Royal College of Anaesthetists

Chapter 9

Guidelines for the Provision of Anaesthesia Services (GPAS)

Guidelines for the Provision of Anaesthesia Services for an Obstetric Population 2025

Chapter 9
Guidelines for the Provision of Anaesthesia Services for an Obstetric Population 2025

Authors

Dr James Bamber
Consultant Anaesthetist
Addenbrooks Hospital

Dr Sophie Kimber-Craig
Consultant Anaesthetist
Bolton NHS Foundation Trust

Dr Nuala Lucas
Consultant Anaesthetist
Northwick Park Hospital

Dr Felicity Plaat
Consultant Anaesthetist
Queen Charlotte's & Hammersmith Hospitals

Chapter Development Group members

Dr Anita Banerjee
Obstetric Physician
St Thomas' Hospital

Dr Rosamunde Burns
Consultant Anaesthetist
Royal infirmary of Edinburgh

Dr Steve Cantellow
Consultant anaesthetist and intensivist
Nottingham University Hospitals

Dr Jon Careless
Specialty Doctor
Buckinghamshire Healthcare NHS Trust

Ms Jenny Dorey
PatientsVoices@RCoA
Royal College of Anaesthetists

Mr Lloyd Howell
Senior Lecturer
College of Operating Department Practitioners

Dr Damien Hughes
Consultant Anaesthetist
Ulster Hospital Belfast

Dr Carol Kenyon
Consultant Anaesthetist
Liverpool Women's Hospital

Dr Yavor Metodiev
Consultant Anaesthetist
Cardiff and Vale University Health Board

Ms Tracey Radcliffe
Clinical Governance Lead Nurse
British Anaesthetic and Recovery Nurses Association

Dr Prea Ramasamy
Consultant Anaesthetist
University Hospitals of Leicester NHS Trust

Dr Abigail Richardson
Consultant Anaesthetist
Northwick Park Hospital

Dr Kathryn Spence
Lead Obstetric Consultant Anaesthetist
Antrim Hospital

Ms Aimee Yarrington
College of Paramedics

Chapter 9
Guidelines for the Provision of Anaesthesia Services for an Obstetric Population 2025

Acknowledgements

Peer reviewers

Dr Sarah Armstrong
Consultant Anaesthetist
Frimley Park Hospital NHS Foundation Trust

Dr Jeremy Campbell
Consultant Anaesthetist
Imperial College Healthcare NHS Trust

Dr Sarah Gibb
Consultant Anaesthetist
South Tyneside and Sunderland NHS Foundation Trust

Chapter development technical team

Dr Rachel Evley
Senior Research Fellow
University of Nottingham

Ms Stephanie James
Royal College of Anaesthetists

Ms Ruth Nichols
Royal College of Anaesthetists

Mr Owen Waite
Royal College of Anaesthetists

Declarations of interest

All chapter development group (CDG) members, stakeholders and external peer reviewers were asked to declare any pecuniary or non-pecuniary conflict of interest, in line with the guidelines for the provision of anaesthetic services (GPAS) conflict of interest policy as described in the GPAS chapter development process document.

The nature of the involvement in all declarations made was not determined as being a risk to the transparency or impartiality of the chapter development. Where a member was conflicted in relation to a particular piece of evidence, they were asked to declare this and then, if necessary, remove themselves from the discussion of that particular piece of evidence and any recommendation pertaining to it.

Medicolegal implications of GPAS guidelines

GPAS guidelines are not intended to be construed or to serve as a standard of clinical care. Standards of care are determined based on all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.

Promoting equality and addressing health inequalities

The Royal College of Anaesthetists (RCoA) is committed to promoting equality and addressing health inequalities. Throughout the development of these guidelines we have:

- given due regard to the need to eliminate discrimination, harassment and victimisation, to advance equality of opportunity, and to foster good relations between people who share a relevant Protected Characteristic (as defined in the Equality Act 2010) and those who do not share it
- given regard to the need to reduce inequalities between patients in access to, and outcomes from healthcare services and to ensure services are provided in an integrated way where this might reduce health inequalities.

GPAS Guidelines in context

The GPAS documents should be viewed as 'living documents'. The GPAS guidelines development, implementation and review should be seen not as a linear process, but as a cycle of interdependent activities. These in turn are part of a range of activities to translate evidence into practice, set standards and promote clinical excellence in patient care.

Each of the GPAS chapters should be seen as independent but interlinked documents. Guidelines on the general provision of anaesthetic services are detailed in the following chapters:

- chapter 1: Guidelines for the Provision of Anaesthesia Services: The Good department
- chapter 2: Guidelines for the Provision of Anaesthesia Services for the Perioperative Care of Elective and Urgent Care Patients.

These guidelines apply to all patients who require anaesthesia or sedation, and are under the care of an anaesthetist. For urgent or immediate emergency interventions, this guidance may need to be modified as described in chapter 5: guidelines for the provision of emergency anaesthesia.

The rest of the chapters of GPAS apply only to the population groups and settings outlined in the 'Scope' section of these chapters. They outline guidance that is additional, different or particularly important to those population groups and settings included in the 'Scope'. Unless otherwise stated within the chapter, the recommendations outlined in chapters 1–5 still apply.

Each chapter will undergo yearly review, and will be continuously updated in the light of new evidence.

Guidelines alone will not result in better treatment and care for patients. Local and national implementation is crucial for changes in practice necessary for improvements in treatment and patient care.

Aims and objectives

This chapter is intended to define the standards for the provision of anaesthetic care in all consultant led maternity units in the UK. The guidance is intended to be used by anaesthetists and healthcare managers with service delivery responsibilities.

These recommendations are not intended to describe the best practice for clinical care; the main focus is on outlining requirements for a service to be safe and effective and to ensure robust governance and training structures to support the provision of care.

These guidelines have been developed using a process accredited by the National Institute for Health and Care Excellence (NICE) in accordance with its criteria for guidance production.[1] They are evidence based and peer reviewed. There is a paucity of randomised controlled trials in the field of provision of obstetric anaesthesia services; the vast majority of data come from retrospective cohort studies and expert opinion Where available, analysis of the literature (including national and international guidance) has been undertaken to formulate these recommendations. This is alongside learning from past experience from national reports on failure of care. [9,2,3,4]

Chapter 9
Guidelines for the Provision of Anaesthesia Services for an Obstetric Population 2025

Anaesthetists may be involved at any stage of a pregnancy, so there are recommendations relevant to the antenatal, peripartum and postpartum periods. The workload of units vary in terms of delivery rates, acuity and the dependency of the patients they care for, but all should be able to manage acute medical or obstetric deterioration in anyone. Some units will require the resources to care for pregnant women with complex needs on a regular basis. There is no 'one size fits all' in terms of maternity units; there is evidence of considerable variation in the care delivered across the UK.[5] Our aim is for our recommendations to ensure that all units meet the standards to provide safe effective care and, through their implementation, prevent harm to their patients.

We know that the mortality rate is higher in those who do not speak English or those born outside the UK, some ethnic minority groups, those in abusive relationships, older parents and those coming from the most deprived areas. Serious pre-existing medical or psychiatric conditions are also associated with higher mortality rates[4,5,6] It is our aim to provide recommendations that address the additional specific needs of these women and describe a service that reduces the risk of poor outcomes for them.

Any service needs to be able to monitor and regulate the care being provided. It is essential to understand that this goes beyond performing routine audits; it requires developing and maintaining an organisational commitment towards high-quality care and a strong safety culture in maternity units. This commitment comes from the hospital management as well as the maternity unit staff, and the unit must be provided with adequate resources, including clinicians' protected time to implement this care. We should never miss the opportunity to learn from past experience.

Scope

Objective

To provide and describe current best practice in the provision of anaesthetic services for an obstetric population, supported by evidence and national recommendations where available, for anaesthetists with responsibilities for service delivery and healthcare managers.

Target population

All pregnant women who require anaesthetic input for:

- antenatal anaesthesia
- labour
- peripartum operative procedures.
- high dependency care on labour ward
- obstetric procedures during pregnancy, eg cervical sutures, fetal surgery.

Anaesthetic departments that provide anaesthesia or analgesia input as detailed above.

Healthcare setting

All settings in which obstetric anaesthesia or analgesia services are provided.

Clinical management

Key components for the provision of anaesthesia or analgesia services for an obstetric population.

Key components needed to ensure provision of high quality anaesthetic services for an obstetric population.

Areas of provision considered:

- levels of provision of service, including (but not restricted to) staffing, equipment, support services and facilities
- areas of special requirement, such as maternal critical care and the morbidly obese woman
- training and education
- research, audit and quality improvement
- organisation and administration
- patient information and communication.

Issues that will not be covered:

- clinical guidelines specifying how healthcare professionals should care for patients
- national-level issues.

Exclusions

Provision of obstetric services by a specialty other than anaesthesia.

Pregnant women who require non-obstetric surgical intervention outside the immediate peripartum period.

Introduction

Pregnancy and childbirth remains a risky time for both mother and baby. In recent years, we have seen the maternal mortality rate plateau. [7,8,9] However, the confidential review of every maternal death over the past seven decades continues to identify that substandard care, frequently caused by deficiencies in service provision, has led to avoidable deaths in the majority of cases. Areas where improvements can be made to reduce the risk for mothers and babies are identified in every report. It is vital that we use this shared learning and the available evidence to shape our provision of care to pregnant and recently delivered women, both here in the UK and with the wider population globally.

Working on delivery units can be incredibly rewarding, but it can also be highly challenging and dynamic. It is not possible to identify all women or babies who are at risk of rapid deterioration but we do need to be able to respond appropriately and in a timely manner in the event of an emergency. Obstetrics accounts for a large proportion of the emergency surgery performed in hospitals.[10,11] Provision of obstetric care is by its nature multidisciplinary. The team, which includes, obstetricians, anaesthetists, neonatologists, midwives, theatre staff, anaesthetic assistants and others, has to be able to work closely under stress in dynamic situations. To ensure that teams can function effectively in this environment, they need to train together and have the appropriate infrastructure and necessary resources in place to deliver a high-quality service.

The role of the anaesthetist on the delivery unit encompasses that of a peripartum physician and has expanded markedly in recent years. Over 50% of women require anaesthetic intervention around the time of delivery of their baby[12]. It is currently difficult to quantify other areas of care provided by anaesthetists on delivery suites.[13] Some evidence suggests that there has been a recent increase in the requirement for labour induction ; in addition, anaesthetic care is required for operative/assisted deliveries and other procedures during pregnancy or the peripartum period.[14] Anaesthetists are also involved in planning the care of high-risk women during the antenatal period and with providing higher levels of care in the peripartum period.

The obstetric population is changing; over half of pregnant women are now considered to be at high risk for complications during their pregnancies. [15] In 2015, the greatest increase in fertility rate was for women aged 40 years and over (a group that has been identified as at high risk of

mortality) and a large proportion of pregnancies in this age group are the result of assisted conception. In the UK, one in six couples seeks fertility treatment. The resulting pregnancies are associated with more complications for both women and their babies. The incidence of obesity also continues to rise across the UK population.[10,16,17] The number of women who have had a previous caesarean birth is rising, increasing the risks of associated placenta accreta syndrome and uterine rupture. The number of pregnant women with significant pre-existing conditions (e.g. congenital cardiac disease) who are proceeding with their pregnancies is increasing. These women require specialised services to support them during this time. These guidelines include recommendations for areas of service where anaesthetists are expected to take a lead role but, as a pregnant woman may present anywhere, all maternity units should be ready to recognise and manage acute deterioration, with pathways in place to obtain expert guidance when required.

Public expectations of maternity services are high; through media, internet and educational resources, pregnant women and their families are often well informed. Many are keen for a particular mode of delivery or type of analgesia. We have to deliver an anaesthesia service that is safe and effective and that also aims to meet these expectations, where appropriate. It is vital that we adopt the principles of shared decision making and that we recognise the need to support autonomy by building good relationships, respecting both individual competence and interdependence on others.[15,18]

In 2022, two major reports related to maternity services were published; Ockenden and Kirkup.[19] The Ockenden Report made several recommendations specifically relating to obstetric anaesthetic services. These align with existing GPAS recommendations and are referenced in the text.

Recommendations

The grade of evidence and the overall strength of each recommendation are tabulated in Appendix I.

1 Staffing requirements

The duty anaesthetist

The duty anaesthetist is responsible for providing care to those in labour or who, in the antenatal, perinatal or postpartum period, require anaesthetic, medical or surgical attention. The duty anaesthetist can be a consultant, an SAS doctor, clinical fellow or anaesthetic trainee.

1.1 To act as the duty anaesthetist without direct supervision from a consultant or autonomously practising anaesthetist, the duty anaesthetist should meet the basic training specifications and have attained the RCoA's Initial Assessment of Competence in Obstetric Anaesthesia.[20,21]

1.2 There should be a duty anaesthetist immediately available for the obstetric unit 24/7. As their primary responsibility is to provide care to those in labour or who require medical or surgical interventions, ante or peripartum, the role should not include undertaking elective work during the duty period.[22]

1.3 Busier units (see Glossary) should consider having two duty anaesthetists available 24/7, in addition to the supervising autonomously practising anaesthetist.[23]

1.4 In units offering a 24-hour regional analgesia service, the duty anaesthetist should be resident on the hospital site where the regional analgesia is provided (not at a nearby hospital).

1.5 The duty anaesthetist should have an effective and rapid means of communication with their supervisor at all times.[23] Staff working in the maternity unit should be aware of their supervisor's

identity, location and how to contact them. The name(s) of the autonomously practising anaesthetist(s) covering the delivery suite and how to contact them should be clearly displayed and easily visible to all staff. [24] There should be guidelines for escalation to the consultant on-call with specific guidance for consultant attendance.[25]

1.6 It is recognised that, in smaller units, the workload may not justify having an anaesthetist exclusively dedicated to the delivery unit. If the duty anaesthetist does have other responsibilities, these should be of a nature that would allow the activity to be immediately delayed or interrupted should obstetric work arise. Under these circumstances, the duty anaesthetist should be able to delegate care of their non-obstetric patient to be able to respond immediately to a request for care of obstetric patients. They would therefore, for example, not simultaneously be able to be a member of the on-call resuscitation team. If the duty anaesthetist covers general theatres, another anaesthetist should be ready to take over immediately should they be needed to care for obstetric patients.

1.7 Adequate time for formal multidisciplinary team (MDT) handovers between shifts should be built into the timetable. In the case of the anaesthetist being otherwise engaged with work at the time of the MDT labour ward handover, a briefing from the midwifery and obstetric team should be sought at the earliest opportunity to facilitate a shared mental model of the existing workload/potential patients.[2,25]

1.8 A structured tool should be considered for handover between shifts and its formal documentation.[24,25,26]

1.9 The duty anaesthetist should participate in MDT delivery suite handovers and ward rounds.[25,27]

The lead obstetric anaesthetist

1.10 Every obstetric unit should have a designated lead anaesthetist (see Glossary) with specific programmed activities allocated for this role.[2]

1.11 The lead obstetric anaesthetist should be responsible for the overall delivery of the service, including:

- ensuring that evidence based guidelines and protocols are in use and are up to date[25]
- monitoring staff training
- workforce planning
- service risk management
- ensuring that national specifications are met
- auditing the service against agreed standards, including anaesthetic complication rates, as set out in the RCoA *QI Compendium* Chapter 7.

1.12 The lead obstetric anaesthetist should ensure representation of the anaesthetic department at multidisciplinary meetings for service planning and governance purposes, including labour ward forum, risk management groups and incident reviews. [23,25]

1.13 The lead obstetric anaesthetist should ensure that there are continuing quality improvement projects to maintain and improve the care in their units.[28]

Consultant or other autonomously practising anaesthetist

1.14 As a basic minimum for any obstetric unit, a consultant or other autonomously practising anaesthetist should be allocated to ensure senior cover for the full daytime working week;

that is, ensuring that Monday to Friday morning and afternoon sessions (see Glossary), are staffed.[23] This cover is to provide urgent and emergency care, not to undertake elective work.

1.15 In busier units, increased levels of consultant or other autonomously practising anaesthetist cover may be necessary and should reflect the level of consultant obstetrician staffing in the unit.[29] This may involve extending the working day to include senior presence into the evening session and/or increasing numbers of autonomously practising anaesthetists.

1.16 Additional programmed activities for consultant or autonomously practising anaesthetists should be allocated for elective caesarean birth lists and antenatal anaesthetic clinics (or to review referrals if no formal clinic is in place).[23] Time is required to identify and follow up potential anaesthetic morbidity and to arrange continuing investigation and referral.

1.17 In units where anaesthetists in training work a full or partial shift system and/or rotate through the department every three months (or more frequently), provision of additional programmed activities for autonomously practising anaesthetists should be considered, to allow initial orientation, training and supervision into the evening.[30]

1.18 There should be a named consultant or other autonomously practising anaesthetist responsible for every elective caesarean delivery list. This anaesthetist should be immediately available. The named person should have no other concurrent clinical responsibilities.

1.19 Consultant or other autonomously practising anaesthetist support should be contactable at all times and have a response time for attendance on site of not more than half an hour to attend the delivery suite and maternity operating theatre. The supervising anaesthetist should not therefore be responsible for two or more geographically separate obstetric units.

1.20 The anaesthetist's primary responsibility is care of the woman. A separate healthcare professional should be responsible for neonatal resuscitation and the care of the newborn baby.[1,67,31]

Anaesthetic assistance

1.21 Women requiring anaesthesia in the peripartum period should have the same standards of perioperative care as for any surgical and medical patient.[6,32]

1.22 The anaesthetist should have a competent trained assistant immediately available for the duration of any anaesthetic intervention and this practitioner should not have any other duties. [33]

1.23 All theatre staff acting as anaesthesia assistants should comply fully with current national training standards, and should be required to have attained and maintained the relevant competencies to perform the role (an example of these competencies is referenced).[33,34]

1.24 Anaesthetic practitioners who cover obstetrics should demonstrate additional knowledge and skills specific to the care of pregnant women.[34]

1.25 Anaesthetists and anaesthesia assistants working without direct supervision in obstetric theatres and on the delivery suite should be familiar with the environment and working practices of that unit and work there on a regular basis to maintain that familiarity.

Postanaesthetic recovery staff

1.26 Those requiring postoperative recovery care should receive the same standard of care as the non-obstetric postoperative population.[6,34,35,36,37]

1.27 All staff caring for the obstetric population following anaesthesia should be familiar with the area for recovery of obstetric patients and be experienced in the use of the different early warning scoring systems for obstetric patients. They should have been trained to the same standard as for all recovery practitioners working in other areas of general surgical work, should maintain their skills through regular work on the theatre recovery unit and should have undergone a supernumerary preceptorship in this environment before undertaking unsupervised work.[35,38]

Other members of the team

1.28 An adult resuscitation team trained in resuscitation of the pregnant patient should be immediately available.[39]

1.29 There should be secretarial support for the department of anaesthesia, including the obstetric anaesthetic service.

1.30 Provision should be made to ensure access to other allied healthcare professionals, such as clinical pharmacists, dieticians, outreach nurses and physiotherapists, is available if required.[40]

1.31 Hospitals should have approved documentation defining safe staffing levels for anaesthetists and anaesthetic practitioners, including contingency arrangements for managing staffing shortfalls; annual reviews of compliance with these standards should be performed.

2 Equipment, services and facilities

Equipment

2.1 Blood gas analysis (with the facility to measure serum lactate and the facility for rapid estimation of haemoglobin and blood sugar) should be available on the delivery suite.

2.2 Delivery suite rooms should be equipped with monitoring equipment to measure non-invasive blood pressure, oxygen saturation and heart rate.

2.3 Delivery suite rooms should have oxygen, suction equipment and access to resuscitation equipment. This equipment should be checked daily. [41]

2.4 Delivery suite rooms must comply with Control of Substances Hazardous to Health Regulations 2002 and guidelines on workplace exposure limits on waste gas pollution.[42]

2.5 The standard of monitoring in the obstetric theatre should comply with Association of Anaesthetists standards of monitoring.[43]

2.6 A fluid warming device allowing rapid infusion of blood products and intravenous fluids should be immediately available to the delivery suite.[44]

2.7 In tertiary units with a high-risk population it is recommended that there should be equipment to enable near-patient estimation of coagulation.[44]

2.8 Cell salvage may be considered for women who refuse blood products or where massive obstetric haemorrhage is anticipated but it should not be used routinely for caesarean birth. When cell salvage is required, staff who operate this equipment should have received training and should maintain the appropriate skills to continue to do so.[45,46,47,48]

2.9 Devices such as warming mattresses and forced air warmers should be available to prevent and treat hypothermia.[49,50]

2.10 A difficult intubation trolley with a variety of laryngoscopes including video laryngoscopes, tracheal tubes (size 7 and smaller), second-generation supraglottic airway devices, equipment for emergency front of neck and other aids for difficult airway management should be available in theatre. Videolaryngoscope should always be available. The difficult intubation trolley should have a standard layout that is identical to trolleys in other parts of the hospital so that users will find the same equipment and layout in all sites. The Obstetric Anaesthetists Association/Difficult Airway Society difficult and failed tracheal intubation algorithms should be displayed. [41,51,52]

2.11 Patient controlled analgesia equipment should be available for postoperative pain relief, and staff should be trained in its use and how to look after women using the equipment.[53]

2.12 Ultrasound imaging equipment should be available to anaesthetists trained in its use for central vascular access and transversus abdominis plane blocks. Where staff have the relevant competencies, ultrasound may also be useful for other tasks.[54,55,56,57]

2.13 An intraosseous access insertion device should be immediately available.

2.14 Synchronised clocks should be present in all delivery rooms and theatres to facilitate the accurate recording of events and to comply with medicolegal requirements.[58]

2.15 Resuscitation equipment as described by the Resuscitation Council UK should be available on the delivery suite and should be checked regularly.[59] A resuscitative hysterotomy pack containing a scalpel, surgical gloves and cord clamp should be available on all resuscitation trolleys in the Maternity Unit and areas admitting pregnant women e.g. emergency departments.[60] A range of sizes of endotracheal tubes of 7 mm internal diameter or less should also be kept on the resuscitation trolleys.[9,61]

Support services

2.16 There should be arrangements or standing orders in place for agreed preoperative laboratory investigations.[62]

2.17 There should be a standard prescription or a local patient group directive for preoperative antacid prophylaxis.[63,64]

2.18 Haematology and biochemistry services to provide analysis of blood and other body fluids should be available 24/7. Anaesthetists should be represented on blood user groups.

2.19 A local policy should be established with the transfusion services to ensure that blood products, once available, are transferred to the delivery suite rapidly for the management of major haemorrhage.[44]

2.20 Group O Rhesus negative blood should be immediately (see Glossary) available. To enable immediate availability, most units will require a blood fridge located within the delivery suite.

2.21 There should be rapid availability of radiology services.[65]

2.22 In tertiary referral centres, there should be 24-hour access to interventional radiology, computed tomography and magnetic resonance imaging services.[65,66,67]

2.23 Echocardiography services should be available at all times in units that routinely deal with cardiac patients.[6]

2.24 Robust and reliable local arrangements should be in place to ensure the supply and maintenance of all medicines required for obstetric anaesthesia. There must be a system for ordering, storage, recording and auditing controlled drug use, according to legislation.[68,69,70]

2.25 There should be access to a clinical pharmacist of an appropriate competency level and expertise in obstetrics. They should advise on day-to-day medication or prescribing issues in the obstetric population and should provide input in local policies and procedures about any aspects of medicines management.[71,72] Where possible, hospitals should follow national guidance for drug shortages and this should guide local practice.[73]

2.26 Preprepared drugs should be used where available, including sterile ampoules or bags of low-dose local anaesthetic combined with opioid solutions for regional analgesia. Prefilled syringes of commonly used emergency drugs (e.g. suxamethonium and phenylephrine) should be used where available.[74]

2.27 Local anaesthetic solutions intended for epidural infusion should be stored separately from intravenous infusion solutions to minimise the risk of accidental intravenous administration of such drugs.[75]

2.28 Medication for life threatening anaesthetic emergencies should be immediately available to the delivery suite and their location should be clearly identified. There should be a clear local agreement on the responsibility for maintenance of these emergency medicines (i.e. regular checks of stock levels, integrity and expiry dates).[59]

2.29 Physiotherapy services should be available 24/7 for patients requiring higher levels of care.[76]

Facilities

2.30 There should be easy and safe access to the delivery suite from the main hospital at all times.[77,78]

2.31 An emergency call system should be provided.[77]

2.32 There should be at least one fully equipped obstetric theatre within the delivery suite or immediately adjacent to it. Appropriately trained staff should be available to allow emergency operative deliveries to be undertaken without delay.[167] The number of operating theatres available for obstetric procedures will depend on the number of deliveries and the operative risk profile of the women delivering in the unit.

2.33 Medication storage facilities should be available within maternity theatres to provide timely access to medicines when clinically required, while maintaining integrity of the medicinal product and allowing the organisation to comply with regulations on the safe and secure storage of medicines.[71,79]

2.34 Adequate recovery room facilities that comply with the Association of Anaesthetists' recommendations for standards of monitoring during anaesthesia and recovery should be available within the delivery suite theatre complex.[43]

2.35 Anaesthetic machines, monitoring and infusion equipment and near-patient testing devices should be maintained, repaired and calibrated by medical physics technicians.[80]

2.36 An anaesthetic office, located within five minutes' walk of the delivery suite, should be available to the duty anaesthetic team. The room should have a computer with intra/internet access to specialist reference material and local multidisciplinary evidence based guidelines and policies. The office space, facilities and furniture should comply with the Association of Anaesthetists' standards.[81] This office could also be used to allow teaching, assessment and appraisal. [82]

2.37 A communal rest room should be provided in the delivery suite to enable staff of all specialties to meet.[83]

2.38 A seminar room should be accessible for training, teaching and multidisciplinary meetings.[83]

2.39 All hospitals should ensure the availability of areas that allow those doctors working night shifts to take rest breaks, which are essential for the reduction of fatigue and improve safety.[28] These areas should not be used by more than one person at a time and should allow the doctor to fully recline.[84]

2.40 Standards of accommodation for doctors in training should be adhered to.[28] Where a consultant or other autonomously practising anaesthetist is required to be resident, on-call accommodation should be provided.[28]

2.41 Hotel services should provide suitable on-call facilities, including housekeeping services for resident and non-resident anaesthetic staff. Refreshments should be available 24/7.[84]

Guidelines

2.42 Guidelines containing standards about the following subjects should be held and easily accessible[25]:

- provision of information to patients
- conditions requiring antenatal referral to the anaesthetist[85]
- antacid prophylaxis for labour and delivery and oral intake in labour
- regional analgesia for labour[25]
- management of regional techniques in patients with coagulopathy or receiving thromboprophylaxis
- management of the complications of regional analgesia and anaesthesia, including:
    - management of failed or inadequate regional block
    - accidental dural puncture
    - post-dural puncture headache[86]
    - prolonged neuroaxial block[87,88]
    - epidural haematoma
    - management of severe local anaesthetic toxicity[82]
    - management of high regional block
- intravenous opioid patient controlled anaesthesia (Including remifentanil)
- caesarean section anaesthesia[25,] including:
    - fasting and antacid prophylaxis before elective and emergency obstetric procedures
    - regional anaesthesia for caesarean section (emergency and elective)
    - general anaesthesia for caesarean section (including avoiding awareness under general anaesthesia)[89]
    - management of difficult or failed intubation in obstetrics[52]
    - management of failed regional anaesthesia, including pain during caesarean section
    - antibiotic and thromboprophylaxis for caesarean section[90]
    - recovery following general and regional anaesthesia[37,91]

- post caesarean section analgesia
- care of the obstetric patient with an elevated BMI
- anaesthetic management of major obstetric haemorrhage
- anaesthetic management of pre-eclampsia and eclampsia
- modified obstetric early warning score use
- higher levels of care for the critically ill obstetric patient[40]
- resuscitation of the pregnant patient
- intrauterine fetal resuscitation
- sickle cell disease[92]
- anaesthesia for non-caesarean section obstetric procedures.
- escalation policy to summon support for the Duty Anaesthetist[2]
- staffing and supervision

3 Special populations

General recommendations for special populations are comprehensively described in *GPAS Chapter 2: Guidelines for the Provision of Anaesthesia Services for the Perioperative Care of Elective and Urgent Care Patients*.

3.1 Care for the acutely ill obstetric patient and NICE guidance on the recognition of and response to acute illness in adults in hospitals should be implemented.[40,93,94]

3.2 An early warning score system, modified for use in obstetrics, with a graded response system should be used for all obstetric patients to aid early recognition and treatment of the acutely ill woman.[95,96,97,98]

3.3 All units should be able to escalate care to an appropriate level; critical care support should be provided if required, regardless of location.[40]

3.4 Whenever possible, escalation in care should not lead to the separation of mother and baby. When separation is unavoidable, the duration should be minimised. [9,40,99]

3.5 Midwives working in enhanced care areas or providing enhanced care to patients should have the appropriate training.[40,100]

3.6 There should be a named consultant or other autonomously practising anaesthetist and obstetrician responsible 24/7 for all women requiring a higher level of care.[40]

3.7 Women requiring critical care in a non-obstetric facility should be reviewed daily by a maternity team that includes an obstetric anaesthetist.[11]

3.8 The obstetric anaesthetist should be informed and should be consulted when there is a multidisciplinary transfer of care of a pregnant or postpartum woman. This is particularly important when there is a physical transfer of care (e.g. transfer to or from a critical care ward or another hospital), which should necessitate direct communication between the obstetric anaesthetist and the other anaesthetists/intensivists involved in the transfer of care.

3.9 All units should have facilities, equipment and appropriately trained staff to provide care for acutely ill obstetric patients. If they are unavailable, patients should be transferred to the general critical care area in the same hospital with staff trained to provide care to obstetric patients.

3.10 All patients should be able to access level 3 critical care if required. Units without such provision on site should 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.[40,59] Portable monitoring with the facility for invasive monitoring should be available to facilitate safe transfer of obstetric patients to intensive care.[101]

Care for the obese woman

Obesity is associated with an increased incidence of both obstetric and medical complications.[102]

3.11 There should be a system in place for antenatal anaesthetic review by a senior anaesthetist for women who are morbidly obese.[103] Assessment should be arranged to ensure that timely delivery planning can take place.[104]

3.12 The duty anaesthetist should be informed as soon as a woman with a BMI above a locally agreed threshold is admitted.

3.13 Equipment to facilitate the care of women with morbidly obesity (including specialised electrically operated beds, operating tables with suitable width extensions and positioning aids, such as commercially produced ramping pillows, extra-long spinal and epidural needles, weighing scales, sliding sheets and hover mattresses or hoists) should be readily available. Staff should receive training on how to use the specialised equipment.[105] The maximum weight that the operating table can support should be known and alternative provision made for women who exceed this weight.

Care for women under the age of 18 years

The following recommendations apply to units that admit young women and girls under the age of 18 years for obstetric services.

3.14 There should be a multidisciplinary protocol governing care of young women and girls under the age of 18 years that includes consent, the environment in which patients are cared for, and the staff responsible for caring for these young women.

3.15 Anaesthetists should be aware of legislation and good practice guidance relevant to children and according to the location in the UK.[106,107,108,109,110,111,112] These documents refer to the rights of the child, child protection processes and consent.

3.16 Anaesthetists must undertake at least level 2 training in safeguarding/child protection,[113] and must maintain this level of competence by regular annual updates on current policy and practice and case discussion.[114]

3.17 At least one anaesthetist in each anaesthesia department, not necessarily an obstetric anaesthetist, should take the lead in safeguarding/child protection; they should undertake training and maintain core level 3 competencies.[115] The lead anaesthetist for safeguarding/child protection should liaise with their multidisciplinary counterparts within the obstetric unit.

Care for women requiring specialist services

3.18 There should be policies defining how women are referred to and access specialist or tertiary services (e.g. neurosurgery, acute stroke services).[9,116,117]

Patients who decline to have transfusion of blood and blood products

3.19 Those who refuse transfusion of blood or blood products, whether because of adherence to the Jehovah's Witness faith or for other reasons, should be identified early in the antenatal period. They should meet with an anaesthetist to discuss their specific wishes and should receive information about the potential risks associated with their decision to ensure informed consent process.[118,119,120] Such conversations should be conducted with appropriate privacy to avoid the risk of coercion. Their decision should be documented and shared with the MDT to plan for delivery with the appropriate equipment and resources available.

4 Training and education

4.1 All anaesthetists involved in the care of pregnant women should be competent to deliver high quality safe care that considers the physiological changes and other specific requirements of these pregnant women.[121]

4.2 There should be a nominated anaesthetist responsible for training in obstetric anaesthesia, with adequate programmed activities allocated for these responsibilities.[59]

4.3 A process should be in place for the formal assessment of anaesthetists before allowing them to join the on-call rota for obstetric anaesthesia with distant supervision.[20,122]

4.4 In-situ simulation training can help to identify system process gaps.[123] Simulation based learning techniques should assist anaesthetists in resolving these issues and developing the necessary technical and non-technical skills.[124,125,126,127,128,129,130,131,132]

4.5 All anaesthetists working in the maternity unit should have received training in human factors, addressing key factors including situational awareness, effective team working and communication, decision making and the effect of biases.[133,134]

4.6 There should be induction programmes for all new members of staff, including locum doctors. Induction for a locum doctor should include the following and should be documented:

- familiarisation with the layout of the labour ward
- the location of emergency equipment and drugs (e.g. massive obstetric haemorrhage trolley/ intralipid/ dantrolene)
- access to guidelines and protocols
- information on how to summon support/assistance
- assurance that the locum is capable of using the equipment in that obstetric unit.

4.7 Any autonomously practising anaesthetist providing cover for the labour ward regularly or on an ad hoc basis must undertake continuing professional development (CPD) in obstetric anaesthesia and must have enough exposure to obstetric patients to maintain appropriate skills. This could be achieved through allocation of supernumerary sessions on the labour ward or in elective caesarean lists while reviewing appropriate CPD during the appraisal process.[25,135]

4.8 Any non-trainee anaesthetist who undertakes anaesthetic duties in the labour ward should have been assessed as competent to perform these duties in accordance with RCoA guidelines.[20]

4.9 Anaesthetists who primarily work on the labour ward during the night should be given opportunities to work on the labour ward during the daytime on weekdays.[25]

4.10 Any anaesthetist working on the labour ward should also regularly undertake non-obstetric work to ensure maintenance of a broad range of skills.

4.11 All staff working on the delivery suite should have annual resuscitation training, including the specific challenges of pregnant women.[91]

4.12 Anaesthetists should contribute to the education and updating of midwives, anaesthesia assistants, obstetricians and intensive care staff involved in the care of maternity patients. [25]

4.13 Anaesthetists should help to organise and participate in regular multidisciplinary courses and 'skills and drills' for emergencies. [25,8,88,129,130,131]

5 Organisation and administration

Organisation

5.1 A system should be in place to ensure that those requiring antenatal and postnatal anaesthetic referral are seen and assessed by a senior obstetric anaesthetist, usually an autonomously practising anaesthetist, within a suitable time frame. Where the workload is high, consideration should be given to risk stratification so that not all women are required to attend in person, by using targeted telemedicine and/or distribution of relevant literature. [25,32,136]

5.2 An anaesthetist should be included in the MDT antenatal management planning for those with complex medical needs.[9] Planning should be in the form of shared decision making and include consideration of the woman's wishes and preferences.[136,137]

5.3 All pregnant women requiring caesarean birth should, except in an extreme emergency, be visited and assessed by an anaesthetist before arrival in the operating theatre. This should allow sufficient time to weigh up the information to give informed consent for anaesthesia.[137]

5.4 There should be a local guideline on monitoring of women after regional anaesthesia and the management of postanaesthetic neurological complications.

5.5 All women who have received an anaesthetic intervention for labour and/or delivery should be reviewed postnatally. Locally agreed discharge criteria should be met before they go home and written information should be provided. [25,138]

5.6 There should be local guidelines on preoperative, intraoperative and postoperative care for those cases where an enhanced recovery process is appropriate.[139]

5.7 Units with high numbers of caesarean births should have specific lists to minimise disruption due to emergency work.[140] Any elective caesarean delivery list should have dedicated obstetric, anaesthetic and theatre staff and should take place in a separate theatre to where emergency cases are undertaken.[141]

Consent

5.8 All pregnant women must be assumed to have capacity unless there is evidence to the contrary, as per the Mental Capacity Act.[137,142,143]

5.9 There should be documentation of any discussions involving informed consent for any procedures undertaken by the anaesthetist. [137,142]

5.10 Those with potential issues with their capacity to consent should be identified early in the antenatal period. Arrangements should be made to both to maximise their capacity and to

ensure that they are adequately represented and advocated for, in keeping with current legislation.[137,142,143]

The provision of analgesia on the labour ward

5.11 Obstetric units should be able to provide regional analgesia on request. Smaller units may be unable to provide a 24-hour service; those booking at such units should be made aware that regional analgesia may not always be available.[59]

5.12 Midwifery care of a pregnant woman receiving regional analgesia in labour should comply with local guidelines that have been agreed with the anaesthetic department. Local guidelines should include required competencies, maintenance of those competencies and frequency of training. If the level of midwifery staffing is considered inadequate, regional analgesia should not be provided.[165]

5.13 Units should have local guidelines on the recognition and management of complications of regional analgesia that include training on the recognition of complications and access to appropriate imaging facilities when neurological injury is suspected. The patient's general practitioner should be informed in the event of any of these complications.[15,136]

5.14 Units should provide low-dose regional analgesia.[144,145]

5.15 Regional analgesia should not be used in labour unless the obstetric team is immediately available.

5.16 There should be a locally developed regional analgesia record and a protocol for the prescription and administration of drugs.

5.17 When the anaesthetist is informed of a request for regional analgesia (and the circumstances would be suitable for this type of analgesia) the anaesthetist should attend within 30 minutes of being informed. Only in exceptional circumstances should this period be longer, and in all cases attendance should be within one hour. There should be a clear escalation plan for instances where analgesia cannot be performed within this timeframe. This should be the subject of regular audits.[28,146]

5.18 Units that provide remifentanil patient controlled anaesthesia for labour analgesia should have policies and processes in place to ensure that it is used safely, that midwives who care for women using it are familiar with its use and have received specific training. Unit staffing levels should permit continuous midwifery supervision of its use.

Emergency caesarean birth

5.19 There should be a clear line of communication between the duty anaesthetist, theatre staff and anaesthetic practitioner once a decision is made to undertake an emergency caesarean birth.

5.20 The anaesthetist should be informed about the category of urgency of caesarean birth and the indication for surgery at the earliest opportunity.[147]

5.21 A World Health Organization (WHO) checklist adapted for maternity should be used in theatre.[148]

5.22 There should be clear arrangements for contingency plans and an escalation policy should two emergencies occur simultaneously, including whom to call.

The multidisciplinary team

Teams rather than individuals deliver care to pregnant women. Effective teamwork has been shown to increase safety, while poor teamwork has the opposite effect.[95,126] It is, therefore, important that obstetric anaesthetists develop effective leadership and team membership skills, with good working relationships and lines of communication with all other professionals. This includes midwives, obstetricians, neonatologists and professionals from other disciplines such as intensive care, physicians (including neurology, cardiology and haematology), radiology, general practitioners and surgeons.

5.23 Team briefing and the WHO checklist should be in routine use on the labour ward to promote good communication and team working and reduce adverse incidents.[147,148,149,150]

5.24 If any major restructuring of the provision of local maternity services are planned, the lead obstetric anaesthetist should be involved in that process.[22, 25]

5.25 Anaesthesia should be represented on all committees responsible for maternity services (e.g. the maternity services liaison committee, delivery suite forum, obstetric multidisciplinary guidelines committee, obstetric risk management committee). [22, 25,59]

5.26 Hospitals should have systems in place to facilitate multidisciplinary morbidity and mortality meetings. [25,151]

5.27 Anaesthetists should be an integral part of locally developed networks looking at obstetric services. [25]

Serious incidents

5.28 When members of the healthcare team are involved in a critical incident, they can be profoundly affected. A team debriefing should take place immediately after a significant critical incident. The lead clinician should review the clinical commitments of the staff concerned promptly. Further practical and psychological support may be necessary to assist individuals to recover from a traumatic event. [25]

5.29 There should be local governance measures in place to respond to serious incidents. These measures should protect patients and ensure that trained safety leads carry out robust investigations. When an incident occurs, it should be reported to all relevant bodies within and beyond the hospital. A system of peer review or external evaluation of serious incident reports should be in place. [25,152,153]

5.30 An anaesthetist should be involved in all case reviews where the case includes anaesthetic input.[2]

6 Quality improvement, audit and research

6.1 The lead obstetric anaesthetist should audit and monitor the duty anaesthetist's workload to ensure that there is sufficient provision within the unit. Senior management should be made aware of any deficiencies found.

6.2 There should be effective governance systems and processes in place to assess, monitor and improve the quality and safety of services with particular reference to local guidelines, reviews of adverse events, and record keeping.[23, 25]

6.3 There should be organisational support provided to facilitate data collection and analysis in obstetric anaesthesia to assist with quality improvement and benchmarking. [25,154]

6.4 All cases of maternal death, significant permanent neurological deficit, failed intubation or awareness during general anaesthesia should undergo case review, with learning from this shared locally and/or nationally (by reporting to MBRRACE).[29]

6.5 Research in obstetric anaesthesia and analgesia should be encouraged. Research must follow strict ethical standards as stated by the GMC and *Good Clinical Practice* guidelines.[155]

7 Patient communication and information

It is important that a patient is acknowledged as an individual and that care and services are tailored to respond to their needs, preferences and values. Part of that process is providing information, oral and written, to enable patients to have informed participation in their care.

For the obstetric population requiring anaesthetist delivered care, examples of information resources, both written and visual, are available on the public information website (www.labourpains) provided by the Obstetric Anaesthetists' Association, which includes translations of these resources in over 20 languages. The Royal College of Anaesthetists has developed a range of Trusted Information Creator Kitemark accredited patient information resources not specific for the obstetric population that can be accessed from the RCoA website. Our main leaflets are now translated into more than 20 languages, including Welsh.

7.1 Early on in the antenatal period women should be informed of the analgesic options available in their planned delivery location, so that they can make informed decision about their place of birth.[59]

7.2 Every unit should provide, in early pregnancy, advice about pain relief and anaesthesia during labour and delivery. An anaesthetist should be involved in preparing this information and should approve the final version.[142]

7.3 Pregnant women should have access to information about the differing modes of delivery during the antenatal period and should be offered the opportunity to speak to an anaesthetist if they wish to discuss how this might affect their choices around analgesia and anaesthesia.[142,156,157,158]

7.4 Information should be made available to non-English speaking women in their native languages.[159,160]

7.5 Units should consider local demographics, such as the prevalence of particular languages, when designing information or commissioning interpreting services.

7.6 Hospitals should ensure that the individual need for information in other languages should be assessed and recorded during antenatal care so that interpreting services can be planned for.

7.7 Interpreting services should be made available for non-English speaking women, with particular attention paid to how quickly such services can be mobilised and their availability out of hours.

7.8 Face to face interpreting services should be considered as most suitable, given the practical requirements for women in labour. However, telephone based services may be able to serve a greater number of languages and be more quickly mobilised, particularly out of hours.

7.9 The use of family members to interpret or translate should be avoided unless absolutely necessary or an independent interpreter is specifically declined. It should be a rare occurrence that there is no alternative translation method available.[161,162]

7.10 All information given to women and their consent to undergo obstetric anaesthetic procedures should be clearly documented in their records.

Complaints

7.11 If complaints are made about anaesthetic aspects of care, a consultant or other autonomously practising anaesthetist should review and assess the patient's complaint, discussing her concerns and examining her where appropriate. This should be clearly documented alongside any subsequent action taken. Referral for further investigations may be required.

7.12 Complaints should be handled according to local policies.

7.13 The lead obstetric anaesthetist should be made aware of all complaints.

Financial considerations

There is a paucity of evidence regarding the financial implications of many of the recommendations we make here, The vast majority of units will already adhere to most of the standards outlined. Many of the recommendations represent a financial impact on workforce and time allowance and this should be dealt with in robust job planning and specification in each anaesthetic department and, if required, at trust or board level.

The acquisition of specific equipment and its continuing use and maintenance may have implications for capital and operational expenditure. Recommendations are made based on evidence that there is a cost-effective benefit to patients in terms of outcome and/or improved safety. Local business cases and action plans may need to be developed. The cost of implementing any recommendations should always be considered in relation to the financial risks and human cost of providing substandard care.

Any service implications will have to be considered against the background of the need for all NHS trusts in England and Wales to reduce expenditure.[117] It is not the purpose of this guidance to dictate how these recommendations are met – that is to be decided locally. Individual trusts/boards and their executives will need to consider the continuing viability of any maternity unit that continues to fail to meet these standards. The amalgamation or formalised intertrust/board partnerships of smaller consultant-led units, for example, which are an effort to pool resources more efficiently, may require consideration if service provision consistently falls short of the expected standards.

Implementation support

The Anaesthesia Clinical Services Accreditation (ACSA) scheme, run by the RCoA, provides a set of standards based on the recommendations contained in the GPAS chapters. As part of the scheme, departments of anaesthesia self-assess against the standards and undertake quality improvement projects to close the gap. Support is provided by the RCoA in the form of the good practice library, which shares documents and ideas from other departments on how to meet the standards. Further advice can be obtained from the ACSA team and department's assigned College guide.

The ACSA standards are regularly reviewed on at least a three yearly basis to ensure that they reflect current GPAS recommendations and good practice. This feedback process works both ways and the ACSA scheme regularly provides CDGs with comments on the GPAS recommendations, based on departments' experience of implementing the recommendations.

Further information about the ACSA scheme can be found here: https://www.rcoa.ac.uk/safety-standards-quality/anaesthesia-clinical-services-accreditation

Areas for future development

Areas of research currently identified as deficient by the GPAS chapter development group include:[9]

- criteria for defining obstetric or obstetric anaesthetic workload (may be different)
- organisation of elective obstetric services
- optimal service provision for acutely ill obstetric patients.

Abbreviations

ACSA	Anaesthesia Clinical Services Accreditation scheme
BMI	Body mass index
GPAS	Guidelines for the Provision of Anaesthetic Services
GMC	General Medical Council
MDT	Multidisciplinary team
NICE	National Institute for Health and Care Excellence
RCoA	Royal College of Anaesthetists
SAS	Staff grade, associate specialist and specialty
WHO	World Health Organization

Glossary

Autonomously practising anaesthetists – a consultant or a staff grade, associate specialist or specialty (SAS) doctor who can function autonomously to a level of defined competencies, as agreed within local clinical governance frameworks.

Busy units – the workloads of a unit cannot be defined solely by the number of births. For an individual anaesthesia department the workload comprises the number of women seen in the anaesthetic antenatal clinics, the number of anaesthetic procedures for labour, delivery and other operative intervention, the complexity of the case mix, the number of critically ill patients requiring anaesthetic input and the number of patients requiring obstetric anaesthetic follow up post-delivery for anaesthesia-related morbidity and debriefing.[163] In this document, the term 'busier units' is used to denote those units that, due to the number of anaesthetic interventions and/or other local factors, require higher levels of resources to deliver the necessary service.

Duty anaesthetist – the term ‘duty anaesthetist’ is used here to denote the anaesthetist who is the doctor immediately responsible for the provision of obstetric anaesthetic services during the duty period.

Lead anaesthetist – the autonomously practising anaesthetist who has overarching responsibility for the governance of the obstetric anaesthetic service in the organisation and oversees the provision of a service that meets the standards outlined in this chapter. Individuals should be fully supported by their clinical director and be provided with adequate time and resources to allow them to effectively undertake the lead role.

Immediately – within five minutes.

Obstetric unit – an NHS-clinical location in which care is provided by a team, with obstetricians taking primary professional responsibility for women at high risk of complications during labour and birth. Midwives offer care to all pregnant women in an obstetric unit, whether or not they are considered at high or low risk, and take primary responsibility for those with straightforward pregnancies during labour and birth. Diagnostic and treatment medical services, including obstetric, neonatal and anaesthetic care, are available on site 24 hours a day.[164]

Obstetrician-led care – care in labour where the obstetrician is responsible for the pregnant woman's care. This should only be provided in an obstetric-led unit in a hospital. Much of the their care will still be provided by a midwife.[165,166]

Obstetric team – the term 'obstetric team' is used here to denote all the members of the multidisciplinary team that work in the maternity unit [167]

Session – a session typically describes a notional half day. Traditionally, this would have been confined to mornings or afternoons but, increasingly, hospitals are expanding the working day to accommodate a third evening session.

Supervising anaesthetist – denotes the autonomously practising anaesthetist with overall clinical responsibility for the delivery of obstetric anaesthetic services during the duty period.

References

1 National Institute for Health and Care Excellence. *Accreditation Process Manual: Renewals. Process manual for renewing accreditation for producers of guidance, advice and recommendations for practice already NICE accredited*. London, 2017 (bit.ly/2exc5hg)

2 Independent Review of Maternity Services at the Shrewsbury and Telford Hospital NHS Trust; Chair, Donna Ockenden. *Ockenden Report. Emerging findings and recommendations from the Independent Review of Maternity Services at the Shrewsbury and Telford Hospital NHS Trust. Our First Report following 250 Clinical Reviews*. HC1081. London: HMSO, 2020 (bit.ly/3c0wyWy)

3 Kirkup B. *The Report of the Morecambe Bay Investigation: An independent investigation into the management, delivery and outcomes of care provided by the maternity and neonatal services at the University Hospitals of Morecambe Bay NHS Foundation Trust from January 2004 to June 2013*. London: Stationery Office, 2015 (bit.ly/1DTolFC)

4 Knight M, Tuffnell D, Kenyon S, eds. *Saving Lives, Improving Mothers' Care: Surveillance of maternal deaths in the UK 2011—13 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–13.* Oxford: National Perinatal Epidemiology Unit, 2015 (bit.ly/3AfpUq8)

5 London School of Hygiene and Tropical Medicine and Royal College of *Obstetricians and Gynaecologists. Pattern* of Maternity Care in English NHS Trusts 2013/14. London: RCOG, 2016 (bit.ly/1ZwCb0m)

6 Knight M, Nair M, Tuffnell D, eds. *Saving Lives, Improving Mothers' Care: Surveillance of maternal deaths in the UK 2012–14 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–14.* Oxford: National Perinatal Epidemiology Unit, 2016 (bit.ly/3FLS2Cr)

7 UNICEF Data: Monitoring the Situation of Children and Women. Maternal mortality fell by almost half

between 1990 and 2015. UNICEF, 2017 (bit.ly/2FO4bMI)

8 Centre for maternal and child enquiries (CMACE). Saving mothers' lives: reviewing maternal deaths to make motherhood safer: 2006-2008. The eighth report on confidential enquiries into maternal death in the United Kingdom. *BJOG* 2011; 118: 1–203

9 Knight M, Nair M, Tuffnell D, Shakespeare J, Kenyon S, Kurinczuk JJ (Eds.) on behalf of MBRRACE-UK. *Saving Lives, Improving Mothers' Care – Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2013–2015.* Oxford: National Perinatal Epidemiology Unit, University of Oxford 2017 (bit.ly/2FS50E5)

10 Jonker WR, Hanumanthiah D, Ryan T *et al.* Who operates when, where and on whom? A survey of anaesthetic-surgical activity in Ireland as denominator of NAP5. *Anaesth* 2014; 69: 961–8

11 Kane, A.D., Soar, J., Armstrong, R.A., Kursumovic, E., Davies, M.T. Oglesby et al Patient characteristics, anaesthetic workload and techniques in the UK: an analysis from the 7th National Audit Project (NAP7) activity survey. RCOA. 2023

12 Bamber, J.H., Goldacre, R., Lucas, D.N., Quasim, S. and Knight, M. (2023), A national cohort study to investigate the association between ethnicity and the provision of care in obstetric anaesthesia in England between 2011 and 2021. Anaesthesia, 78: 820-829.

13 NHS Digital. NHS maternity statistics – England 2021–22 (bit.ly/3Ds3xk9)

14 NHS Digital. NHS maternity statistics – England 2013–14 (bit.ly/2o6YC4q)

15 National Institute for Health and Care Excellence. *Intrapartum Care for Healthy Women and Babies*. Clinical Guideline CG190. London, 2017 (bit.ly/2FMCNhU)

16 Office for National Statistics. Births in England and Wales: 2020 (bit.ly/29QPvhE)

17 Public Health England. Severe maternal obesity, 2017 (bit.ly/2FLbZ1t)

18 National Institute for Health and Care Excellence. *Shared Decision Making*. NICE Guideline NG197. London, 2021 (bit.ly/39ulSh4)

19 Maternity and neonatal services in East Kent – the Report of the Independent Investigation. 2022. (bit.ly/3HN0AgD)

20 Royal College of Anaesthetists. 2021 Anaesthetics curriculum, 2021(bit.ly/34DcQMz)

21 Royal College of Anaesthetists and Obstetric Anaesthetists' Association. *Joint OAA/RCoA Obstetric Anaesthetic Training Survey. RCoA and OAA, 2010.* London, 2011 (bit.ly/1N8cwaA)

22 Royal College of Obstetricians and Gynaecologists, Royal College of Midwives, Royal College of Anaesthetists, and Royal College of Paediatrics and Child Health. *Safer Childbirth: Minimum standards for the organisation and delivery of care in labour*. London: RCOG Press, 2007 (bit.ly/3LEp6At)

23 Royal College of Anaesthetists. Cappuccini test (bit.ly/2Df7Pfg)

24 Dharmadasa A, Bailes I, Gough K *et al.* An audit of the efficacy of a structured handover tool in obstetric anaesthesia. *Int J Obstet Anesth* 2014; 23: 151–6

25 Department of Health and Social Care. Independent review of maternity services at The Shrewsbury and Telford Hospital NHS Trust. 2022 (https://bit.ly/3kRzHPF))

26 Gabot M, Hintz C, Elisha S. Implementation of a SAFE OB Handover for CRNAs. *AANA Journal 2022; 90: 17-24*

27 Leslie RA, Astin J, Tuckey J, Kinsella SM. The effect of the anaesthetist's attendance at the obstetric ward round on preoperative assessment of non-elective Caesarean section. *Int J Obstet Anesth* 2012; 21: S31

28 Chereshneva M, Johnston C, Colvin JR, Peden CJ. *Raising the Standard: RCoA quality improvement compendium*, 4th ed. London: Royal College of Anaesthetists, 2020 (bit.ly/2Dnz3Ej)

29 Royal College of Obstetricians and Gynaecologists. *The Future Workforce in Obstetrics and Gynaecology, England and Wales: Full report*. London, 2009 (bit.ly/2p8dCN8)

30 Royal College of Anaesthetists. *Working Time Directive 2009 and shift working: Ways forward for anaesthetic services, training doctors and patient safety*. London, 2007 (bit.ly/2FOMCLX)

31 Knight M, Bunch K, Cairns A *et al.*, on behalf of MBRRACE-UK. *Saving Lives, Improving Mothers' Care. Rapid Report: Learning from SARS-CoV-2-related and associated maternal deaths in the UK*. Oxford:

National Perinatal Epidemiology Unit, 2020 (bit.ly/3jDfGYU)

32 Association of Anaesthetists. *The Anaesthesia Team 2018*. London, 2018 (bit.ly/3p2nYgz)

33 NHS Education for Scotland. *Core Competency Framework for Anaesthetic Assistants*. Edinburgh, 2019 (bit.ly/3lc8fD1)

34 Association of Anaesthetists. *UK National Core Competencies for Post-anaesthesia Care: Immediate post-anaesthesia recovery 2013 supplement*. London, 2013(bit.ly/3h6UsBC)

35 Freedman RL, Lucas DN. MBRRACE-UK: Saving lives, improving mothers' care – implications for anaesthetists. *Int J Obstet Anesth* 2015; 24: 161–73

36 Royal College of Anaesthetists. *Chapter 2 Guidelines for the Provision of Anaesthesia Services for the Perioperative Care of Elective and Urgent Care Patients*. London, 2021(bit.ly/3tZx9BN)

37 Whitaker DK, Booth H, Clyburn P *et al.* Immediate post-anaesthesia recovery 2013. *Anaesthesia* 2013; 68: 288–97

38 Storage of Drugs in Anaesthetic Rooms. RCoA and AAGBI, 2016 (bit.ly/3LOjtzH)

39 Resuscitation Council UK. *Quality Standards: CPR and AED Training in the Community*. London, 2020 (bit.ly/1TRl4l6)

40 Royal College of Anaesthetists, Royal College of Obstetricians and Gynaecologists, Royal College of Midwives, *et al*. *Care of the Critically Ill Woman in Childbirth; Enhanced Maternal Care*. London, 2018 (bit.ly/3lhkNIM)

41 Odor P.M., Bampoe S., Moonesinghe S.R., Andrade J., Pandit J.J., Lucas D.N et al. General anaesthetic and airway management practice for obstetric surgery in England: a prospective, multicentre observational study. *Journal of Maternal-Fetal and Neonatal Medicine*. (no pagination). 2021

42 Health and Safety Executive. *Occupational Exposure Limits*, 4th ed. EH40/2005. London: Stationery Office, 2020 (bit.ly/3s51RrH)

43 Association of Anaesthetists. *Recommendations for Standards of Monitoring During Anaesthesia and Recovery 2021*. London, 2021 (bit.ly/3wpu3Ey)

44 Association of Anaesthetists. AAGBI guidelines: the use of blood components and their alternatives 2016. *Anaesthesia* 2016; 71: 829–42

45 Khan KS, Moore PAS, Wilson MJ *et al*. Cell salvage and donor blood transfusion during caesarean section: a pragmatic, multicentre randomised controlled trial (SALV)). *PLoS Med* 2017; 14: e1002471

46 Klein AA, Bailey CR, Charlton AJ *et al.* Association of Anaesthetists guidelines: cell salvage for peri-operative blood conservation. *Anaesthesia* 2018; 73: 1141–50

47 Khalid K, Moore P, Wilson M et al. A randomised controlled trial and economic evaluation of intraoperative cell salvage during caesarean section in women at risk of haemorrhage: the SALVO (cell SALVage in Obstetrics) trial. *Health Technol Assess* 2018; 22: 1–88

48 Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee. UK Cell Salvage Action Group (bit.ly/3hjBPLE)

49 National Institute for Health and Care Excellence. *Hypothermia: Prevention and management in adults having surgery*. Clinical Guideline CG65. London, 2016 (bit.ly/2lWzjNs)

50 Madrid E, Urrútia G, Roqué i Figuls M, Pardo-Hernandez H, Campos JM, Paniagua P, Maestre L, Alonso-Coello P. Active body surface warming systems for preventing complications caused by inadvertent perioperative hypothermia in adults. *Cochrane Database Syst Rev;* 2016 21:4

51 Cook T, Woodall N, Frerk C, eds. *Major Complications of Airway Management in the United Kingdom. 4th National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society: Report and findings*. London: Royal College of Anaesthetists, 2011 (bit.ly/3v5szSH)

52 Obstetrics Anaesthetists' Association. OAA DAS obstetric airway guidelines 2015 (bit.ly/2lWtqje)

53 National Institute for Health and Care Excellence. *Caesarean Section*. NICE Guideline NG132. London. 2011 (bit.ly/2lWtsHH)

54 Lee A, Loughrey JPR. The role of ultrasonography in obstetric anesthesia. *Best Pract Res Clin Anaesthesiol* 2017; 31: 81–90

55 Zieleskiewicz L, Bouvet L, Einav S *et al.* Diagnostic point-of-care ultrasound: applications in obstetric anaesthetic management. *Anaesthesia* 2018; 73: 1265–79

56 Brass P, Hellmich M, Kolodziej L, Schick G, Smith AF. Ultrasound guidance versus anatomical landmarks for internal jugular vein catheterization. *Cochrane Database Syst Rev*. 2015 9:1

57 Perlas A, Chaparro LE, Chin KJ. Lumbar Neuraxial Ultrasound for Spinal and Epidural Anesthesia: A Systematic Review and Meta-Analysis. *Reg Anesth Pain Med* 2016 41:251-60

58 Sehgal A, Bamber J. Different clocks, different times. Anaesthesia 2003; 58: 398

59 Resuscitation Council UK. *Quality Standards: Acute care equipment and drugs list 2020*. London, 2020 (bit.ly/3Dh7h6p)

60 Beckett VA, Knight M, Sharpe P. The CAPS Study: incidence, management and outcomes of cardiac arrest in pregnancy in the UK: a prospective, descriptive study. *BJOG* 2017; 124: 1374–81

61 Mushambi MC, Kinsella SM, Popat M. Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics. *Anaesthesia* 2015; 70: 1286–306

62 National Instiitute for Health and Care Excellence. *Caesarean birth*. NICE guideline NG192. London. 2021 (bit.ly/3gO2m2O)

63 National Institute for Health and Care Excellence. *Patient group directions*. Medicine practice guideline mpg2. London. 2013 (bit.ly/3LEm1k0)

64 Nursing and Midwifery Council. *Practising as a midwife in the UK*. 2017 (updated 2021) (bit.ly/3sHOfBI)

65 Royal College of Obstetricians and Gynaecologists. *The Role of Emergency and Elective Interventional Radiology in Postpartum Haemorrhage*. 2007 (bit.ly/36lbf1Y)

66 NHS Improving Quality. *Providing access to interventional radiology services, seven days a week* 2014 (bit.ly/3I4F9pi)

67 The Royal College of Radiologists. Standards for providing a seven-day acute care diagnostic radiology service. London: 2015 (bit.ly/356m1Z2)

68 Misuse of Drugs Act 1971 (bit.ly/1SemPeM)

69 The Misuse of Drugs Regulations 2001. UK Statutory Instuments 2001 No.3998 (bit.ly/1VkePZ3)

70 Home Office. *Misuse of Drugs and Misuse of Drugs (Safe Custody) (Amendment) Regulations 2007*. Home Office Circular 027/2007. London, 2007 (bit.ly/1nJbjNo)

71 Royal Pharmaceutical Society. *The Safe and Secure Handling of Medicines: A team approach. A revision of the Duthie Report (1988) led by the Hospital Pharmacists' Group of the Royal Pharmaceutical Society*. London, 2005 (bit.ly/1Z2KC1D)

72 Kasson B, Hledin V, Clayton B *et al*. Considerations for management of bupivacaine formulation shortage affecting obstetric anesthesia services. *AANA J* 2018; 86: 76–8

73 Obstetric Anaesthetists Association. OAA commentary on alternatives to intrathecal and epidural diamorphine for caesarean section analgesia (bit.ly/38fO72s)

74 Whitaker D, Brattebø G, Trenkler S *et al*. The European Board of Anaesthesiology recommendations for safe medication practice. *Eur J Anaesthesiol* 2016; 22: 1–4

75 National Patient Safety Agency. *Safer Practice with Epidural Injections and Infusions*. Patient Safety Alert 21. London, 2007 (bit.ly/293BOaU)

76 National Institute for Health and Care Excellence. *Enhanced inpatient access To physiotherapy and occupational therapy.* NICE guideline NG94. London. 2018. (bit.ly/3LR4oO6)

77 Department of Health. Health Building Note 09-02: *maternity care facilities.* 2013. (bit.ly/3oUKJCZ)

78 Odor P.M., Bampoe S., Moonesinghe S.R., Andrade J., Pandit J.J., Lucas D.N et al. General anaesthetic and airway management practice for obstetric surgery in England: a prospective, multicentre observational study. *Anaesthesia 2021; 76 460-471*

79 Royal College of Anaesthetists and Association of Anaesthetists. *Storage of Drugs in Anaesthetic Rooms*. London: RCoA, 2016 (bit.ly/3lmNkNT)

80 MHRA. *Managing Medical Devices*. 2021(bit.ly/3uXg1Na)

81 Association of Anaesthetists. Department of anaesthesia: secretariat and accommodation. AAGBI, 1992

82 Association of Anaesthetists. *Management of Severe Local Anaesthetic Toxicity*. AAGBI Safety Guideline. London, 2010 (bit.ly/3A3Oeuh)

83 Liberati EG, Tarrant C, Willars J et al; SCALING Authorship Group. Seven features of safety in maternity units: a framework based on multisite ethnography and stakeholder consultation. *BMJ Qual Saf*. 2021 30: 444-456

84 NHS Staff Council. Wellfare facilities for healthcare staff. 2021 (bit.ly/3JEd7kN)

85 Uwubamwen N.A., Verma D., Jones B. Antenatal anaesthetic assessment of obstetric patients. Anaesthesia and Intensive Care Medicine 2022; 23 315-318

86 Obstetric Anaesthetists' Association. *Treatment of Obstetric Post-Dural Puncture Headache*. London, 2018 (bit.ly/3E7WP1k)

87 Kothari T, Gohil S, Pairaudeau C. Complex obstetric anaesthesia clinic: service analysis and where next? *International Journal of Obstetric Anesthesia* 2019; 39: 31

88 Laylock S. Education and training in the face of dwindling experience with obstetric general anaesthesia. Anaesth Inten Care 2014; 42: 803–4

89 National Institute of Academic Anaesthesia. National Audit Projects. NAP5 local resources (bit.ly/3jZF2Bv)

90 Royal College of Obstetricians and Gynaecologists. Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium 2015 (bit.ly/3yZHJaC)

91 Yentis SM, Lucas DN, Brigante L *et al*. Safety guideline: neurological monitoring associated with obstetric neuraxial block 2020: A joint guideline by the Association of Anaesthetists and the Obstetric Anaesthetists' Association. *Anaesthesia*. 2020; 75: 913-9

92 Walker I., Trompeter S., Howard J., Williams A., Bell R., Bingham R et al. Guideline on the peri-operative management of patients with sickle cell disease: Guideline from the Association of Anaesthetists. Anaesthesia 2021; 76 805-817

93 National Institute for Health and Care Excellence. *Acutely Ill Adults in Hospital: Recognising and responding to deterioration.* Clinical Guideline CG50. London, 2007 (bit.ly/3s4M3VN)

94 Intensive care Society. Enhanced Maternal Care Units: Guidance on Development and Implementation. 2023. (https://ics.ac.uk/resource/enhanced-maternal-care-units.html)

95 Confidential Enquiry into Maternal and Child Health. *Saving Mothers' Lives: Reviewing maternal deaths to make motherhood safer 2003–2005. The seventh report of the Confidential Enquiries into Maternal Deaths in the United Kingdom*. London, 2007

96 Isaacs RA, Wee MY, Bick DE *et al*. A national survey of obstetric early warning systems in the UK: Five years on. *Anaesthesia* 2014; 69: 687–92

97 Singh S, McGlennan A, England A, Simons R. A validation study of the CEMACH recommended modified early obstetrics warning system (MEOWS). *Anaesthesia*. 2012; 67:12-18

98 Robbins T, Shennan A, Sandall J. Modified early obstetric warning scores: A promising tool but more evidence and standardization is required. *Acta Obstet Gynecol Scand*. 2019 98: 7-10

99 Knight M, Bunch K, Tuffnell D et al., eds, on behalf of MBRRACE-UK. *Saving Lives, Improving Mothers' Care: Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2015–17*. Oxford: National Perinatal Epidemiology Unit, 2015

100 Royal College of Anaesthetists. *Providing Equity of Critical and Maternity Care for the Critically Ill Pregnant or Recently Pregnant Woman.* London, 2011 (bit.ly/3ksMyDX)

101 Association of Anaesthetists of Great Britain and Ireland. *Interhospital Transfer*. Patient Safety Guideline. London, 2009 (bit.ly/1jMaNqQ)

102 Knight M, Kurinczuk J, Spark P. Extreme obesity in parturients in the United Kingdom. *Obstet Gynecol* 2010; 115: 989–97

103 Centre for Maternal and Child Enquiries and Royal College of Obstetricians and Gynaecologists. *Management of Women with Obesity in Pregnancy*. CMACE/RCOG Joint Guideline. London, 2010

104 Foye R, Marshall C, Litchfield K. The increasing burden of maternal obesity: high BMI parturients and anaesthetic workload. *Int J Obstet Anesth* 2017; 31(Suppl 1): S28

105 Association of Anaesthetists. *Peri-operative Management of the Obese Surgical Patient*. London, 2015 (bit.ly/2odFSQB)

106 General Medical Council. *0–18 Years: Guidance for all doctors*. London, 2007 (bit.ly/1cNqZsz)

107 Department for Children, Schools and Families and Department of Health. *Getting Maternity Services Right for Pregnant Teenagers and Young Fathers*, 2nd ed. London: Department for Children, Schools and Families, 2015

108 Royal College of Obstetricians and Gynaecologists. *Obtaining Valid Consent*. Clinical Governance Advice No.6. London, 2015 (bit.ly/2lWPtq5)

109 Family Proceedings Courts (Children Act 1989) (Amendment) Rules 2004. UK Statutory Instruments 2004 No. 3376, L. 26. (bit.ly/1h9UVvA)

110 Age of Legal Capacity (Scotland) Act 1991 (bit.ly/1h9V7uU)

111 Children (Scotland) Act 1995 (bit.ly/1h9Ve9O)

112 Department of Health Social Services and Public Safety. *Northern Ireland Child Care law: 'the rough guide'*. Belfast, 2004

113 General Medical Council. *Protecting Children and Young People: The responsibilities of all doctors*. London, 2nd ed. London, 2020 (bit.ly/1cNoXZk)

114 Royal College of Nursing. *Safeguarding Children and Young People: Roles and competencies for healthcare staff*, 4th ed. London, 2019 (bit.ly/3LMAP02)

115 Royal College of Anaesthetists and Association of Paediatric Anaesthetists of Great Britain and Ireland. *Lead Anaesthetist for Child Protection/Safeguarding*. London: RCoA, 2016

116 NHS England. The NHS Long Term Plan. London, 2019 (bit.ly/2Z0uZ7O)

117 National Maternity Review. Julia Cumberlege, Chair. *Better Births: Improving outcomes of maternity services in England. A five year forward view for maternity care*. London: NHS England, 2016 (bit.ly/3s3X8X4)

118 Klein AA, Bailey CR, Charlton A *et al*. Management of anaesthesia for Jehovah's Witnesses. *Anaesthesia* 2019; 74: 74–82

119 Royal College of Obstetricians and Gynaecologists. *Blood Transfusion, Pregnancy and Birth*. Information for You. London, 2015 (bit.ly/17Qtbh1)

120 Royal College of Surgeons of England, *Caring for patients who refuse blood - a guide to good practice,* 2016 (bit.ly/3uTrVYF)

121 National Institute for Health and Care Excellence. *Caesarean Birth*. Quality Standard QS32. London, 2021 (bit.ly/36itwNc)

122 Royal College of Anaesthetists. Curriculum for a CCT in Anaesthetics, 2nd ed. London, 2010 (bit.ly/3LOzSnR)

123 Lutgengorf MA, Spalding C, Drake E *et al*. Multidisciplinary in situ simulation based training as a postpartum hemorrhage quality improvement project. *Mil Med* 2017; 182: e1762–6

124 Uppal V, Kearns RJ, McGrady EM. Evaluation of M43B Lumbar puncture simulator-II as a training tool for identification of the epidural space and lumbar puncture. *Anaesthesia* 2011; 66: 493–6

125 Pratt S. Simulation in obstetrics anaesthesia. *Anaesth Analg* 2012; 114: 186–90

126 King's Fund. *Safe Births: Everybody's business. An independent enquiry into the safety of maternity services in England*. London, 2008 (bit.ly/1jMd9WB)

127 Scavone BM, Toledo P, Higgins N *et al*. A randomized controlled trial of the impact of simulation-based training on resident performance during a simulated obstetric anaesthesia emergency. *Simul Healthc* 2010; 5: 320–4

128 Draycott TJ, Collins KJ, Crofts JF *et al.* Myths and realities of training in obstetric emergencies. *Best Pract Res Clin Obstet Gynaecol* 2015; 29: 1067–76

129 Weiner CP, Collins L, Bentley S *et al.* Multi-professional training for obstetric emergencies in a US hospital

over a 7-year interval: an observational study. *J Perinatol* 2016; 36: 19–24

130 Shoushtarian M, Barnett M, McMahon F, Ferris J. Impact of introducing practical obstetric multi-professional training (PROMPT) into maternity units in Victoria, Australia. *BJOG* 2014; 121: 1710–19

131 Bergh AM, Baloyi S, Pattison RC. What is the impact of multi-professional emergency obstetric and neonatal care training? *Best Pract Res Clin Obstet Gynaecol* 2015; 29: 1028–43

132 Dillon S.J., Kleinmann W., Fomina Y., Werner B., Schultz S., Klucsarits S et al. Does simulation improve clinical performance in management of postpartum hemorrhage? *American Journal of Obstetrics and Gynecology 2021; 225 435-435*

133 Knight M, Nair M, Tuffnell D eds., on behalf of MBRRACE-UK. *Saving Lives, Improving Mothers' Care: Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2016–18*. Oxford: National Perinatal Epidemiology Unit, 2020 (bit.ly/3hVZUrW)

134 Minehart RD, Katz D. Decision Making in Obstetric Anesthesia. *Anesthesiology Clinics 2021; 39 793-809*

135 General Medical Council. *Good Medical Practice*. London, 2013 (bit.ly/2ClkzxT)

136 Knight M, Kenyon S, Brocklehurst P, Neilson J, Shakespeare J, Kurinczuk JJ, on behalf of MBRRACE-UK, editors. Saving lives, improving mothers care - lessons learned to inform future maternity care from the UK and Ireland confidential enquiries into maternal deaths and morbidity 2009–12. Oxford 2014.

137 General Medical Council, *Guidance on professional standards and ethics for doctors.* 2020 (bit.ly/3GVhRAv)

138 Henry S, Paul G, Martin L. Development of an obstetric post-anaesthetic care review service. *Int J Obstet Anesth* 2018; 35(S1): S55

139 Wilson D, Caughley A, Wood S *et al*. Guidelines for Antenatal and preoperative care in cesarean delivery: Enhanced Recovery After Surgery Society recommendations (part 1). *Am J Obstet Gynecol* 2018; 219: 523.e1-523.e15

140 Obstetric Anaesthetists' Association and Association of Anaesthetists. *The delivery of obstetric anaesthetic care in UK maternity units: a survey of practice in 2021*London, 2021 (bit.ly/3Jm8q25)

141 Knight M, Bunch K, Felker A, Patel R, Kotnis R, Kenyon S, Kurinczuk JJ (Eds.) on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care Core Report - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2019-21. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2023.

142 Association of Anaesthetists. AAGBI: Consent for anaesthesia 2017. *Anaesthesia* 2017; 72: 93–105

143 Mental Capacity Act, 2005

144 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

145 National Institute for Health and Care Excellence. *2019 surveillance of intrapartum care for healthy women and babies*. NICE guideline CG19 London. 2019 (bit.ly/3LIpWfw)

146 Yurashevich M, Carvalho B, Butwick A *et al*. Determinants of women's dissatisfaction with anaesthesia care in labour and delivery. *Anaesthesia* 2019; 74: 1112–20

147 Lucas DN, Yentis SM, Kinsella SM *et al.* Urgency of caesarean section: a new classification. *J R Soc Med* 2000; 93: 346–50

148 Haynes AB, Weiser TG, Berry WR *et al.* A surgical safety checklist to reduce morbidity and mortality in a global population. *N Engl J Med* 2009; 360: 491–9

149 Rao K, Lucas DN, Robinson PN. Surgical safety checklist in obstetrics. *Int J Obstet Anesth* 2010; 19: 235–6

150 NHS England. *National Safety Standards for Invasive Procedures (NatSSIPs*). London, 2015 (bit.ly/1K6fRY2)

151 Safe Anaesthesia Liaison Group. *Anaesthesia Morbidity and Mortality Meetings: A practical toolkit for improvement*. London, 2013

152 Shah A, Kemp B, Sellers S *et al.* Towards optimising local reviews of severe incidents in maternity care: messages from a comparison of local and external reviews. *BMJ Qual Saf* 2017; 26: 271–8

153 Royal College of Obstetricians and Gynaecologists. *Each Baby Counts: 2015 full report*. London, 2017

(bit.ly/2lXG3ho)

154 Wikner M, Bamber J. Quality improvement in obstetric anaesthesia. *Int J Obstet Anesth* 2018; 35 :1–3

155 General Medical Council. *Good Practice in Research and Consent to Research*. London, 2020

156 UK Supreme Court. Montgomery (Appellant) v Lanarkshire Health Board (Respondent). Hilary Term [2015] UKSC 11 2015 (bit.ly/2f4wJ4z)

157 Fortescue C, Wee MY, Malhotra S *et al*. Is preparation for emergency obstetric anaesthesia adequate? A maternal questionnaire survey. *In J Obstet Anesth* 2007; 16: 336–40

158 Youash S, Campbell MK, Avison W *et al*. Examining the pathways of pre- and postnatal health information. Can *J Public Health* 2012; 103: 314–9

159 National Institute for Health and Care Excellence. *Pregnancy and Complex Social Factors: A model for service provision for pregnant women with complex social factors*. Clinical Guidance CG110. London, 2010 (bit.ly/3laDCOu

160 OAA patient information leaflets and videos. OAA (bit.ly/1r3x7Ed)

161 Hsieh E. Not just 'getting by': factors influencing providers' choice of interpreters. *J Gen Intern Med* 2015; 30: 75–82

162 NHS England. *Principles for High Quality Interpreting and Translation Services*, Version 1.19. London, 2015 (bit.ly/36h2wh5)

163 Yentis SM, Robinson PN. Definitions in obstetric anaesthesia: how should we measure anaesthetic workload and what is 'epidural rate'? *Anaesthesia* 1999; 54: 958–62

164 Rowe R, on behalf of the Birthplace in England Collaborative Group. *Birthplace Terms and Definitions: Consensus process. Birthplace in England research programme. Final report part 2*. Oxford: NIHR Service Delivery and Organisation programme, 2011 (bit.ly/3ryBEjB)

165 National Institute for Health and Care Excellence. *Intrapartum care for healthy women and babies*. Clinical guideline CG190. London. 2014 (bit.ly/2FMCNhU)

166 National Institute for Health and Care Excellence. *Intrapartum care for women with existing medical conditions or obstetric complications and their babies.* Guideline NG121, 2019 (bit.ly/2FP0XGM)

167 College of Operating Department Practitioners, Royal College of Midwives and Association for Perioperative Practitioners. *Staffing of Obstetric Theatres: A consensus statement*. London, 2009

Appendix 1: Recommendations Grading

The grading system is outlined in the methodology section of this chapter. The grades for each of the recommendations in this chapter are detailed in the table below:

Recommendation Number	Level of Evidence	Strength of Recommendation
1.1	B	Strong
1.2	C	Strong
1.3	C	Moderate
1.4	GPP	Strong
1.5	B	Strong
1.6	GPP	Strong
1.7	GPP	Strong

Recommendation Number	Level of Evidence	Strength of Recommendation
1.8	B	Moderate
1.9	C	Strong
1.10	GPP	Strong
1.11	GPP	Strong
1.12	C	Strong
1.13	C	Strong
1.14	C	Strong
1.15	C	Moderate
1.16	C	Strong
1.17	C	Moderate
1.18	GPP	Strong
1.19	GPP	Strong
1.20	B	Strong
1.21	B	Strong
1.22	C	Strong
1.23	C	Strong
1.24	C	Strong
1.25	GPP	Strong
1.26	B	Strong
1.27	B	Strong
1.28	C	Strong
1.29	GPP	Strong
1.3	C	Strong
1.31	GPP	Strong
2.1	GPP	Strong
2.2	GPP	Strong
2.3	GPP	Strong
2.4	M	Mandatory
2.5	C	Strong
2.6	C	Strong
2.7	C	Moderate
2.8	A	Strong
2.9	C	Strong
2.10	B	Strong
2.11	C	Strong
2.12	C	Strong

Recommendation Number	Level of Evidence	Strength of Recommendation
2.13	GPP	Strong
2.14	C	Strong
2.15	B	Strong
2.16	GPP	Strong
2.17	GPP	Strong
2.18	GPP	Strong
2.19	C	Strong
2.20	GPP	Strong
2.21	GPP	Strong
2.22	GPP	Moderate
2.23	B	Moderate
2.24	M	Strong
2.25	C	Strong
2.26	C	Strong
2.27	C	Strong
2.28	GPP	Strong
2.29	GPP	Strong
2.30	GPP	Strong
2.31	GPP	Strong
2.32	C	Strong
2.33	C	Strong
2.34	C	Strong
2.35	GPP	Strong
2.36	C	Strong
2.37	GPP	Strong
2.38	GPP	Strong
2.39	C	Strong
2.40	C	Strong
2.41	GPP	Strong
2.42	GPP	Strong
2.43	C	Strong
2.44	C	Strong
2.45	B	Strong
3.1	C	Strong
3.2	B	Strong
3.3	C	Strong

Recommendation Number	Level of Evidence	Strength of Recommendation
3.4	B	Strong
3.5	C	Strong
3.6	GPP	Strong
3.7	B	Strong
3.8	GPP	Strong
3.9	GPP	Strong
3.10	C	Strong
3.11	C	Strong
3.12	GPP	Strong
3.13	C	Strong
3.14	GPP	Strong
3.15	M	Mandatory
3.16	M	Mandatory
3.17	C	Strong
3.18	C	Strong
3.19	C	Strong
4.1	C	Strong
4.2	GPP	Strong
4.3	C	Strong
4.4	B	Strong
4.5	B	Strong
4.6	GPP	Strong
4.7	M	Mandatory
4.8	C	Strong
4.9	GPP	Strong
4.10	GPP	Strong
4.11	C	Strong
4.12	GPP	Strong
4.13	B	Strong
5.1	C	Strong
5.2	GPP	Strong
5.3	GPP	Strong
5.4	C	Strong
5.5	C	Strong
5.6	B	Strong
5.7	M	Mandatory

Recommendation Number	Level of Evidence	Strength of Recommendation
5.8	M	Strong
5.9	M	Strong
5.10	GPP	Strong
5.11	C	Strong
5.12	C	Strong
5.13	A	Strong
5.14	GPP	Strong
5.15	GPP	Strong
5.16	C	Strong
5.17	GPP	Strong
5.18	GPP	Strong
5.19	C	Strong
5.20	B	Strong
5.21	GPP	Strong
5.22	B	Strong
5.23	GPP	Strong
5.24	C	Strong
5.25	C	Strong
5.26	GPP	Strong
5.27	GPP	Strong
5.28	C	Strong
5.29	C	Strong
6.1	GPP	Strong
6.2	C	Strong
6.3	C	Strong
6.4	C	Strong
6.5	M	Mandatory
7.1	GPP	Strong
7.2	C	Strong
7.3	C	Strong
7.4	C	Strong
7.5	GPP	Strong
7.6	GPP	Strong
7.7	GPP	Strong
7.8	GPP	Strong
7.9	C	Strong

Recommendation Number	Level of Evidence	Strength of Recommendation
7.10	GPP	Strong
7.11	GPP	Strong
7.12	GPP	Strong
7.13	GPP	Strong

About these guidelines

Methodology

The process by which this chapter has been developed has been documented within the GPAS Chapter Development Process Document, which is available on request.

The evidence included in this chapter is based on a systematic search of the literature. Abstracts were independently screened by two investigators and reviewed against inclusion and exclusion criteria. Data were extracted by one investigator in accordance with predefined criteria. The review objective was to determine the key components needed to ensure provision of high-quality perioperative services for patients who have undergone surgery and/or interventions which involve anaesthesia.

Search strategy

Searches were performed on Embase (1980 to 2015), Ovid MEDLINE (1946 to present), CINAHL and Cochrane Library, for the literature search strategy, outcomes, databases, criteria for inclusion and exclusion of evidence (for the full perioperative care chapter search protocol please contact the RCoA). A hand search of the literature was also conducted by the authors using the reference lists of relevant original articles and review articles.

The literature search was performed in March 2019.

The authors and researcher independently reviewed the abstracts and titles of the studies found in the initial search. After agreement on the primary selection of papers, full-text versions were accessed and reviewed against the following predefined inclusion and exclusion criteria. The full-text papers were also reviewed by the CDG for suitability. The final list of publications used can be found in the references.

Inclusion criteria

The literature review considered studies that included the following patient population with all of the inclusion criteria listed below:

- all patients undergoing elective or emergency anaesthesia
- all staff groups working within perioperative care, under the responsibility of an anaesthetic clinical director, including (but not restricted to) consultant anaesthetists, SAS anaesthetists, trainee anaesthetists, nurses, operating department practitioners, surgeons, pharmacists, general practitioners, radiologists and radiographers.

Exclusion criteria

The literature review used the following exclusion criteria:

- provision of perioperative care of elective and urgent care patients service provided by a speciality other than anaesthesia.

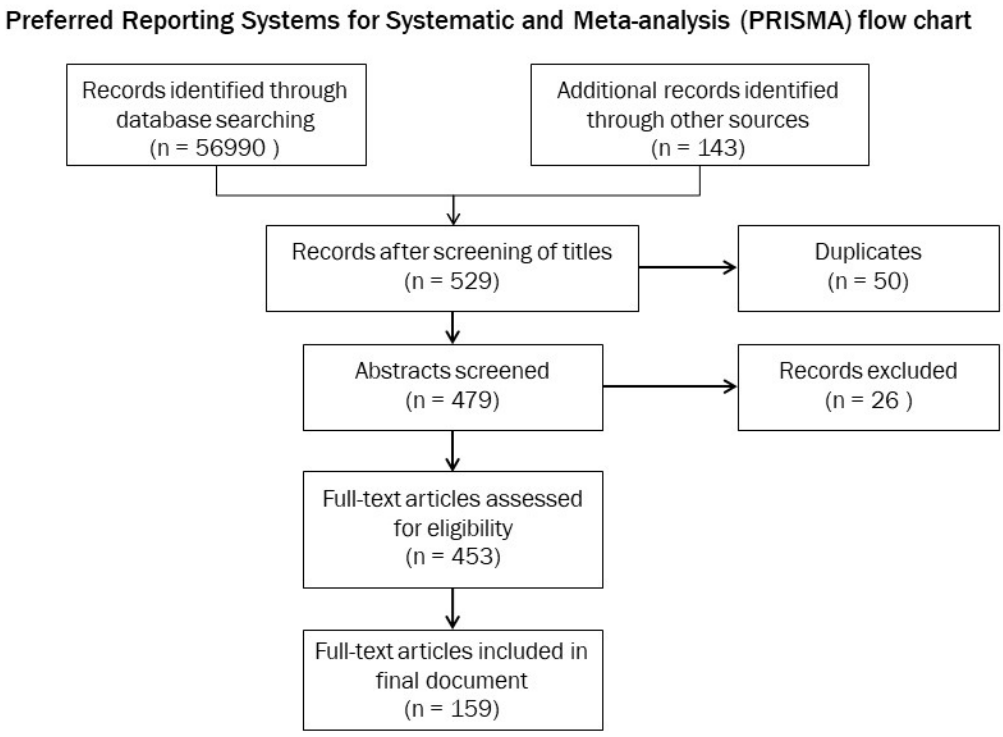
Data extraction and analysis

Data were extracted by the authors using a proforma. The study characteristics data included:

- the journal and country of publication
- the number of patients recruited into the study
- the study design
- patient characteristics
- outcome data
- the logic of the argument
- author's conclusions
- reviewer's comments.

The patient characteristics data extracted were: age, gender and type of surgery. The analysis considers studies that included any clinical outcome, including (but not restricted to) survival, length of stay – critical care or hospital, morbidity, adverse effects and complications.

The results of the literature review can be seen below:



The evidence that is included in this chapter has been graded according to a grading system adapted from NICE and outlined below:

Level	Type of evidence	Grade	Evidence
Ia	Evidence obtained from a single large/multicentre randomised controlled trial, a meta-analysis of randomised controlled trials or a systematic review with a low risk of bias	**A**	At least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation (evidence level I) without extrapolation
Ib	Evidence obtained from meta-analyses, systematic reviews of RCTs or RCTs with a high risk of bias	**B**	Well-conducted clinical studies but no high-quality randomised clinical trials on the topic of recommendation (evidence levels Ib, II or III); or extrapolated from level Ia evidence
IIa	Evidence obtained from at least one well-designed controlled study without randomisation		
IIb	Evidence obtained from at least one well-designed quasi-experimental study		
IIc	Evidence obtained from case control or cohort studies with a high risk of confounding bias		
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies		
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities	**C**	Expert committee reports or opinions and/or clinical experiences of respected authorities (evidence level IV) or extrapolated from level I or II evidence. This grading indicates that directly applicable clinical studies of good quality are absent or not readily available.
UG	Legislative or statutory requirements	**M**	This grading indicates that implementation of this recommendation is a statutory requirement, or is required by a regulatory body (e.g. CQC, GMC)
		GPP	Recommended good practice based on the clinical experience of the CDG.

Adapted from Eccles M, Mason J. How to develop cost-conscious guidelines. *Health Technology Assessment* 2001;5(16) and Mann T. Clinical guidelines: using clinical guidelines to improve patient care within the NHS. *Department of Health*, London 1996.

Strengths and limitations of body of evidence

Most of the published evidence on perioperative care anaesthesia services is descriptive. There are publications describing aspects of this process based on expert opinion.

The limitations of the evidence are:

- the 'unmeasurables' (attitudes, behaviour, motivation, leadership, teamwork)
- few randomised controlled trials (RCTs); studies frequently use mixed populations of emergency and elective patients, or all emergency patients grouped together despite different underlying diagnoses
- papers often examine a single intervention within complex system or bundle
- papers are often examining small numbers and/or patients from a single centre
- poor use of outcome measures, frequently concentrating on easily measured short-term outcomes which are not patient centred
- generally, a paucity of long-term follow up
- there is no standard definition used of 'high risk'
- use of different risk-scoring systems
- decrease in outcome over time and geography when 'good papers' are used in quality improvement programmes
- application of international studies in systems with either more or less resources than the UK into NHS practice
- older studies may no longer be applicable within the NHS
- very few studies included any analysis of financial implications
- evidence was mainly based on literature graded III and IV.

Methods used to arrive at recommendations

Recommendations were initially drafted based on the evidence by the authors for the chapter. These were discussed with the CDG, and comments were received both on the content and the practicality of the recommendations. The level of evidence that was the basis for each recommendation was graded according to a grading system, and the recommendation was then graded taking into account the strength of the evidence and the clinical importance using a recommendations criteria form.

Recommendations were worded using the following system of categorisation:

Strength	Type of evidence	Wording
Mandatory	The evidence supporting the recommendation includes at least one with an 'M' grading	Wording should reflect the mandatory nature of the recommendation i.e. 'must'
Strong	Confidence that for the vast majority of people, the action will do more good than harm (or more harm than good)	Wording should be clearly directive 'should' or 'should not'

Weak	The action will do more good than harm for most patients, but may include caveats on the quality or size of evidence base or patient preferences	Wording should include 'should be considered'
Aspirational	While there is some evidence that implementation of the recommendation could improve patient care, either the evidence or the improvement is not proven or substantial	Wording should include 'could'
Equipoise	There is no current evidence on this recommendation's effect on patient care	Wording should include 'there is no evidence of this recommendation's effect on patient care'

Consultation

The chapter has undergone several rounds of consultation. The multidisciplinary CDG formed the first part of the consultation process. The authors and GPAS Editorial board identified key stakeholder groups. Where stakeholders are represented by an association or other medical college, they were asked to nominate delegates to join the CDG. The GPAS Chapter Development Process Document (available on request) explains the recruitment process for those CDG members who were not directly nominated. The CDG members were involved in drafting the recommendations, and were provided with an opportunity to comment on all subsequent drafts of the chapter.

The chapter underwent peer review. Peer reviewers were identified by the GPAS Editorial Board or Clinical Quality and Research Board (CQRB). Nominees were either anaesthetists of consultant grade or were nominated by a key stakeholder group. Nominees had not had any involvement in the development of GPAS to date and were asked to comment upon a late draft of the chapter.

Following peer review, the chapter was reviewed by CQRB and the PatientsVoices@RCoA committee. Comments from all groups were considered and incorporated into a consultation draft.

The consultation draft of this chapter was circulated for public consultation from 19 November 2021 to 17 December 2021. As well as being made available on the College's website and promoted via Twitter and the President's newsletter to members, the draft was also circulated to all key stakeholder groups identified by the authors and the College. A list of organisations contacted by the College is available from the GPAS team at the College: GPAS@rcoa.ac.uk.

The editorial independence of GPAS

The development of GPAS is wholly funded by the Royal College of Anaesthetists. However, only the GPAS technical team and the GPAS researcher are paid directly by the College for their work on GPAS: the GPAS Editors' employing organisation receives 2 programmed activities (PA) backfill funding. All funding decisions by the College are made by the chief executive officer, in collaboration with the senior management team and College Council.

The authors of the chapters are all fellows of the Royal College of Anaesthetists. Members of College Council cannot act as chair of any CDG, as this individual has the deciding vote under the consensus method of decision making used in the chapters. Where College Council members have been involved in chapter development, this has been declared and recorded.

All persons involved in the development of GPAS are required to declare any pecuniary or non-pecuniary conflict of interest, in line with the GPAS conflict of interest policy as described in the GPAS Chapter Development Process Document (available on request). Any conflicts of interest are managed on a case-by-case basis to maintain the transparency and impartiality of the GPAS document. The conflicts, and the way they were managed, are outlined at the beginning of the chapter.

The role of the GPAS Editorial Board and CQRB

The overall development of the entire GPAS document is overseen by the CQRB of the Royal College of Anaesthetists, which includes representatives from all grades of anaesthetist and from clinical directors, and which also has PatientsVoices@RCoA representation.

Responsibility for managing the scope of the document and providing clinical oversight to the project technical team is delegated by the CQRB to the GPAS Editorial Board, which includes individuals responsible for the various internal stakeholders (see above for membership). On the inclusion/exclusion of specific recommendations within each chapter, the Editorial Board can only provide advice to the authors. In the event of disagreement between the authors, the majority rules consensus method is used, with the GPAS Editor holding the deciding vote.

Both of these groups, along with the PatientsVoices@RCoA committee, review each chapter and provide comment prior to public consultation and are responsible for signoff before final publication. In the event of disagreement, consensus is reached using the majority rules consensus method, with the chair of CQRB holding the deciding vote.

Updating these guidelines

This chapter will be updated for republication in January 2025.

Guidelines will be updated on an annual basis. The researcher will conduct the literature search again using the same search strategy to uncover any new evidence and members of the public will be able to submit new evidence to the GPAS project team. Where new evidence is uncovered, the lead author will decide whether the recommendations that were originally made are still valid in light of this new evidence.

If new evidence contradicts or strengthens existing recommendations, the authors decide whether or not to involve the remainder of the CDG in revising the recommendations accordingly.

If new evidence agrees with existing recommendations, then a reference may be added but no further action is required.

If there is no new evidence then no action is required.

This chapter is due to be fully reviewed for publication in January 2027.

Every five years guidance will be submitted to a full review involving reconvening the CDG (or appointment of a new, appropriately qualified CDG), and the process described in the methodology section of this chapter begins again.

RCoA
Royal College of Anaesthetists

Chapter 9
Guidelines for the Provision of Anaesthesia Services for an Obstetric Population 2025

Royal College of Anaesthetists, Churchill House, 35 Red Lion Square, London WC1R 4SG
020 7092 1500 | www.rcoa.ac.uk/gpas | GPAS@rcoa.ac.uk