clinical judgement or agreed clinical guidelines before laboratory confirmation of abnormal coagulation. In complex situations, there should be rapid access to advice from a consultant haematologist.
- 2.16** Tranexamic acid should be available for administration if major haemorrhage is suspected in a trauma patient within three hours of injury.²³
- 2.17** There must be 24-hour access to a fully-staffed and equipped post-anaesthesia care unit (PACU)²⁴ with facilities for invasive haemodynamic monitoring.
- 2.18** Patients undergoing emergency laparotomy for trauma (or other emergency conditions), who do not require a critical care unit bed, should go to a level-1 bed on an acute ward or be managed in an extended PACU facility.²⁵ Patients undergoing long or complex elective orthopaedic procedures, particularly in those with preexisting health problems, should also be able to go to a level-1 bed or stay in an extended PACU to optimise care before returning to a level-0 ward bed. Selected hip fracture patients may benefit from similar postoperative arrangements.

Critical care services

- 2.19** Hospitals admitting patients with major trauma should have a high dependency unit (HDU) of Level 2 standard and ICU of Level 3 standard on site. Portable invasive haemodynamic monitoring must be available to facilitate transfer to and from the critical care areas.
- 2.20** A fully-equipped HDU of Level 2 standard should be available on site for high risk patients undergoing major orthopaedic surgery, including revision joint replacement and surgery involving instrumentation of the spine. If the hospital does not have a Level 3 facility, protocols should be in place to determine when and how to transfer to a hospital with a Level 3 facility.
- 2.21** Critical care outreach services provide a vital link between trauma and orthopaedic wards and ICU facilities. Clinical deterioration can be identified using early warning scores and mitigated by proactively reviewing patients at risk.
- 2.22** In MTCs, the critical care outreach service may be called to the ED as part of the trauma team response, facilitating the transition from resuscitation to intensive care.

Imaging requirements

- 2.23** Hospitals admitting patients with major trauma should have 24-hour availability of plain radiography, CT scanning and interventional radiology within or close to the emergency department. Radiographers for plain films should be immediately available at all times.
- 2.24** CT radiographers and a radiologist skilled in CT interpretation should be available within 30 minutes of the patient's arrival in hospital. CT scanning is the primary imaging modality for severely injured patients.²⁶

23 CRASH-2 trial collaborators. Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial. *Lancet* 2010;376:23–32 (also, The importance of early treatment with tranexamic acid in bleeding trauma patients: an exploratory analysis of the CRASH-2 randomised controlled trial. *Lancet* 2011;377:1096–1101).

24 Immediate Post-anaesthesia recovery. AAGBI Safety Guideline. AAGBI, London 2013 (<http://bit.ly/1xWA9vI>).

25 Guidance on the provision of anaesthesia services for emergency surgery. RCoA, London 2014 (www.rcoa.ac.uk/node/14669).

26 Standards of practice and guidance for trauma radiology in severely injured patients. RCR, London 2011 (<http://bit.ly/1Alf1ys>).

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- 2.25** An appropriately trained interventional radiologist should be rapidly available to undertake embolisation or other radiological interventions to treat or prevent major haemorrhage within one hour of the patient's arrival in an MTC.
- 2.26** An ultrasound scanner and a radiologist, or other trained operator, should be available at all times to assess for and monitor bleeding into the peritoneal and pleural cavities and the pericardium. However, the use of ultrasound in the resuscitation room must not delay CT scanning, which has succeeded it as a primary imaging modality.
- 2.27** Ultrasound machines for trans-thoracic and trans-oesophageal echocardiography and a cardiologist, or other trained operator, should be available at all times to assess suspected injuries to the heart in major trauma cases and worsening myocardial dysfunction in elective or emergency cases.
- 2.28** Magnetic resonance imaging (MRI) is the investigation of choice for spinal cord injury.^{2,26} Patients with unstable spinal fractures, dislocations and subluxations or with suspected spinal cord or nerve root injury should undergo prompt MRI scanning.
- 2.29** An MRI scanner must be available 24 hours a day in MTCs.^{2,26} Specialist anaesthetic equipment should be available that is compatible with strong magnetic fields. TUs should also have an MRI scanner. Remote TUs should look to provide an MRI service out-of-hours to optimise decisions on patient transfer to MTCs.
- 2.30** Trained radiographers and an image intensifier with facilities for producing plain films should be available in the operating theatre 24 hours a day for trauma and orthopaedic surgery. All Trauma lists should have the provision of a dedicated radiographer for the session and availability of a radiographer for out-of-hours cases. There should be clear planning for the provision of a radiographer for elective orthopaedic operating sessions when intraoperative imaging is required.
- 2.31** A computerised imaging system should be in place, with viewing facilities in the emergency department, operating theatre, recovery room, critical care areas and acute wards.
- 2.32** Radiation protection screens or gowns and collars for thyroid protection must be worn by all staff remaining in the operating room or imaging suite when radiographs are taken, an image-intensifier is used or a CT scan is performed.
- 2.33** Imaging suites receiving patients with major trauma should be equipped as a critical care environment. They should be situated sufficiently close to the emergency operating theatre to allow rapid transfer there when indicated.

Difficult airway management

- 2.34** A 'difficult intubation trolley' with a variety of laryngoscopes, tracheal tubes, laryngeal masks, and other aids for airway management must be available in all areas where major trauma patients may be received, including the emergency department.
- 2.35** Equipment for fiberoptic intubation for patients with potentially difficult airways should be available. Intubating bronchoscopes should be adequately and recently sterilised according to infection control standards.

Local anaesthesia and analgesia

- 2.36** Anaesthetists who provide anaesthesia for elective and emergency orthopaedic surgery should be competent in a wide range of local anaesthetic techniques, including central and peripheral neural blockade. Ultrasound devices should be used to facilitate safe, accurate needle and catheter placement.
- 2.37** An acute pain service should be available for advice on and delivery of postoperative pain relief. The service must be competent in the ongoing management of local anaesthetic and analgesic infusions through epidural and peri-neural catheters.

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- 2.38** Patient-controlled analgesia equipment and infusion devices must be available for postoperative pain relief.
- 2.39** An ultrasound scanner with a probe for visualising vessels, nerves and other structures to facilitate regional nerve blocks should be available, whenever they are performed.²⁷ A nerve stimulator should also be available.
- 2.40** A supply of sterile pre-mixed solutions of low-concentration local anaesthetic drugs, alone and in combination with opioids, should be available for use in continuous regional anaesthetic techniques, as well as other opioid solutions for use in patient-controlled analgesia devices.
- 2.41** There should be clear guidance on whom to call for problems with postoperative pain relief. There should be a locally-agreed regional analgesia record and a protocol for the prescription and administration of epidural drugs and training needed to manage epidurals on the ward.

Guidelines

- 2.42** There should be agreed clinical guidelines for the management of emergency anaesthesia within the emergency department, emergency surgical airway and resuscitative thoracotomy.
- 2.43** There should be clear, written guidelines regarding the management of haemodynamically unstable patients, including immediate treatment in the emergency department, imaging suite or operating theatre and ongoing care after the emergency interventions. The use of adjuncts, such as tourniquets and pelvic binders, and the key treatment options of immediate surgery and interventional radiology should be addressed within the policy.
- 2.44** There should be a major haemorrhage protocol to cover the use of blood and blood products in appropriate proportions in a series of 'shock packs' and to give guidance on laboratory and near-patient monitoring, permissive hypotension and damage control resuscitation. In MTCs and in other large acute hospitals, pre-thawed plasma should be immediately available with the initial shock pack.
- 2.45** Tranexamic acid should be administered to patients when evidence of serious haemorrhage is identified within three hours of injury.²³
- 2.46** In the management of major haemorrhage, due consideration should be given to the concept of permissive hypotension and to the use of small increments of fentanyl in combination with judicious blood or blood product administration. During damage control resuscitation with uncontrolled bleeding, blood and blood products should be administered rather than crystalloids or non-blood product colloids.²¹
- 2.47** There should be clear guidelines for the management of patients on anticoagulation medication in trauma cases and in patients undergoing elective or other emergency orthopaedic surgery. These should include specific guidance on managing patients with cardiac stents and those on newer anticoagulants with no defined reversal agents. If major haemorrhage is suspected in patients on warfarin (or a similar drug), the anticoagulation effect should be reversed promptly with prothrombin complex concentrate, without waiting for laboratory results.

²⁷ Ultrasound in anaesthesia and intensive care: a guide to training. *Association of Anaesthetists of Great Britain and Ireland, Royal College of Anaesthetists and Intensive Care Society*. RCoA, London 2011 (www.rcoa.ac.uk/node/2286).

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- 2.48** There should be a policy for the prevention of thromboembolic events postoperatively. Patients undergoing pelvic surgery are at particular risk. Anticoagulant prophylaxis may be deferred in patients who are vulnerable to further bleeding, but it is important to plan future therapy so that this is not omitted when the risk of bleeding has diminished. The insertion of an inferior vena cava filter should be considered.
- 2.49** There should be specific guidelines for acute pain relief in adults and children with major trauma.³²
- 2.50** Specific anaesthetic guidelines that should be in place include:
- the management of failed difficult intubation
 - the management of regional techniques in relation to thromboprophylaxis
 - the management of high regional block, failed regional block, accidental dural puncture and post-dural puncture headache.
- 2.51** There should be agreed anaesthetic protocols for orthopaedic day case anaesthesia
- 2.52** All hospitals providing joint replacement surgery should have clear guidelines for enhanced recovery in place in order to promote the benefits of early mobilization and reduced mortality associated with their use.

3 Areas of special requirement

Spinal injuries

- 3.1** The precautions used in suspected spinal injury should be clearly defined. These include the use of collars and blocks, placing the patient on a firm surface, log-rolling, and (for intubation) manual in-line immobilisation. A spinal clearance policy should address if and when the precautions can be relaxed in patients with distracting pain or altered consciousness.²
- 3.2** In suspected spinal injury, hard spinal boards should only be used from the scene to the ED. Their use is not recommended for secondary transfer. Spinal clearance should be achieved in a timely fashion to minimise discomfort from collars, head blocks and prolonged immobilisation in patients who do not have spinal injuries.
- 3.3** Acute nerve or spinal cord compression requires immediate referral to a neurosurgeon or specialist spinal surgeon. Patients with a spinal cord injury should be referred to a consultant in the regional spinal cord injury rehabilitation centre within four hours of identifying the injury.²⁸
- 3.4** Anaesthesia for patients undergoing MRI scanning after suspected spinal injury should be provided by consultant anaesthetists who have undergone specific training.²⁹
- 3.5** **Jehovah's Witnesses**
In elective orthopaedic surgery where heavy blood loss is anticipated, specific measures should be considered in patients who are Jehovah's Witnesses,³⁰ including re-infusion of postoperatively drained blood or cell salvage or alternative. All options must be discussed with the patient first if possible. Such patients should be operated on and anaesthetised by senior and experienced members of surgical and anaesthetic staff.

28 Management of people with spinal cord injury. Advice from the National Spinal Cord Injury Strategy Board 2011 (<http://bit.ly/1AlfLDQ>).

29 Safety in magnetic resonance units: an update. AAGBI Safety Guideline. AAGBI, London 2010 (<http://bit.ly/1roXocD>).

30 Management of anaesthesia for Jehovah's Witnesses (2nd Edition). AAGBI, London 2005 (<http://bit.ly/1ouWpak>).

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3.6 Children

Children presenting for orthopaedic or trauma surgery must have access to appropriate facilities, staff and equipment.^{7,8} Services should be child friendly. Children and young people must be informed about and have active involvement in decisions related to their own ongoing care.

3.7 Rehabilitation

The rehabilitation team plays a vital role in major trauma care.² A referral should be made on day one. A formal rehabilitation prescription is an important element in the co-ordination of ongoing care.

3.8 Hip fracture patients should be assessed by a physiotherapist and, unless medically or surgically contraindicated, mobilised the day after surgery. Mobilisation should be offered at least once a day and regularly reviewed by a physiotherapist.

3.9 Early supported discharge should be considered as part of the hip fracture programme,^{9,10,11} provided the multidisciplinary team remains involved and the patient is medically stable, has the mental ability to participate in continued rehabilitation, is able to transfer and mobilise short distances, and has not yet achieved their full rehabilitation potential, as discussed with the patient, carer and family.

4 Training and education

4.1 Anaesthetists and surgeons who manage patients with major trauma should undertake Advanced Trauma Life Support (ATLS) or equivalent training. Additional training on the European Trauma Course (ETC) provides an understanding of human factors and promotes teamwork. Those who continue to practise major trauma care should continue to update ATLS or ETC training at regular intervals.

4.2 All anaesthetists providing anaesthesia for trauma or orthopaedic surgery should have the knowledge, skills, attitudes and behaviour in accordance with the Royal College of Anaesthetists' training standards.³¹

4.3 Anaesthetists providing anaesthesia for trauma and orthopaedic surgery should learn and maintain expertise in a wide range of local anaesthetic techniques to allow a versatile approach to patients with serious co-morbidity.

4.4 Consultant anaesthetists responsible for the intraoperative anaesthetic care of patients with major trauma must maintain their skills and be up to date with current recommendations.

4.5 All anaesthetists involved in the management of major trauma must understand the principles and techniques of aggressive haemorrhage control and prevention of coagulopathy.

4.6 Specific skills, drills and scenario training for the initial management of major trauma care should be regularly conducted for all members of the trauma and theatre team. Scenario practice sessions are of greatest value in a multidisciplinary setting. High-fidelity simulators should be available for specific training sessions. Well organised, lower fidelity scenario training remains a valuable, complementary, cost-effective means of improving logistics and incorporating human factors training.

4.7 Consultants in trauma resuscitation anaesthesia and other consultant anaesthetists providing emergency anaesthesia for major trauma patients within an MTC should undergo periodic damage control resuscitation training, jointly with their surgical consultant colleagues.

³¹ The CCT in anaesthesia IV. Competency based. Higher and advanced level (Annex D). RCoA, London 2012 (updated June 2012) (www.rcoa.ac.uk/node/1437).

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- 4.8 Major incident training exercises should take place at regular intervals.
- 4.9 Where a service is being provided for children, all of the anaesthesia team members must have regularly updated training (appropriate to their roles) in paediatric anaesthesia and resuscitation.^{7,8}
- 4.10 Staff in the recovery area and in the wards who receive patients after surgery with epidural infusions, nerve blocks or intravenous opioid infusions (including PCA) should have received formal training in caring for these forms of analgesia.
- 4.11 Trauma theatre teams should be trained in the correct use of all essential theatre equipment for trauma surgery and anaesthesia, including tourniquets, high-performance blood warming systems and cell-savers or alternative.
- 4.12 Nurses expected to care for patients with epidurals in-situ should be trained to local guidelines before they top up epidurals or look after such patients.

5 Research, audit and governance

- 5.1 Research in anaesthesia for trauma and orthopaedic surgery should be encouraged. Staff undertaking research should have received training on ethical and organisational issues. They should complete a Good Clinical Practice course with regular updates.
- 5.2 Each major trauma network should have an appointed research lead as part of the trauma programme board.
- 5.3 Trauma and orthopaedic surgery should be included in anaesthetic departmental audit programmes, including ongoing audit of complications and adverse events. The corresponding surgeons should be invited to meetings of mutual interest and concern.
- 5.4 All hospitals treating patients with hip fractures should submit complete data to the National Hip Fracture Database (www.nhfd.co.uk) to monitor its performance against national benchmarks and quality standards.
- 5.5 All hospitals receiving major trauma cases should contribute to the Trauma Audit and Research Network (TARN) to monitor its performance against national benchmarks and quality standards and contribute to research (www.tarn.ac.uk). Comparative data analysis and display on the national major trauma dashboard (via TARN) is invaluable for quality assurance.
- 5.6 MTCs and TUs in England must undergo regular peer reviews within the National Peer Review Programme. Their performance will be judged according to national major trauma measures.³² The measures cover reception and resuscitation, definitive care, and rehabilitation in adult MTCs, paediatric MTCs and TUs. Other measures cover pre-hospital care and overall network governance.
- 5.7 Critical care units should form part of a constituted critical care network and subscribe to a nationally recognised audit process (www.icnarc.org).
- 5.8 All new spinal cord injury patients must be referred through the NHS Spinal Cord Injury Service (NSCIS) and registered on the national spinal cord injury database (NSCID).^{28,33} The incidence of complications should be recorded.

32 National Peer Review Programme: Major Trauma Measures (version 1.0, November 2014). *NHS England*, London. (<http://bit.ly/15lPkK>).

33 NHS Spinal Cord Injury Service (www.nscisb.nhs.uk).

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- 5.9 Major trauma governance meetings should follow the guidance from the World Health Organisation (WHO).³⁴ Multidisciplinary mortality and morbidity meetings should take place every one to four weeks in MTCs. Governance meetings should take place across the entire trauma network at defined intervals. Besides individual case discussion, feedback information from TARN should be disseminated, and mechanisms set in place to correct any problems identified.
- 5.10 In addition to mortality and morbidity meetings, WHO has made specific recommendations for preventable death panels. They should take place across the entire network every one to three months.³⁴
- 5.11 Nationally agreed key performance indicators should be used to monitor performance of the pathways for hip fractures and major trauma. In addition, local quality indicators should be developed proactively to support continuing improvement of these services within organisations.

6 Organisation and administration

Hip fractures

- 6.1 Patients with a hip fracture should normally have surgical correction within 24 hours of admission to hospital. They should receive prompt, appropriate pain relief and adequate pre-operative hydration.⁷ Hip fracture surgery should be scheduled on a planned (and, ideally, dedicated) trauma list during normal working hours.
- 6.2 A system should be in place to offer a formal hip fracture programme, based on an acute orthogeriatric or orthopaedic ward. This includes 'fast tracking' patients from the emergency department to the ward within four hours of presentation, rapid optimisation of fitness for surgery using standardised preoperative investigations, timely surgery and early rehabilitation.¹⁰
- 6.3 The involvement of orthogeriatricians in all phases of care in patients with hip fractures is vital.^{9,10,11}

Emergency orthopaedics and trauma

- 6.4 A triage tool, similar to that developed by the American College of Surgeons, should be used by pre-hospital personnel to identify patients with suspected major trauma.²
- 6.5 Triage-positive patients should be sent directly to an MTC if the travelling time is under 45 minutes, unless there is an imperative to go to a closer TU for the immediate management of a life-threatening condition.² The majority of patients presenting to TUs with major trauma should be transferred to an MTC after immediate management.
- 6.6 Triage-positive patients should not be taken to an LEH, in other words an acute hospital not accredited as a TU or MTC.²
- 6.7 In hospitals receiving patients with major trauma, there should be a multidisciplinary trauma team that includes an anaesthetist of ST4 or above, is led by a defined trauma team leader and is available 24 hours a day.² The team should be called out in cases of suspected major trauma on the basis of pre-hospital information, according to pre-defined criteria. The trauma team should also be called out if there are unexpected findings after arrival in triage-negative patients and to receive patients following inter-hospital transfer.
- 6.8 Trauma team members should be called in advance of the patient's arrival to allow time for briefing and drug and equipment preparation, whenever possible. A prompt response by team members is essential. The team should also assemble before receiving patients from other hospitals, allowing transferred imaging and treatment plans to be defined in advance.

34 Guidelines for trauma quality improvement programmes. WHO, 2009 (<http://bit.ly/1roXTlx>).

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- 6.9** There should be a defined agreement for immediate or emergency access to an operating theatre or intervention suite with appropriately trained and experienced staff to provide rapid intervention in life-threatening or limb-threatening conditions.² All patients requiring acute intervention for haemorrhage control must be in a definitive management area (operating room or intervention suite) within 60 minutes.
- 6.10** The trauma list may need to be interrupted between cases or a separate theatre opened and staffed. A flexible approach to emergency theatre list planning and management is required.
- 6.11** Theatre teams should be informed whenever a patient who is unstable with major trauma is expected, has arrived or has been identified in the emergency department. A member of the theatre team should have responsibility for ensuring the availability of appropriately trained staff and facilities.
- 6.12** Vascular impairment requires emergency surgery and restoration of the circulation using shunts, ideally within three to four hours, with a maximum acceptable delay of six hours of warm ischaemia. The anaesthetic team should be engaged promptly to achieve timely intervention.
- 6.13** Definitive skeletal stabilisation of open fractures and wound cover should be achieved within 72 hours.⁹
- 6.14** There should be due consideration to the timing of major reconstructive surgery. The risk of the 'second hit' of the surgical intervention leading to organ failure is greater during days two to four after severe trauma. It is often wise to avoid major interventions at this time.
- 6.15** When appropriate, definitive surgery within the first day avoids unnecessary delays and reduces length of stay. In order to achieve this, specific surgeons and anaesthetists may need to rearrange operating lists at short notice. This may involve postponing planned cases.
- 6.16** Displaced pelvic and acetabular fractures requiring reduction and internal fixation should generally undergo definitive surgery within five days and no later than ten days from injury.⁹
- 6.17** A clear line of communication from the duty anaesthetist to the on-call consultant should be assured at all times. Any conflict of priorities should be referred to senior staff.
- 6.18** Consultant anaesthetists and intensivists should be involved in the planning of local trauma services. Those with defined responsibility for major trauma management should be engaged in the layout and logistics of the resuscitation room.
- 6.19** Trauma operating lists should take place on a daily basis in working hours to prevent a backlog that results in unnecessary overnight operations. The provision of extra trauma lists in the evenings and at weekends further helps to prevent patients requiring surgery late at night.
- 6.20** All acute hospitals should have a defined major incident plan that complies with current recommendations. This should cover the call-in of extra staff and the assignment of specific roles. The plan should be built around the network of MTCs, TUs and LEHs with initial transfer of patients from the scene to these hospitals depending on the location of the incident and the major incident triage categories (P1-4) ascribed at the scene.
- 6.21** The formal involvement of adjacent networks will be required in major incident management if the number of casualties is likely to overwhelm the network's hospitals with the major incident plan in effect. This should also be considered in incidents that are close to network boundaries.

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Elective orthopaedics

- 6.22 Elective orthopaedic operating lists should be separated from those for traumatic orthopaedic surgery to allow efficient planning in advance for elective cases, prevent cancellation of planned cases and allow a flexible response for emergencies.
- 6.23 Elective patients with major co-morbidities or those undergoing complex or prolonged surgery should not be scheduled late in the day, so that early postoperative stabilisation can be optimally supervised.
- 6.24 Hospitals should look to provide specific local anaesthesia lists, using a dedicated area for initiating and assessing local nerve blocks. Cohorting cases in this way fosters the development and maintenance of expertise in the anaesthetists and supporting staff and minimises delays in between cases.
- 6.25 There should be a preoperative assessment clinic for elective orthopaedic surgery. Given the high incidence of co-morbidity in these patients, there should be clear pathways for assessment and optimisation of medical conditions. There should be specific guidelines for assessing a suspected difficult airway in patients with spine and joint disease, and for measuring lung function in patients with kyphoscoliosis.
- 6.26 There should be an enhanced recovery programme (ERP) for patients undergoing elective orthopaedic surgery to improve the integration, efficiency and quality of care in suitable patients.³⁵

7 Patient information

Information for patients, relatives and carers

- 7.1 For hip fractures, the NICE document that describes quality standards for hip fractures in layman's terms should be made available for patients, relatives and carers.¹¹
- 7.2 For major trauma, there should be a network-wide information booklet describing the major trauma services and providing relatives and carers with practical information on visiting the MTC from the surrounding areas. The important roles played by anaesthetists throughout the pathway should be clearly described.
- 7.3 For patients with spinal cord injuries and their families, there should be rapid access to advice from a consultant and other key professionals in the regional spinal cord injury rehabilitation unit.²⁸ They should be made aware of the Spinal Injuries Association (www.spinal.co.uk) that provides information and support for patients with SCI and their families

Patients with difficult airways

- 7.4 When an awake fiberoptic intubation is required, it is important to fully inform the patient of what to expect.
- 7.5 As part of a difficult airway follow up, patients should be informed about any airway problem the anaesthetist has encountered and be advised to highlight this problem in any future pre-operative assessment.

Regional anaesthetic techniques

- 7.6 When a regional anaesthetic technique is planned on an awake patient, it important to fully inform the patient of what to expect. The potential complications and the risk in relation to the benefits of the technique should be explained and documented in the patient's notes.

35 Guidelines for patients undergoing surgery as part of an Enhanced Recovery Programme (ERP). The Royal College of Anaesthetists, Royal College of Surgeons of England and Royal College of General Practitioners. *RCOA*, London 2012 (www.rcoa.ac.uk/node/5994).

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- 7.7 Where alternative techniques with a similar level of risk are available, the patient's preference should be taken fully into account.

Informed consent and the confused patient

- 7.8 Informed consent may be impossible for many patients undergoing hip fracture and major trauma surgery due to confusion, dementia, altered conscious level, severe pain or the effects of sedative drugs. Patients should not be asked to sign a consent form if they are not competent to do so. Standard operating procedures should be compliant with the Mental Capacity Act. A high level of integrity must be maintained, and good documentation is essential.

Death and dying

- 7.9 Major trauma results in a sudden loss of health, disability and a risk of dying. Communicating with the patients and their families is essential. On occasions, explanations and detailed discussion may need to be deferred or delegated to others so that emergency treatment can proceed without delay.
- 7.10 Breaking bad news to close relatives in the event of a death occurring should be undertaken by senior medical and nursing staff in appropriate surroundings as soon as is feasible. Follow-up arrangements should be offered.
- 7.11 When it is considered appropriate for an order not to attempt resuscitation in the event of a cardio-pulmonary arrest (DNACPR) it must be discussed with competent patients, including those who have expressed their own wish not to be resuscitated.³⁶ In patients not competent to consent, every attempt should be made to discuss this with the close family (or an independent mental capacity advocate), according to local trust guidelines.

Further reading

- Major trauma care in England. NAO, London 2012 (<http://bit.ly/1zhKikx>).
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- Damage control resuscitation: history, theory and technique. *Can J Surg* 2014;**57**(1):55–60.
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- Scher CS (editor). Anesthesia for Trauma – new evidence and new challenges. *Springer*, New York 2014.
- Wilson WC, Grande CM, Hoyt DB. Trauma: volume 1 (emergency resuscitation, peri-operative anesthesia and surgical management), volume 2 (critical care). *Informa Healthcare*, New York 2007.
- Huber-Wagner S et al. Effect of whole-body CT during trauma resuscitation on survival: a retrospective, multicentre study. *Lancet* 2009;**373**:1399–1494.
- The National Hip Fracture Database National Report. *NHFD* 2012 (www.nhfd.co.uk).
- Useful documents on the NHS website for spinal cord injury (<http://bit.ly/1xWC3fJ>).

36 Do not attempt resuscitation (DNAR) decisions in the perioperative period. *AAGBI*, London 2009 (<http://bit.ly/1ouXTBj>).

Chapter 18

GUIDELINES FOR THE PROVISION OF anaesthetic services

Cardiac and thoracic anaesthesia services 2015

Author

Dr D Smith, Southampton General Hospital

In association with the Association of Cardiothoracic
Anaesthetists (ACTA)

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

www.rcoa.ac.uk/gpas2015
gpas@rcoa.ac.uk

Guidance on the provision of cardiac and thoracic anaesthesia services 2015

Summary

- Each cardiothoracic unit must have consultant anaesthetists with dedicated, individual responsibility for cardiac and thoracic anaesthetic services.
- Minimum staffing levels to provide 24-hour consultant cover for theatres and ICU should comply with published guidance.^{1,2} Cardiothoracic intensive care may be provided by dedicated intensivists, or by cardiothoracic anaesthetists with the necessary competencies, depending on staffing structure in individual units.
- Minimum monitoring during bypass must conform to the standards recommended by the joint working group of the Society of Clinical Perfusion Scientists, Association of Cardiothoracic Anaesthetists and Society of Cardiothoracic Surgeons.³
- Post-operative recovery facilities for cardiac surgery should be appropriately staffed and equipped, ring-fenced and located close to the theatres.^{1,4,5}
- In cardiothoracic units, there must be immediate access to critical care facilities, which must be staffed by appropriately trained personnel.¹
- There must be appropriate support facilities provided on site for cardiothoracic units including perfusion services, transoesophageal echocardiography (TOE), blood transfusion services, microbiology, pharmacy, pathology, respiratory function testing and radiological services. Staff who deliver these services must be trained to the appropriate level of competence. These must be backed up by modern information technology (IT) and archiving systems.¹
- Special provision of staff, environment, facilities and services must be made for children undergoing cardiac or thoracic procedures.⁶
- Patients who have undergone thoracic procedures must be managed in dedicated thoracic units post-operatively with access to an acute pain service and governed by pain relief protocols.
- Consultant anaesthetists providing anaesthesia for cardiac or thoracic surgery are expected to maintain the individual competencies recommended by the Royal College of Anaesthetists.⁷ Evidence of continuing educational and professional development will be necessary to demonstrate fitness to practise in this speciality.

1 Service specifications for cardiac surgery. *NHS England*, London 2015 (<http://bit.ly/1wtGXi1>).

2 Core Standards for Intensive Care Units. *FICM and ICS*, London 2013 (<http://bit.ly/1wtH3WQ>).

3 Recommendations for standards of monitoring during cardiopulmonary bypass. *ACTA*, London 2007 (<http://bit.ly/WICRoJ>).

4 Immediate post-anaesthesia recovery. *AAGBI*, London 2013 (<http://bit.ly/1eU6yIz>).

5 Guidance on provision of anaesthesia services for post-operative care. *RCoA*, London 2014 (www.rcoa.ac.uk/node/14668).

6 Guidance on the provision of paediatric anaesthesia services. *RCoA*, London 2015 (www.rcoa.ac.uk/node/17853).

7 CCT in anaesthesia, Parts I–IV. *RCoA*, London 2010 (updated July 2014) (www.rcoa.ac.uk/node/230).

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- Anaesthetic trainees attached to the cardiac or thoracic unit should be of appropriate seniority to benefit from higher training in this area and an anaesthetist training in cardiothoracic anaesthesia should be supervised at all times by an appropriately trained consultant or specialist.⁷
- All cardiothoracic units must participate in local and national audit.⁸
- Patients receiving anaesthesia for cardiac or thoracic procedures should be provided with written information regarding their surgery and peri-operative care.^{9,10,11,12}

Introduction: the importance of anaesthetic services for cardiac surgery

- Cardiac anaesthetic services are provided for patients undergoing cardiac and thoracic vascular investigations and surgery.
- Cardiac surgery may involve adult, paediatric and neonatal patients and includes all forms of open and closed heart surgery, whether elective or emergency. It also includes some interventional cardiological procedures, more commonly performed in children, but increasingly in adults, such as percutaneous atrial septal defect (ASD) and patent foramen ovale (PFO) closure, transcatheter aortic valve implantation (TAVI), and ablation of aberrant pathways causing complex dysrhythmias. These are increasingly performed in hybrid operating rooms, where radiological imaging and conventional operating theatres are combined. Cardiac surgery may also include heart or heart/lung transplantation, increasing use of 'off-pump' surgery (performed without cardiopulmonary bypass), and the use of ventricular assist devices (VADs) to support the failing circulation for periods of days or weeks in the intensive care unit (ICU).
- Cardiac surgery is mainly carried out in specialist units within teaching hospitals or specialist hospitals dedicated to cardiothoracic work.
- Many factors are influential in determining the viability of a cardiac surgical unit. However, the most important of these is clinical activity, based mainly on the yearly caseload of heart operations.
- The nature of cardiac surgery demands that all patients should be cared for post-operatively in a unit which conforms to the standards of general Level 3 and 2 intensive care facilities.
- Evidence suggests that clinical excellence in cardiac anaesthesia has an important influence on outcome.
- Cardiac anaesthesia provides an important area of training for trainee anaesthetists. It offers training in the peri-operative care of patients with severe heart and lung disease, essential for all anaesthetists whatever their future area of practice.

8 Audit of cardiothoracic surgical practice. *SCTS*, London, 1999 (www.scts.org).

9 Getting it right – improving the consent process for cardiac surgery. *The NHS Heart Improvement Programme* (<http://bit.ly/1lIMYiL>).

10 Raising the standard: information for patients. *RCoA*, London 2003 (www.rcoa.ac.uk/node/2136).

11 Guidance on the provision of anaesthesia services for pre-operative assessment and preparation. *RCoA*, London 2014 (www.rcoa.ac.uk/node/14666).

12 Your anaesthetic for heart surgery. *ACTA*, London 2006 (<http://bit.ly/1pqKGpR>).

The importance of anaesthetic services for thoracic surgery

- Thoracic surgery in adults includes surgery on the lungs (including lung transplantation), pleura, thymus, oesophagus and other thoracic structures, as well as the chest wall. Thoracic procedures include lobar resection, pneumonectomy for malignant and non-malignant conditions, mediastinoscopy and mediastinotomy, and bronchoscopy for diagnostic and interventional indications. Video-assisted thoracoscopic surgery (VATS) is also performed for drainage and investigation of effusions, lung resection, sympathectomy and removal of mediastinal tumours. Other procedures include surgical management of air-leaks, management of empyema, operations on the chest wall, endobronchial laser surgery and tracheal stenting.
- Anaesthesia for lung transplantation, although limited in the UK at present due to donor shortage, may sometimes require the use of cardiopulmonary bypass. There is also an expanding use of extracorporeal membrane oxygenation (ECMO) for acute lung injury (ALI).
- Although thoracic surgical units usually exist as part of a cardiothoracic service within a larger hospital, their needs may vary to some extent from those of pure cardiac units. New service specifications for thoracic surgery mean that in the near future surgeons will not have mixed cardiac and thoracic practices. This may have implications for the organization of anaesthetic services.

Levels of provision of service

1 Staffing requirements

Cardiac anaesthetic services

- 1.1 Each unit should have a designated lead consultant anaesthetist who is responsible for cardiac anaesthetic services. This should be recognized in their job plan and they should be involved in multidisciplinary service planning and governance within the unit.
- 1.2 A consultant anaesthetist must be available continuously, preferably through a dedicated cardiac anaesthetic on-call rota. Trained staff and appropriate facilities should be immediately available for emergency re-sternotomy. A suitably trained resident anaesthetist should be available for attendance for perioperative emergencies.
- 1.3 Minimum staffing levels to provide 24-hour consultant anaesthetic cover for theatres should comply with published guidance.¹ There should also be 24 hour consultant cover of the cardiac ICU.²
- 1.4 The level of expertise and availability of anaesthetist and surgeon must be adapted to the evolving needs of the patient before and after surgery. In the early stages this will require the immediate availability of anaesthetists, intensivists, and surgeons.
- 1.5 Two anaesthetists may be required for more complex procedures.
- 1.6 Perfusion services must be provided by suitably trained and accredited perfusion scientists³ and comply with Department of Health guidelines.¹³
- 1.7 Interventional cardiology services must take into account the likely impact on anaesthesia, intensive care and nursing resources according to patient acuity. General anaesthesia may be needed to facilitate complex interventions, or required in an emergency in the event of major complications during invasive cardiological procedures. Both eventualities require the provision of anaesthetic staffing, dedicated assistance, equipment and monitoring.

¹³ Guide to Good Practice in Clinical Perfusion. DH, London, 2009 (<http://bit.ly/103zYEi>).

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- 1.8** At centres where 24 hour primary percutaneous coronary interventions (PCI) are performed and in heart attack centres which include out of hospital cardiac arrest (OOHCA) patients, there must be provision for immediate availability of a resident anaesthetist, dedicated assistance and appropriate equipment and facilities.

Thoracic anaesthetic services

- 1.9** Each unit should have a designated lead consultant anaesthetist for thoracic services. This should be recognized in their job plan and they should be involved in multidisciplinary service planning and governance within the unit.
- 1.10** The complexity of the cases may necessitate additional sessional commitment for pre-operative visiting and assessment.
- 1.11** Two anaesthetists may be required for more complex procedures.
- 1.12** A consultant anaesthetist must be available continuously, preferably through a dedicated thoracic or cardiothoracic anaesthetic on-call rota, particularly if lung transplantation is performed.
- 1.13** It is essential that wherever thoracic anaesthesia and surgery are performed, there should be a resident anaesthetist and thoracic surgeon available.
- 1.14** The consultant anaesthetists in cardiothoracic units will be responsible for the provision of service, teaching, production of protocols, management, research and audit. Adequate sessional time will be required for these activities.

2 Equipment, support services, facilities and environment

Equipment and monitoring

- 2.1** Cardiac anaesthesia and surgery are carried out under intensive physiological patient monitoring. Routinely used monitoring during cardiac surgery will include the following:^{14,15}
- in the induction/anaesthetic room: electrocardiogram (ECG); pulse oximetry; invasive and non-invasive blood pressure (BP) monitoring; respired gas monitoring
 - during surgery: ECG; pulse oximetry; invasive pressure monitoring (systemic and pulmonary artery, and central venous pressures); respired gas monitoring; measurement of body core temperature. Transoesophageal echocardiography should be immediately available. Complex cases may require more sophisticated monitoring, such as cardiac output estimation or transcranial near-infra-red spectroscopy
 - during the transfer of the patient at the end of surgery to post-operative care unit: ECG; invasive BP; pulse oximetry; disconnection alarm for any mechanical ventilation system; fractional inspired oxygen concentration; end tidal carbon dioxide.
- 2.2** Monitoring during cardiopulmonary bypass must conform to the standards recommended by the joint working group of the Society of Clinical Perfusion Scientists, Association of Cardiothoracic Anaesthetists and Society of Cardiothoracic Surgeons.³ Provision of perfusion services must conform to Department of Health guidance.¹³
- 2.3** Comprehensive monitoring facilities are also required for complex thoracic cases,^{14,15} for example, facilities for pulmonary artery catheterisation and cardiac output measurement. For patients undergoing lung transplantation, additional facilities will be needed.
- 2.4** On ICU, equipment for a variety of methods of mechanical ventilation and circulatory support is required.² Transthoracic and transoesophageal echocardiography should

14 Standard of monitoring during anaesthesia and recovery (4th Edition). AAGBI, London 2007 (<http://bit.ly/1gbB7aS>).

15 Guidance on provision of anaesthesia services for intra-operative care. RCoA, London 2014 (www.rcoa.ac.uk/node/14667).

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be immediately available. Staff who are competent in the delivery of advanced echocardiography must also be immediately available.

Facilities

- 2.5** Dedicated thoracic, cardiac, or cardiothoracic wards are desirable.
- 2.6** Cardiac surgery must take place in dedicated cardiothoracic operating rooms. It is unlikely that an operating room will be kept available at all times for emergencies. It is preferable that all cardiac surgery and post-operative care be carried out in a dedicated environment whenever possible.
- 2.7** Many units care for selected cardiac surgical patients in the immediate post-operative period in facilities other than designated ICUs. These are variously referred to as the high dependency unit (HDU), cardiac recovery, cardiac fast-track or by another similar name. They have in common the aim of selecting patients and minimising the period of mechanical ventilation in the post-operative period. The patient monitoring and support requirements of such a facility are no less than the essential monitoring requirements of patients cared for in ICU, and the governance arrangements should also be the same. Agreed clinical criteria for the appropriate case mix cared for in these facilities must be in place. Suitably experienced anaesthetic and surgical staff must be immediately available. Service line arrangements must be in place for immediate escalation to a Level 3 intensive care unit facility when complications arise. Patients would normally stay no longer than 24 hours in this facility and either progress to ward care or ICU care.
- 2.8** After major thoracic surgery, patients must be transferred to a properly equipped and staffed area. In the United Kingdom most patients will return to an HDU. However, in some instances, for example, elderly patients who have had oesophageal surgery and some patients undergoing lung surgery, there may be a need for post-operative mechanical ventilation on ICU. Access to ICU or HDU is therefore essential. Nursing staff on ICUs and HDUs receiving patients after thoracic surgery should be trained in thoracic nursing care and have access to the same services that are available on a general thoracic ward.
- 2.9** There should be an appropriately sized, equipped and staffed post-anaesthetic recovery unit for those patients who do not require HDU or ICU.
- 2.10** On rare occasions, when unexpected difficulties arise in thoracic surgery, access to cardiopulmonary bypass is essential.

Support services

- 2.11** Haematology, blood transfusion and biochemistry services should be available with rapid access for both cardiac and thoracic surgery. In cardiac surgery, there should be satellite or point of care laboratory facilities in or near the operating room for the measurement of blood gases, electrolytes, haemoglobin and anticoagulation (including thromboelastography or thromboelastometry).
- 2.12** There should be immediate access to X-ray facilities, and computerised axial tomography (CT) and magnetic resonance imaging (MRI) services must be available for patients undergoing cardiac or thoracic surgery. For cardiac patients, dedicated echocardiography equipment, including transoesophageal echo (TOE) should be immediately available in the operating suite and post-operative care areas. Those who deliver intra-operative echocardiography services should be trained to the level of competence defined by the British Society of Echocardiography and Association of Cardiothoracic Anaesthetists accreditation.¹⁶ The demand for echocardiography services is likely to continue to increase in the future, especially for 3D echo in congenital cardiac surgery.

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- 2.13 Access to respiratory function measurements is required for patients undergoing thoracic surgery, including facility for pulmonary exercise testing.
- 2.14 Physiotherapy services are required during the pre-operative preparation and post-operative care of patients undergoing cardiothoracic surgery.
- 2.15 Medical physics or other suitably qualified technicians are required to maintain, repair and calibrate anaesthetic machines, mechanical ventilators, monitors, infusion equipment, the heart/lung machines, cooling/warming devices and other machinery that may be essential such as intra-aortic counter-pulsation balloon pump equipment. Some specialised equipment may need to be maintained by contractual arrangement with an external supplier.
- 2.16 For patients undergoing thoracic surgery, physicians and surgeons experienced in specialist non- thoracic areas, such as cardiac and endocrine disease, should be available for consultation.
- 2.17 The provision of an acute pain service is necessary for thoracic surgery. Pain relief and clinical management protocols must be clearly defined for thoracic and cardiac patients.

3 Areas of special requirement

- 3.1 Children undergoing thoracic surgery have special requirements and the responsibility for paediatric anaesthetic care may be shared with paediatric anaesthetists.⁶
- 3.2 Paediatric patients who have undergone cardiac surgery must be cared for in a unit designed and equipped to care for paediatric patients, and staffed by appropriately trained nurses. Such a unit should meet the standards laid down for paediatric intensive care, including adequate arrangements for retrieval and transfer.⁶
- 3.3 Service provision for cardiac surgery in children and adults with congenital heart disease (ACHD) is currently under review, with a proposed model of care and draft designation standards.¹⁷

4 Training and education

- 4.1 Cardiac and thoracic anaesthesia is a 'key unit of training' for intermediate level training in anaesthesia.⁷ Trainee anaesthetists must be of appropriate seniority to be able to benefit from this area of training, at least specialist trainee year 3 or above.
- 4.2 Consultant anaesthetists intending to undertake anaesthesia for cardiac or thoracic surgery should have received training to higher level in adult intensive care, adult cardiac and/or thoracic anaesthesia for a minimum of one year in recognised training centres as part of general training.⁶ Those providing intensive care for cardiac surgical patients should have received training to the minimum level as defined by the FICM special skills year in cardiothoracic ICM.²
- 4.3 An anaesthetist training in cardiothoracic anaesthesia should be supervised at all times by an appropriately trained consultant, and normally should not be expected to supervise other trainees in theatre.

17 Proposed Congenital Heart Disease Standards and Service specifications. *NHS England*, London (accessed October 2014) (<http://bit.ly/1wtFS9S>).

Guidance on the provision of cardiac and thoracic anaesthesia services 2015

- 4.4** The number of centres that perform thoracic surgery is decreasing. It is therefore essential that the training opportunities for anaesthetists, nursing staff, physiotherapists and other staff are used to the maximum, and that teaching and training in thoracic anaesthesia are given a high priority.

5 Research, audit, and governance

- 5.1** Most research in cardiothoracic anaesthesia will be undertaken in specialist cardiothoracic units and must therefore be given high priority.
- 5.2** Regular clinical audit of the work of cardiothoracic units and cardiothoracic anaesthesia is essential. This includes the participation of anaesthetists in the MDT pre-operative assessment meeting.
- 5.3** All cardiothoracic units should have a regular morbidity and mortality meeting. These should have a list of patients to discuss in advance, an attendance register and minutes with learning points. Consultant anaesthetists should attend these meetings and trainees should be encouraged to attend during their attachments.
- 5.4** Robust procedures should be in place to report and investigate adverse incidents to staff or patients.

6 Organisation and administration

- 6.1** Perfusion services must be included in a clinical directorate or equivalent, under the managerial control of an NHS consultant who may be a consultant anaesthetist.
- 6.2** Clinical protocols should be developed from national guidelines and reviewed on a regular basis.

7 Patient information

- 7.1** Booklets providing information for patients about their stay in hospital should be available for all patients. This will include the patient information booklets published by the British Heart Foundation on cardiac disease, prevention, treatment and lifestyle modification and information on the anaesthetic.^{9,10,11,12}
- 7.2** Information about cardiac rehabilitation generally, and information regarding the availability of such courses locally, should also be available.

Chapter 19

GUIDELINES FOR THE PROVISION OF anaesthetic services

Sedation services 2015

Authors

Dr M Newton, National Hospital for Neurology and
Neurosurgery, London

Dr K Blightman, Royal Surrey County Hospital, Guildford

When considering the provision of anaesthesia, the Royal College of Anaesthetists recommends that the following areas should be addressed. The goal is to ensure a comprehensive, quality service dedicated to the care of patients and to the education and professional development of staff. The provision of adequate funding to provide the services described should be considered. These recommendations form the basis of the standard expected for departmental accreditation.

Summary

- National guidance on procedural sedation has recently been published.¹ This defines fundamental and minimum standards for all areas and all specialties and provides a universal baseline. The guidance below relates to sedation including circumstances where anaesthesia support has been requested, there is a possibility of deep sedation or progression to general anaesthesia or where patients have material comorbidities. Accordingly, some of this guidance recommends staffing, equipment or processes more rigorous than those defined as the national baseline.
- This chapter is primarily about the provision of sedation by anaesthetists. However, because sedation by non-anaesthetists has long been an area of concern we have addressed standards relating to this in each section and referenced this to existing documents on this subject published by individual royal colleges.
- Practitioners administering sedation should have received appropriate training in sedation and be competent with airway management and resuscitation. This also applies to Physicians' Assistant (Anaesthesia) roles who should be working under the direct supervision of a consultant anaesthetist at all times.
- The recommended standards of pre-assessment, monitoring, trained assistance and post-sedation recovery must be met for every patient undergoing sedation. These must be the same as those required for the provision of anaesthesia.²
- Sedation is frequently provided outside the theatre environment. The same standards of care must be provided as those required for sedation within the theatre environment. This applies to pre-, intra- and post-procedural care.³
- Training in sedation techniques is essential. Safe sedation practice forms part of the necessary competencies for obtaining the Certificate of Completion of Training (CCT) in anaesthesia.⁴
- Where sedation is practised by non-anaesthetists in areas of the hospital outside the theatre environment consideration must be given by the operating team to the requirement of anaesthetic support for patients undergoing complex procedures.⁵ Anaesthetic support should also be sought for patients at the extremes of age and those with significant co-morbidities.
- Anaesthetic departments should facilitate the provision of planned and emergency sedation services in other departments in the hospital.^{5,6}

1 Safe Sedation Practice for Healthcare Procedures: Standards and Guidance. *AoMRC*, London 2013 (www.rcoa.ac.uk/node/15182).

2 Key points on the provision of anaesthesia services. *RCoA*, London 2015 (www.rcoa.ac.uk/node/17861).

3 Guidance on the provision of services for anaesthetic care in the non-theatre environment. *RCoA*, London 2014 (www.rcoa.ac.uk/node/14671).

4 Curriculum for a CCT in Anaesthetics. *RCoA*, London 2010 (www.rcoa.ac.uk/node/230).

5 Safe Sedation, Analgesia and Anaesthesia within the Radiology Department. *RCR*, London 2003 (<http://bit.ly/1jNbxP4>).

6 Guidance for the use of propofol sedation for adult patients undergoing Endoscopic Retrograde Cholangiopancreatography (ERCP) and other complex upper GI endoscopic procedures. Joint Royal College of Anaesthetists (RCoA) and British Society of Gastroenterology (BSG) Working Party. *RCoA*, London 2014 (www.rcoa.ac.uk/node/2266).

- A named Consultant Anaesthetist should be responsible for liaising with Consultants in other departments with responsibility for sedation, to establish local guidelines and training for the provision of safe sedation by non-anaesthetists.^{5,7}
- It is essential that wherever there is an ‘operator-sedationist’ (where the individual performing the procedure also administers sedation), for example, central line insertion, an appropriately trained second individual, ideally with no other role during the procedure, must be responsible for monitoring the sedated patient.^{5,1}
- Wherever sedation is practised, effective audit is essential.
- It has been recommended¹ that all institutions where sedation is practised should have a Sedation Committee. This committee should include key clinical teams using procedural sedation and there should be a nominated clinical lead for sedation. In larger institutions the Sedation Committee should include an anaesthetist.
- It has also been proposed¹ that hospitals should consider developing Sedation Teams analogous to Pain Teams. The role of the Sedation Team would be to support multidisciplinary staff with continuing education and ‘hands-on’ clinical expertise in sedation.

Introduction: the importance of sedation services

- Sedation is often employed to facilitate comfort during diagnostic and therapeutic procedures. It may only be necessary to provide anxiolysis but most painful procedures will also require local or systemic analgesia.
- Sedation is a continuum of a depressed conscious state with unpredictable inter-individual dose responses to the drugs used which may result in unconsciousness. The unconscious patient is unrousable, even by painful stimulation. Deeper levels of sedation are indistinguishable from general anaesthesia.
- ‘Conscious sedation’ refers to a state of sedation where verbal contact is maintained throughout the period of sedation. Cardiovascular stability and good respiratory function are usually maintained, as are airway reflexes. Conscious sedation is therefore considered to be a safe target state.¹
- Deeper levels of sedation, where verbal contact is lost, have the potential to cause cardiovascular and/or respiratory depression as well as the loss of airway reflexes. This may result in significant morbidity and mortality.
- Because sedation is a continuum, it is not always possible to predict how an individual patient will respond. Hence all practitioners intending to produce a certain level of sedation should be able to rescue patients whose level of sedation becomes deeper than originally intended.⁸ Practitioners therefore require skills to recognize and manage airway, respiratory and cardiovascular problems caused by over-sedation.

7 Implementing and ensuring safe sedation practice for healthcare procedures in adults. Report of an Intercollegiate Working Party chaired by the Royal College of Anaesthetists. *RCoA*, London 2001 (www.rcoa.ac.uk/node/2270).

8 Continuum of depth of sedation: definition of general anaesthesia and levels of sedation/analgesia. *ASA*, USA 2009 (<http://bit.ly/11iGlax>).

- As a general rule single drugs are less likely to result in inadvertent over-sedation. The combination of an opioid and benzodiazepine results in pronounced synergism and with it an increased risk of over-sedation.⁹
- Loss of verbal contact with a patient requires the same level of care as that needed for general anaesthesia. In the United Kingdom this means that the patient should be cared for by an anaesthetist or a Physicians' Assistant (Anaesthesia).⁷
- Concerns have long been raised about the failure of safe sedation practice in all specialties. This has been addressed by the RCoA by making sedation training a requirement for obtaining a CCT in anaesthesia. Despite continued efforts to improve safety through publication of cross-specialty guidelines and improvements in training there are still occasional sedation-related adverse events resulting in morbidity and death.^{10,11,12,13,14}
- A recently published document¹ has recommended competency-based formal training for all healthcare professionals involved in sedation to a clearly defined national standard.
- Anaesthetists can play a key leadership role in providing educational support and practical hands-on experience to non-anaesthetist sedation practitioners to help acquire and maintain airway and resuscitation skills.
- There is currently no complete dataset on the safety of sedation in UK practice. Wherever sedation is practised there should be continuous audit and incident reporting. Clinical incidents such as sustained drop in oxygen saturation <90%, midazolam over-sedation or unplanned airway intervention should be reported and investigated to ensure that processes are introduced to prevent recurrence. It is recommended that practitioners using sedation should audit the number of cases performed by each practitioner and collect data on complications.

Levels of provision of service

1 Staffing requirements

- 1.1 All patients undergoing sedation should be pre-assessed by an appropriately trained healthcare professional prior to their procedure. Ideally this should be in pre-admission clinic so that medical problems can be identified and, if possible, resolved before admission for the procedure.
- 1.2 All patients due to receive sedation by an anaesthetist must be seen by an anaesthetist on the day of the procedure, ideally by the anaesthetist who will administer the sedation.
- 1.3 The involvement of an anaesthetist in patient sedation commonly reflects expectation that deep sedation may be used or that there is a possibility of progression to general anaesthesia or that the patient has material comorbidities. Mindful of this, dedicated trained anaesthetic assistants should be available to anaesthetists at all sites in the hospital where sedation by an anaesthetist is required.

9 Ben-Shlomo I et al. Midazolam acts synergistically with fentanyl for induction of anaesthesia. *BJA* 1990;**64**:45–47.

10 Scoping our practice. *NCEPOD*, London 2004 (<http://bit.ly/1mqwO31>).

11 Quine MA et al. Prospective audit of upper gastrointestinal endoscopy in two regions in England: safety, staffing and sedation methods. *Gut* 1995;**36**:462–467.

12 Honeybourne D, Neumann CS. An audit of bronchoscopy practice in the United Kingdom: a survey of adherence to national guidelines. *Thorax* 1997;**52**:7:09–713.

13 Lord DA et al. Sedation for Gastrointestinal Endoscopic Procedures in the Elderly: Getting Safer but Still Not Nearly Safe Enough. *BSG*, London 2006;**19**:1–14 (<http://bit.ly/1f8yV7D>).

14 Sutaria N, Northridge D, Denvir M. A survey of sedation and monitoring practices during transoesophageal echocardiography in the UK: are recommended guidelines being followed? *Heart* 2000;**84**:19.

- 1.4 Following sedation patients must be recovered in a 'post-anaesthesia care unit' (PACU) staffed by healthcare professionals specially trained and competent in recovery procedures.¹⁵
- 1.5 Patients meeting discharge criteria following sedation who are to be discharged home should be discharged into the care of a responsible third party.¹⁶ Verbal and written instructions for post-procedural care should be given if a procedure has been performed.

2 Equipment, support services and facilities

Equipment

General

- 2.1 Facilities for monitoring, ventilation of patients' lungs and resuscitation including defibrillation must be available at all sites where patients are sedated.^{2,5,17}
- 2.2 All equipment used should comply with the recommendations of the AAGBI and be the same as that required for patients receiving general anaesthesia.¹⁷
- 2.3 All anaesthetic equipment must be checked before use according to the AAGBI published guidelines.^{17,18}

Monitoring and oxygen administration

- 2.4 Regular communication with the patient allows monitoring of the level of sedation. Additionally, facilities for monitoring must be available at all sites where patients receive sedation. For patients receiving conscious sedation this must include pulse oximetry.¹⁹ Clinical and instrumental monitoring to a degree relevant to the patient's medical status and the sedation method, must be used.

Monitoring of ECG may not be necessary in young healthy patients but is essential in older patients.⁷ Capnography is not mandatory for conscious sedation but is desirable¹⁶ and should be considered a Developmental Standard.¹ Deeper levels of sedation require the same level of monitoring as patients receiving general anaesthesia.²⁰

- 2.5 Oxygen should be given to sedated patients.^{5,16} Low flow oxygen via nasal cannulae is less likely to mask significant underventilation.

Support services

- 2.6 Local standards and guidelines for patient care should be developed in line with national guidelines.
- 2.7 Guidelines for the management of rare emergencies must be prominently displayed at all sites where sedation is administered .
- 2.8 A contemporary record of drugs administered during sedation with times and doses together with vital signs must be recorded and stored in the patient notes whenever patients receive sedation.

15 The Anaesthesia Team 3. *AAGBI*, London 2010 (<http://bit.ly/1mo43nw>).

16 Safe sedation of adults in the emergency department. *RCoA and CEM*, London 2012 (www.rcoa.ac.uk/node/10214).

17 Guidance on the provision of anaesthesia services for intra-operative care. *RCoA*, London 2014 (www.rcoa.ac.uk/node/14667).

18 Checking anaesthetic equipment. *AAGBI*, London 2012 (<http://bit.ly/OW2PBb>).

19 The Never Events List 2013/2014 Update. *NHS England*, London 2013 (<http://bit.ly/1e3qkwD>).

20 Recommendations for standards of monitoring during anaesthesia and recovery (4th Edition). *AAGBI*, London 2007 (<http://bit.ly/1m4HyjW>).

Facilities

- 2.9 An area must be provided where patients can change in privacy.
- 2.10 A suitably quiet and private area must be provided for patients to wait in before their procedure.
- 2.11 Procedure rooms must be large enough to accommodate equipment and personnel with enough space to move about safely and to enable easy access to the patient at all times.
- 2.12 The procedure room should be easily accessible to the Resuscitation Team and large enough to accommodate them and appropriate equipment if required. It should also be possible to arrange transfer of a patient from the procedure room to other areas within the institution if necessary.
- 2.13 The procedure room must be close to the PACU.

3 Areas of special requirement**Paediatric sedation**

- 3.1 Many children are intolerant of investigations/procedures and sedation is therefore commonly required. Sedation also helps minimize patient movement during procedures. Anaesthesia may be more appropriate depending on the child and the intended procedure.
- 3.2 All standards required for general anaesthesia in children should be met in children undergoing sedation. Special note should be taken of the psychological preparation of the child.
- 3.3 Practitioners administering sedation to children must be familiar with paediatric drug dosage and handling. They must be aware of the differences between adult and paediatric physiology and the relevance of this to sedation.
- 3.4 Practitioners must be able to recognize and manage complications resulting from over-sedation in children. They must be competent with paediatric life support.²¹
- 3.5 It is generally accepted that anaesthetists who administer intravenous sedation to children must be trained in, and have a continuing commitment to, paediatric anaesthesia.

Emergency Department (ED)

- 3.6 Sedation is often required for painful procedures in the ED.
- 3.7 All patients need to be assessed before sedation.
- 3.8 The procedure must be carried out where full resuscitation facilities are available, which usually means a dedicated area in the Resuscitation Area.
- 3.9 The patient should be fasted for any sedation as for anaesthesia. In urgent situations consideration should be given to rapid sequence induction of anaesthesia (RSI) and intubation in non-fasted patients if the patient is considered to be at risk of aspiration.
- 3.10 Recommendations for safe sedation in the ED require a trained assistant to assist the anaesthetist.¹⁶
- 3.11 Patient monitoring must be to the same standard as that for sedation in a theatre environment.
- 3.12 Equipment requirements are the same as for sedation in a theatre environment.
- 3.13 Recovery must take place with full monitoring and be supervised by staff trained in recovering sedated patients. Resuscitation equipment must be immediately available.

²¹ Sedation in children and young people. Sedation for diagnostic and therapeutic procedures in children and young people. NICE, London 2010 (<http://bit.ly/1coBAu3>).

- 3.14** The patient must not be discharged from the ED until the level of consciousness and vital signs have returned to pre-procedural baseline levels.¹⁶
- 3.15** Practitioners should be aware that the RCoA and CEM have published guidelines on safe sedation.¹⁶ Emergency Department physicians holding RCoA initial assessment of competence are considered competent to provide deep sedation. Departments of Anaesthesia may have a role supporting these physicians in the maintenance of these competencies.

Radiology department

- 3.16** Radiology departments are often in remote areas of the hospital and are unfamiliar environments to many personnel.
- 3.17** Induction training for new doctors should include familiarization with these areas of the hospital.
- 3.18** All standards pertaining to safe sedation in the theatre environment need to be applied to sedation in departments of radiology.
- 3.19** The procedural room needs to be large enough to accommodate additional personnel, an anaesthetic machine and resuscitation equipment. Easy access to the patient needs to be assured at all times.
- 3.20** Practitioners working in the Radiology Department need to be aware of many of the additional hazards posed by working in this environment including ionizing radiation and strong magnetic fields. They should be aware of the extra safety measures to be taken to ensure the safety of the patient and healthcare professionals.
- 3.21** All patients need to be assessed prior to sedation. Urgent and emergency cases may require prior optimization in a ward environment.
- 3.22** Some patients will require sedation for imaging due to an inability to keep still, claustrophobia or mental disability.
- 3.23** Departments of Anaesthesia should have a named consultant who liaises with a named consultant radiologist to oversee safe sedation practice⁵ by establishing local guidelines for sedation. Many interventional radiological procedures are painful and require a deeper level of sedation with strong analgesia.
- 3.24** Anaesthetic departments should assist in inter-departmental planning of service needs throughout the hospital. Good relationships between departments are key to providing the best environment for good working practice and facilitating the provision of complex sedation and anaesthesia by anaesthetists.

Gastroenterological procedures

- 3.25** The complexity of procedures carried out endoscopically has increased in recent years. Additionally many patients presenting for these procedures have significant co-morbidity. In 2004 NCEPOD published 'Scoping our Practice'.¹⁰ This document highlighted inadequate monitoring and sedation overdose as contributory causes of mortality in patients undergoing interventional gastrointestinal procedures. It also highlighted the poor provision for out of hours care. Following publication of this document anaesthetic departments may be called upon more frequently to provide sedation for this group of patients.
- 3.26** If sedation is required for a patient undergoing a gastroenterological procedure the standards for equipment and monitoring should be the same as for the provision of sedation in a theatre environment. This also applies to pre-, intra- and post-procedural care.
- 3.27** The procedural room needs to be large enough to accommodate additional personnel, an anaesthetic machine and resuscitation equipment. Easy access to the patient needs to be assured at all times. The need for dimmed lighting may impair observation of the patient.

- 3.28** Many endoscopic GI procedures are painful and are unsuitable for conscious sedation. The Joint Royal College of Anaesthetists and British Society of Gastroenterology Working Party published guidance in 2011 on the use of propofol sedation for patients undergoing complex upper GI endoscopic procedures.⁶ The document states that propofol should be administered and monitored by an anaesthetist with at least 'Intermediate Level' sedation training or an appropriately trained Physicians' Assistant (Anaesthesia) working under the supervision of a trained consultant anaesthetist.
- 3.29** Sedation Committees and a hospital Sedation Team as recommended in 'Safe Sedation Practice for Healthcare Procedures'¹ may have an important role in the provision of safe sedation for gastroenterological procedures.
- Cardiological procedures**
- 3.30** Sedation is used widely for cardiological procedures. Problems of over-sedation have been reported.¹⁴
- 3.31** If sedation is required for a patient undergoing a cardiological procedure the standards for equipment and monitoring are the same as for the provision of sedation in a theatre environment. This also applies to pre-, intra- and post-procedural care.
- 3.32** Many patients will have significant cardiovascular compromise which will affect drug pharmacodynamics.

4 Training and Education

- 4.1** Few anaesthetists in the UK have received formal training in the use of sedation techniques.²² However, sedation was added to the anaesthetic curriculum in 2010 and is now regarded as a core competency for anaesthetic practice. Training and exposure must be provided to current standards at basic, intermediate and higher levels.⁴
- 4.2** Training should emphasise:
- pre-assessment to identify significant co-morbidity which may adversely affect drug-handling
 - fasting status
 - understanding of the procedure to be undertaken: painful/non-painful, duration, requirement for immobilisation
 - choice of technique
 - pharmacology of drugs used in sedation, and flumazenil and naloxone
 - monitoring and recovery standards
 - emergency airway rescue manoeuvres
- 4.3** Better training should mean that anaesthetists provide safer sedation for patients under their care. It will also enable anaesthetists to be better at educating non-anaesthetists in the provision of safe sedation.
- 4.4** Continuing professional development is a requirement of revalidation for those who administer sedation.
- 4.5** It is recommended that there should be a national standard in the education of, and competencies required by, all practitioners of sedation.¹
- 4.6** It is recommended¹ that Royal Colleges should define safe sedation techniques for each specialty. Trainees who will be expected to use conscious sedation on obtaining their CCT must demonstrate acquisition of the necessary competencies at their Annual Review of Competency Progression (ARCP).

22 Blaney MR. Procedural sedation for adults: an overview. *CEACCP* 2012;**12**(4):176-180.

- 4.7 Anaesthetic departments can assist in providing teaching opportunities to other specialties in the practice of sedation of patients and simulated scenarios. Anaesthetic departments may have an important role in the newly proposed Sedation Team.¹

5 Research and Audit

- 5.1 All clinical incidents where sedation is a factor should be reported.
- 5.2 Midazolam over-sedation and failure to monitor oxygen saturation during sedation are both defined as 'never events' by the Department of Health.¹⁹ Reporting these incidents to the National Reporting and Learning System (NRLS) is mandatory.
- 5.3 Each clinical team using sedation within an institution should audit the number of cases performed by each sedation practitioner and their rate of complications.¹
- 5.4 Audit should be under regular review by a clinical lead and co-ordinated by a hospital Sedation Committee.¹
- 5.5 Clinical audit of sedation practice should involve all staff and provide regular feedback and improvement of standards where necessary.

6 Organisation and Administration

- 6.1 Recent recommendations¹ may call for extra resources to be made available to support safe sedation especially where sedation is required outside the theatre environment.

7 Patient information

- 7.1 Information regarding the planned procedure and requirement for sedation should be given to the patient in advance of their admission. Details on fasting times and medications to continue or omit should be included. The patient needs to be aware that they require a competent adult to escort them home after receiving sedation.