

Chapter 16

Guidelines for the Provision of Anaesthesia Services (GPAS)

Guidelines for the Provision of Anaesthesia Services for Trauma and Orthopaedic Surgery 2020



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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 removed themselves from the discussion of that particular piece of evidence and any recommendation pertaining to it.

Medico-legal 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 on the basis of 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 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 cited under 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

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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 of GPAS:

- chapter 2: guidelines for the provision of anaesthesia services for preoperative assessment and preparation
- chapter 3: guidelines for the provision of anaesthesia services for intraoperative care
- chapter 4: guidelines for the provision of anaesthesia services for postoperative care

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 GPAS 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 2–5 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

The objective of this chapter is to promote current best practice for service provision in anaesthesia services for trauma and orthopaedic surgery. The guidance is intended for use by anaesthetists with responsibilities for service delivery and healthcare managers.

This guideline does not comprehensively describe clinical best practice in anaesthesia services for trauma and orthopaedic surgery, but is primarily concerned with the requirements for the provision of a safe, effective, well-led service, which may be delivered by many different acceptable models. The guidance on provision of anaesthesia services for trauma and orthopaedic surgery applies to all settings where this is undertaken, regardless of funding. All age groups are included within the guidance unless otherwise stated, reflecting the broad nature of this service.

A wide range of evidence has been rigorously reviewed during the production of this chapter, including recommendations from peer-reviewed publications and national guidance where available. However, both the authors and the CDG agreed that there is a paucity of level 1 evidence relating to service provision in anaesthesia services for trauma and orthopaedic surgery. In some cases, it has been necessary to include recommendations of good practice based on the clinical experience of the CDG. We hope that this document will act as a stimulus to future research.

The recommendations in this chapter will support the RCoA's Anaesthesia Clinical Services Accreditation (ACSA) process.

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Scope

Target audience

All staff groups working in trauma and orthopaedic surgery, including (but not restricted to) all grades of anaesthetists (consultant anaesthetists, specialty doctors, trainee anaesthetists), nurse practitioners and operating department practitioners.

Target population

All ages of patients undergoing trauma and orthopaedic surgery.

Healthcare setting

All settings within the hospital in which anaesthesia services for trauma and orthopaedic surgery are provided.

Clinical management

Key issues that will be covered

Key components needed to ensure provision of high quality anaesthetic services for trauma and orthopaedic surgery.

Areas of provision considered:

- levels of provision of service, including (but not restricted to) staffing, equipment, support services and facilities
- areas of special requirement including spinal and pelvic injuries, children, pregnant trauma patients, obese patients, and elderly patients
- training and education
- research and audit
- organisation and administration
- patient information.

Exclusions

- provision of trauma and orthopaedic surgery services provided by a specialty other than anaesthesia
- clinical guidelines specifying how healthcare professionals should care for patients
- national level issues.

Introduction

Trauma remains the most common cause of loss of life in the under 40s age group¹ in the UK, and as such major trauma centres (MTCs) and trauma units (TUs) have been established to receive patients of all ages, and improve outcomes. Early anaesthetic involvement is beneficial at all stages, from the prehospital setting, to emergency departments (ED), operating rooms, interventional radiology suites, postoperative care units and the critical care environment. The need for significant anaesthetic input and support for these complex patients is an integral part of this pathway.

MTCs and TUs should have major incident plans in place to deal with mass casualties from any cause.

Primary arthroplasty surgery significantly improves the quality of life and the mobility of those affected. With the advancing age of our population and their increasing expectations, the number

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of patients requiring primary arthroplasty surgery and subsequent revision arthroplasty surgery continues to escalate. This population is frequently elderly with co-existing medical conditions that need to be optimised prior to surgery, and benefits from a multidisciplinary team (MDT) approach and the use of standardised protocols.

Hip fracture is the most common condition presenting for emergency orthopaedic surgery in the UK with many patients aged over 65. These patients along with those requiring surgical intervention for fragility fractures present significant challenges and the input from a multidisciplinary team and early surgery is essential to achieve good outcomes in this population.

Orthopaedic surgery in children ranges from closed fracture manipulation and casting, to complex long bone or spine correction of congenital or acquired conditions. These may be associated with neurological conditions, or specific syndromes that could pose challenges to those providing anaesthesia care.

Recommendations

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

1 Staffing requirements

Appropriate levels of staffing are essential to deliver high quality anaesthetic input into trauma and orthopaedic patients. The challenge is providing the right people at the right place at the right time. Trauma care can be particularly difficult as it occurs frequently out of hours, and may present with multiple casualties at any time.

- 1.1 Each unit should have a designated clinical lead (see glossary) for anaesthesia services for trauma and a designated lead for anaesthesia services for orthopaedic surgery. This should be recognised in their job plan and they should be involved in multidisciplinary service planning and governance within the unit.
- 1.2 Anaesthetists with a specific interest in orthopaedics and trauma should deliver regular theatre sessions to ensure the maintenance of their skills and experience.
- 1.3 All patients undergoing anaesthesia should be under the care of a consultant anaesthetist whose name is recorded as part of the anaesthetic record.^{2,3,4} A staff grade, associate specialist and specialty (SAS) grade anaesthetist could be the named anaesthetist on the anaesthetic record if local governance arrangements have agreed in advance that, based on the training and experience of the individual doctor and the range and scope of their clinical practice, the SAS anaesthetist can take responsibility for patients themselves in those circumstances, without consultant supervision.
- 1.4 Theatre staff should be available who are appropriately trained, skilled and experienced in the various surgical specialties that may present in the treatment of patients with multiple injuries.
- 1.5 Anaesthesia for the emergency control of major traumatic haemorrhage, and other damage limiting interventions in the operating theatre or radiology intervention suite, should be consultant anaesthetist led. Where consultants are not resident, clear lines of communication and notification should be in place to allow early attendance to trauma calls.
- 1.6 MTC and TU anaesthetic departments should consider appointing anaesthetists with an interest in prehospital care. Anaesthetists who provide prehospital care in the field should be qualified to do so.⁵

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Emergency department (ED)

- 1.7 Major trauma patients arriving in the ED of MTCs and TUs should be met by a multidisciplinary team 24/7. An anaesthetist with appropriate airway and damage control resuscitation competencies to manage trauma patients should be part of this team.⁶
- 1.8 Whenever possible, trauma team members should be called in advance of the patient's arrival to allow time for briefing, and drug and equipment preparation. The team should also assemble before inter-hospital trauma transfer, allowing the transfer of imaging and treatment plans to be defined in advance.
- 1.9 The use of general anaesthesia, sedation and regional anaesthesia for procedures undertaken in the ED should be managed according to guidance from the Academy of Medical Royal Colleges and Royal College of Anaesthetists.^{7,8,9}

Transfer

- 1.10 The transfer of trauma patients to a MTC will normally be facilitated by the referring hospital. The referring hospital should have robust arrangements in place to enable this to occur safely without compromising clinical activity at their base hospital.¹⁰
- 1.11 There should always be an adequate number of staff to ensure safe transfer and positioning of anaesthetised patients.
- 1.12 Patient positioning during transfer should be discussed at the team brief and the relevant lead person identified.

Elective orthopaedics

- 1.13 Elderly patients presenting for elective surgery frequently have pre-existing comorbidities that require careful review and perioperative planning. As such, the preassessment service for elective patients should be consultant led, ideally by anaesthetists with an interest in, and appropriate experience in, delivering anaesthetic care to orthopaedic patients.^{11,12}

Hip fracture

- 1.14 Anaesthetists should be involved alongside surgical colleagues and orthogeriatricians, in discussions on preoperative planning, timing of surgery, and postoperative care, especially for high risk patients.
- 1.15 Adequate provision of theatre capacity and staff should be available to facilitate surgery within 36 hours of hospital admission.^{13,14}

2 Equipment, services and facilities

Equipment

- 2.1 A range of operating tables with attachments for spinal, thoracic, pelvic and limb trauma procedures should be available.
- 2.2 Tourniquets and inflation devices of suitable sizes should be available for upper and lower limb surgery requiring a bloodless field.
- 2.3 A cell salvage service should be available for cases where massive blood loss is anticipated.^{15,16} Staff who operate this equipment should receive training in how to operate it, and use it with sufficient frequency to maintain their skills.
- 2.4 Warming devices for patients should be available for use in the anaesthetic room, operating theatre, recovery unit and ED.¹⁷

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- 2.5 Elective orthopaedic and planned trauma cases should have their temperature checked preoperatively on the ward.¹⁷ Active warming devices should be available for patients prior to coming to theatre.
- 2.6 A rapid infuser allowing the infusion of warmed intravenous fluids and blood products should be available.¹⁸
- 2.7 Equipment for portable monitoring and ventilation should be available in the resuscitation room.^{19,20}
- 2.8 Equipment to facilitate haemodynamic and cardiac output monitoring should be available.
- 2.9 A 'difficult airway trolley' should be immediately available in all areas where major trauma patients are received. These should be equipped as defined in the Difficult Airway Society (DAS) guidelines, and include video laryngoscopes, fiberoptic scopes, jet ventilation and surgical airway equipment.^{9,21,22}

Facilities

- 2.10 In MTCs and TUs, the resuscitation room receiving bays should be large enough to allow simultaneous emergency procedures to be performed by trauma team members.
- 2.11 Hospitals that receive patients with major trauma should ideally have an emergency operating theatre and a radiology intervention suite situated sufficiently close to the ED to allow rapid transfer of trauma patients.
- 2.12 An emergency operating theatre should be rapidly available at all times for major trauma patients. The available equipment should be suitable for a full range of emergency trauma procedures. Use of this theatre for non-urgent cases should be tightly controlled. If the designated emergency theatre is occupied, there should be a robust, flexible and agreed backup plan to obtain an appropriate alternative theatre for the next emergency case.
- 2.13 MTCs receiving major trauma patients should have a trauma theatre equipped with a radiolucent operating table that allows fluoroscopic imaging of all body parts without repositioning the patient.
- 2.14 Primary and revision arthroplasty surgery, along with trauma surgery involving bone implants or internal fixation should be carried out in an operating theatre with multiple air changes per hour (e.g. laminar flow).
- 2.15 Point of care testing for haemoglobin, blood gases, lactate, ketones, coagulation, viscoelastic measurements and blood sugar should be available during surgery for patients with major trauma and those undergoing orthopaedic procedures associated with a risk of haemorrhage.²³ If near-patient testing is not available, laboratory testing should be readily and promptly available.
- 2.16 Use of point of care ultrasound (POCUS) is recommended as a useful adjunct to the primary survey in acute trauma.²⁴
- 2.17 Transport and distribution of blood and blood components at all stages of the transfusion chain must be maintained under appropriate conditions to ensure the integrity of the product.²⁵
- 2.18 Appropriate blood storage facilities should be clearly identified and provided in close proximity to the emergency operating theatre.²⁶

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2.19 Tranexamic acid should be available for administration if major haemorrhage is suspected in a trauma patient within three hours of injury.^{27,28,29}

2.20 In MTCs with a high volume of patients, prethawed plasma should be immediately available.

Support Services

Imaging

2.21 In MTCs and TUs there should be a rapidly accessible imaging suite for patients with major trauma, which is equipped with all of the life support facilities available in the emergency room. This will include physiological and gas monitoring; in addition, the room design should allow visual and technical monitoring of the patient by the anaesthetic staff.³¹

2.22 An imaging suite for interventional radiology to control haemorrhage should be available in MTCs. This will ideally be a hybrid care suite that allows a full range of surgical interventions as well as radiological assessment.³⁰

2.23 A MRI scanner should be available in both MTCs and TUs. This service should be available 24/7 in MTCs.^{31,32} Where an MRI service is not available out of hours, transfer to an MTC should be considered.

2.24 Exposure to ionising radiation should be minimised by the use of screens or radiation protection garments and remote slave monitors in screened viewing areas. Staff should remain as distant from the imaging source as possible if they must remain in the x-ray environment.³³

Recovery

2.25 Hospitals admitting patients with major trauma should have critical care to both Level 2 and 3 standards on site.³⁴ Portable invasive haemodynamic monitoring should be available to facilitate transfer to and from the critical care areas.

2.26 A fully equipped high dependency unit (HDU) of Level 2 standards should be available on site for high risk patients undergoing major orthopaedic surgery, including revision joint replacement and surgery involving instrumentation of the spine. If the hospital does not have a Level 3 facility, protocols should be in place to determine when and how to transfer to a hospital with a Level 3 facility.

2.27 Critical care outreach services should be considered to provide a vital link between trauma and orthopaedic wards and intensive care unit (ICU) facilities. Clinical deterioration can be identified using early-warning scores and mitigated by proactively reviewing patients at risk.

3 Areas of special requirement

Spinal and pelvic injuries

3.1 Assessment for a cervical spine injury should follow the existing NICE guidance.³⁵

3.2 The definitive care of complex spinal and pelvic injuries requires specialist spinal (orthopaedic or neurosurgical) and pelvic surgery. The anaesthetist managing such cases should have appropriate training and experience in the management of these cases and their associated complications.

3.3 Clear protocols should be in place for the management of cases of suspected spinal injury. This should include a spinal clearance policy.³²

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- 3.4 Immobilisation equipment including a range of appropriately sized semi rigid collars, head blocks, tape, a vacuum mattress and a scoop board should be available.
- 3.5 Spinal clearance should be achieved as soon as clinically possible, to minimise discomfort and complications from prolonged immobilisation in patients who do not have spinal injuries.
- 3.6 Patients presenting with a neurological deficit should have immediate referral to a specialist unit and be discussed with the neurosurgical or spinal surgeon.
- 3.7 In suspected spinal injury, hard spinal boards should only be used as a prehospital extrication device and not be used for transport.³⁶ A scoop stretcher or full length vacuum mattress should be used for transfer.
- 3.8 Acute nerve or spinal cord compression requires immediate referral to a neurosurgeon or specialist spinal surgeon within four hours of injury.³⁷

Children

Anaesthetists will often be part of the MDT responsible for the initial resuscitation and stabilisation of the critically ill or injured child, prior to transfer to a specialist centre.

All hospitals with an ED will be exposed to high volumes of paediatric patients with low velocity injuries requiring orthopaedic input.

Standards for children's services described in chapter 10 should be followed.

Child protection

It is essential to be vigilant for non-accidental injury in children with trauma injuries.

- 3.9 Healthcare workers, including the anaesthetist, must be aware of the local policy for child protection, and that they have an obligation to document and report any concerns to a responsible individual.³⁸
- 3.10 Hospitals must have guidelines in place to ensure the safety of children admitted to hospital, to monitor injured children known to be at risk, and identify concerns arising from any injury or pattern of injuries.³⁹ They must provide the appropriate training related to these guidelines.

Pregnant trauma patients

Although the primary duty of care is to the mother, fetal and maternal wellbeing are inextricably linked. Standards for non-obstetric emergency procedures in pregnant patients are described in chapter 5.

- 3.11 A multidisciplinary team approach is highly recommended, typically involving anaesthetists, obstetricians, surgeons, paediatricians and midwives.^{40,41,42}
- 3.12 Provision for fetal monitoring and emergency lower (uterine) segment caesarean section should be available if indicated in the ED.^{41,42,43}

Obese patients

- 3.13 Patient positioning for elective and trauma orthopaedic surgery involves a variety of specialist equipment, tables and attachments. These should be suitable to manage patients across a wide weight range, with theatre personnel aware of the upper weight limits.⁴⁴

Elderly patients

- 3.14 The majority of hip fracture patients are >65 years of age and often have multiple comorbidities, some of which may be undiagnosed. Decisions on their treatment should

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ideally be made using a multidisciplinary team that involves senior anaesthetists, perioperative physicians, orthopaedic surgeons and orthogeriatricians, all with a specific interest in this patient population.⁴⁵

- 3.15 Facilities to provide total hip replacement to hip fracture patients with limited comorbidities should be available seven days a week.⁴⁶
- 3.16 Unoperated hip fractures in the elderly have a higher mortality rate. Evidence shows ASA4 patients have a higher survival rate when managed surgically.⁴⁷ Hip fracture surgery should be considered for patients even in the presence of significant comorbidities. Provision for safe anaesthesia and recovery of these patients, including handover to ward teams, should be available to facilitate this.
- 3.17 A fall of <2m is the commonest mechanism of injury in older patients. Prehospital triage to aid early identification of severe injuries in older patients should be available to allow quick transfer from TU to a MTC for specialist investigation and intervention.⁴⁸
- 3.18 Comprehensive geriatric assessment and frailty screening tools may facilitate more informed early decision making in older trauma patients.⁴⁹ Protocols for end of life care should be in place for management of elderly patients with frailty that may prove unsurvivable days or weeks after the initial trauma by a multidisciplinary team.⁵⁰
- 3.19 Units should use a delirium assessment tool and have a delirium policy describing preventative measures and its management.⁵¹

4 Training and education

- 4.1 All anaesthetists providing anaesthesia for trauma and orthopaedics should have appropriate knowledge, skills, attitudes and behaviour in accordance with the RCoA training standards.
- 4.2 Anaesthetists with responsibility for the intraoperative care of trauma patients should ensure that their skills and knowledge of current recommendations are up to date, particularly in the management of major haemorrhage.
- 4.3 Anaesthetists who manage patients with major trauma should consider undertaking advanced trauma life support (ATLS), European Trauma Course (ETC) or equivalent training, and should update their training at regular intervals.
- 4.4 Anaesthetists providing anaesthesia for trauma and orthopaedic surgery should learn and maintain expertise in a wide range of regional anaesthetic techniques, including central and peripheral neural blockade.⁵²
- 4.5 All anaesthetists involved in the management of major trauma should understand the principles and techniques of damage control resuscitation to prevent lethal triad of hypothermia, acidosis and coagulopathy using low volume fluid resuscitation, blood products and damage control surgery.
- 4.6 Anaesthetic trauma theatre teams should be trained in the correct use of all essential anaesthetic theatre equipment used for trauma surgery.
- 4.7 Staff in the recovery area and in the wards who receive patients after surgery with epidural infusions, nerve blocks or intravenous opioid infusions (including patient controlled analgesia) should have received up to date formal training in caring for these forms of analgesia.

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- 4.8 Anaesthetic staff expected to care for patients with epidurals and continuous nerve blockade in situ should be trained to local guidelines before they top up medication or care for such patients.
- 4.9 Anaesthetic practitioners involved in the administration of anticoagulant therapies should have current and up to date knowledge in their use.
- 4.10 There should be regular multidisciplinary in situ simulation training for the initial management of major trauma care and resuscitation to standardise clinical practice.
- 4.11 Awareness of regional analgesia benefits in chest trauma and early referral to acute pain services should be emphasised within the multidisciplinary trauma team.⁵³
- 4.12 The diagnostic and therapeutic applications of POCUS in trauma are expanding. There is a need for emphasis on quality training of POCUS operators within the trauma multidisciplinary team.⁵⁴
- 4.13 Major incident training exercises should take place at regular intervals.
- 4.14 Educational opportunities for trainees in MTC and TU will undoubtedly occur out of hours due to the nature of trauma. Hospitals in which trainee anaesthetists work a full or partial shift system should consider providing additional consultant programmed activities to allow training and supervision to take place in the evening.
- 4.15 Hospitals should consider training of ED staff in acute pain management of both adult and paediatric patients with trauma, in particular using ultrasound-guided femoral nerve block or fascia iliaca block for hip fractures in elderly patients and femoral fractures in children.^{55,56}

5 Organisation and administration

The goal of trauma surgery is to provide definitive fixation to all indicated fractures at the earliest possible opportunity. However, due to associated injuries, or availability of specialist surgeons, this is not always possible. Definitive surgical fixation may have to be approached in a planned, staged response. Equally, patients who become unstable intraoperatively may require a change to the initial surgical plan. Understanding and implementation of locally agreed protocols along with good communication is paramount to its success.

Emergency orthopaedics and trauma

- 5.1 A triage tool, similar to that developed by the American College of Surgeons, should be used to identify patients with suspected major trauma prehospital.³²
- 5.2 Triage positive patients should be sent directly to an MTC if the travelling time is <60 minutes (or 45 minutes if agreed by the trauma network), unless there is an imperative to go to a closer TU for the immediate management of a life threatening condition.³²
- 5.3 Triage positive patients should not be taken to a local emergency hospital (LEH), in other words an acute hospital not accredited as a TU or MTC.³²
- 5.4 The majority of patients presenting to TUs with major trauma should be transferred to an MTC after immediate management by adopting a 'Send and Call' policy.⁵⁷
- 5.5 The trauma team should attend in cases of suspected major trauma according to predefined local criteria. The trauma team should also be called out if there are unexpected findings after arrival in triage-negative patients, and to receive patients following interhospital transfer.

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- 5.6 There should be a local protocol for immediate or emergency access to an operating theatre or intervention suite, with appropriately trained and experienced staff to provide rapid intervention in life threatening or limb threatening conditions.³²
- 5.7 All patients requiring acute intervention for haemorrhage control should be rapidly transferred to a definitive management area, e.g. operating room or intervention suite, without delay.⁵⁸
- 5.8 Dedicated trauma operating lists, staffed by trauma teams should be scheduled daily, enabling maximal efficient use of theatres. This includes the provision of extra trauma lists in the evenings and at weekends. These measures aim to limit overnight operating, with less experienced staff and limited postoperative care facilities.
- 5.9 There should be a flexible approach to trauma list planning and management to allow for interruption from emergency cases.⁵⁹ Theatre teams should be informed whenever an unstable patient with major trauma is expected, has arrived or has been identified in the ED. The practitioner in charge of the trauma theatre team should have responsibility for ensuring the availability of appropriately trained staff and facilities to receive these patients.
- 5.10 All acute hospitals should have a defined major incident plan. The plan should be built around the network of MTCs, TUs and LEHs. A prehospital triage tool should be used to determine where patients should be taken.⁶⁰
- 5.11 Trauma checklists should be used for the rapid transfer of patients from one clinical area to the next to ensure consistent patient care and documentation of treatment.^{61,62}
- 5.12 Rapid and effective communication between healthcare professional and the individual are key to good patient care, not only for initial management but for for the whole of the recovery trajectory. Communication strategies should consider the use of new technologies, e.g. smart phones, and standardised methodology.^{63,64}

Elective orthopaedics

- 5.13 Elective orthopaedic operating lists should be separated from those for trauma orthopaedic surgery, to allow efficient planning, prevent cancellation and enable a flexible response for emergencies.
- 5.14 Elective patients with major comorbidities or those undergoing complex or prolonged surgery should be scheduled earlier in the day, to allow time for postoperative stabilisation.
- 5.15 Hospitals should consider providing specific regional anaesthesia lists, using dedicated areas for performing peripheral nerve blocks. Cohorting cases in this way optimises theatre efficiency, reduces block failure⁶⁵ and creates the environment for developing expertise.
- 5.16 There should be a preoperative assessment clinic for elective orthopaedic surgery. Evidence supports multidisciplinary preassessment and optimisation improves perioperative outcome for joint revision ⁶⁶ and scoliosis surgery.
- 5.17 There should be specific guidelines for assessing a suspected difficult airway in patients with spine and joint disease, and for measuring lung function in patients with kyphoscoliosis.⁶⁷
- 5.18 Hospitals should provide information (web based and written) on types of anaesthesia offered before the date of surgery to provide opportunity for informed consent and shared decision making.^{11,67}

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- 5.19 There should be an enhanced recovery programme for patients undergoing elective orthopaedic surgery, to improve the integration, efficiency and quality of care in suitable patients.^{68,69}
- 5.20 There should be a robust procedure in place to check the specific site of surgery before anaesthesia is administered.⁷⁰ This should include identifying laterality of limbs and use of an indelible mark by the responsible surgical team prior to admission to the operating theatre.
- 5.21 Isolated elective orthopaedic units performing major inpatient surgery should have 24/7 access to all support services including acute pain services and critical care. Local guidelines should be in place to provide safe anaesthesia care which includes preassessment screening for risk stratification, transfer criteria and postoperative care facilities.

Hip fracture

- 5.22 Patients with a hip fracture should ideally have surgical treatment as soon as possible, or within 36 hours from admission.¹³
- 5.23 Preoperative assessment should identify people with cognitive impairment. The anaesthetic risk should be explained including measures to minimise cognitive changes. The carers should be involved in all stages of perioperative care and invited to accompany with the person into the operating room before and after surgery. People with dementia are often frail and should be assessed using a validated scoring system and managed accordingly.⁷¹
- 5.24 Hospitals providing surgical treatment for hip fractures should have a formal pathway including prompt provision of analgesia (including nerve blocks when appropriate) and hydration, preoperative assessment of high risk patients by the anaesthetic team, along with, orthogeriatrician input and be prioritised on orthopaedic trauma lists.^{13,72,73,74, 75}
- 5.25 Agreed local guidelines should be in place and implemented on the following:
- compliance with best practice anaesthetic management protocols for hip fracture as recommended by the Association of Anaesthetists¹³
 - tailored World Health Organization (WHO) safety checklists to identify the potential for adverse events associated with the requirement for use of bone cement should be used during team briefing and at time out
 - preoperative assessment fitness criteria for hip fracture surgery and review of 'do not attempt cardiopulmonary resuscitation' (DNACPR) status.

Regional anaesthesia and analgesia

- 5.26 Agreed local guidelines should be available which have been produced by a multidisciplinary team including an anaesthetist, acute pain nurse, pharmacist, physiotherapist, critical care clinicians, surgeons and other relevant specialties.⁸ These guidelines should cover at least the following:
- protocol for whom to call for problems with postoperative pain relief
 - management of complications including high spinal block, accidental dural puncture and nerve injury
 - assessment and management of local anaesthetic systemic toxicity and peripheral nerve injuries
 - supervision and monitoring of patients by competent clinical staff during surgery performed under peripheral regional anaesthesia and in block room or similar facility
 - checklists to prevent wrong site nerve blocks in theatre and other clinical areas^{70,76,77,78}

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- anticoagulation guidelines for safe placement of epidural and regional nerve block techniques⁸¹
- preoperative screening for complex pain issues and access to acute pain services and advanced pain management methods
- post procedure monitoring of epidurals, nerve blocks and continuous infusion analgesia on the ward, including follow up care in hospital and after discharge
- recognition and management of patients at risk of acute compartment syndrome
- pain management pathway for chest wall injuries including provision for early epidural or nerve blocks in patients with multiple rib fractures as recommended by BOAST 15 blunt chest wall trauma guidelines.⁷⁹

Clinical guidelines

- 5.27 For ongoing management of major trauma patients there should be clear guidelines regarding decisions to transfer for definitive specialist intervention in co-ordination with regional trauma networks.⁶⁰
- 5.28 There should be a major haemorrhage protocol to cover the use of blood and blood products in appropriate proportions in a series of 'shock packs'.⁸⁰
- 5.29 In MTCs and in other large acute hospitals, prethawed plasma should be immediately available with the initial shock pack.
- 5.30 Utilisation of blood and blood products should be guided by point of care testing together with methods to minimise blood loss.²³
- 5.31 There should be clear guidance on damage control resuscitation which is understood by all staff.⁸¹
- 5.32 There should be clear guidelines on how to manage patients on anticoagulant therapy presenting with trauma or for elective orthopaedic surgery. Specific reversal agents may be required, such as prothrombin complex concentrate in the trauma setting in patients on warfarin. Direct oral anticoagulants (DOACs), patients on dual antiplatelet therapy (DAPT) and second generation drug eluting stents (DES) all require careful consideration and timing for surgery, both emergency and elective.⁸²
- 5.33 There should be a policy for the prevention of thromboembolic events postoperatively. This should include planning for anticoagulant prophylaxis in patients who are vulnerable to further bleeding.
- 5.34 All hospitals providing joint replacement surgery should have clear guidelines for enhanced recovery in place, in order to promote the benefits of early mobilisation and reduced mortality associated with their use.
- 5.35 Post induction hypotension associated with poor outcomes in patients with a high ISS. Standard operating procedures should be in place to minimise hypotension post induction.⁸³

Clinical governance

- 5.36 Consultant anaesthetists and intensivists should be involved in the planning of local trauma services. Those with defined responsibility for major trauma management should be engaged in the layout and logistics of the resuscitation room.
- 5.37 In MTCs, multidisciplinary mortality and morbidity meetings should take place and follow the guidance of the World Health Organization (WHO).⁸⁴

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- 5.38 Governance meetings should take place across the entire trauma network at defined intervals. Besides individual case discussion, feedback information from the Trauma Audit and Research Network (TARN)¹ should be disseminated, and mechanisms set in place to correct any problems identified.

6 Financial considerations

Part of the methodology used in this chapter in making recommendations is a consideration of the financial impact for each of the recommendations. Very few of the literature sources from which these recommendations have been drawn have included financial analysis.

The vast majority of the recommendations are not new recommendations, but they are a synthesis of already existing recommendations. The current compliance rates with many of the recommendations are unknown, and so it is not possible to calculate the financial impact of the recommendations in this chapter being widely accepted into future practice. It is impossible to make an overall assessment of the financial impact of these recommendations with the currently available information.

- 6.1 Commitment to early screening of trauma patients at risk of severe pain and opioid related adverse events by the acute pain service along with interdisciplinary protocol implementation of multimodal analgesia will lead to improved patient outcomes.⁸⁵

7 Research, audit and quality improvement

- 7.1 Research in anaesthesia for trauma and orthopaedic surgery should be encouraged. Staff undertaking research should have received training on ethical and organisational issues. They should complete a good clinical practice course with regular updates.
- 7.2 Trauma and orthopaedic surgery should be included in anaesthetic departmental audit programmes, including ongoing audit of complications and adverse events. The trauma anaesthetists should have provision in their job plan to attend trauma MDT meetings for discussion regarding high risk patients.
- 7.3 All hospitals treating patients with hip fractures should participate in national audits, e.g. National Hip Fracture Database or the National Joint Registry^{86,87} to monitor its performance against national benchmarks and quality standards. Outcomes from these audits should be distributed to anaesthetic staff.
- 7.4 All hospitals receiving major trauma cases should contribute to TARN,¹ to monitor its performance against national benchmarks and quality standards and contribute to research. Comparative data analysis and display on the national major trauma dashboard (via TARN) is invaluable for quality assurance.
- 7.5 MTCs and TUs in England should undergo regular peer reviews within the National Peer Review Programme with their performance judged according to national major trauma measures.⁸⁸
- 7.6 All new spinal cord injury patients should be referred through the NHS Spinal Cord Injury Service (NSCIS) and registered on the National Spinal Cord Injury Database (NSCID).^{28,89} The incidence of complications should be recorded.
- 7.7 There should be clear processes and policies for reporting and learning from near misses and critical incidents. National patient safety alerts should be communicated and actions agreed locally to reduce the risk of harm.

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- 7.8 Nationally agreed key performance indicators should be used to monitor the performance of the pathways for hip fractures and major trauma and reviewed by a multidisciplinary committee including a Trauma Lead anaesthetist. In addition, local quality indicators should be developed proactively, to support continuing improvement of these services within organisations.
- 7.9 Impact of enhanced recovery pathways for elective surgery should be audited to focus beyond the length of stay to improve patient outcome and satisfaction.⁹⁰
- 7.10 Evaluation of patient centred outcomes on pain management and quality of recovery in hospital and after discharge using a validated questionnaire can be a useful tool to guide quality improvement in care pathways.⁹¹

8 Implementation support

The Anaesthesia Clinical Services Accreditation (ACSA) scheme, run by the RCoA, aims to provide support for departments of anaesthesia to implement the recommendations contained in the GPAS chapters. The scheme provides a set of standards, and requires departments of anaesthesia to benchmark themselves against these using a self-assessment form available on the RCoA website. Every standard in ACSA is based on recommendation(s) contained in GPAS. The ACSA standards are reviewed annually and republished approximately four months following GPAS review and republication, to ensure that they reflect current GPAS recommendations. ACSA standards include links to the relevant GPAS recommendations, for departments to refer to while working through their gap analyses.

Departments of anaesthesia are given the opportunity to engage with the ACSA process for an appropriate fee. Once engaged, departments are provided with a 'college guide', either a member of the ACSA committee or an experienced reviewer, to assist them with identifying actions required to meet the standards outlined in the document. Departments must demonstrate adherence to all 'priority one' standards listed in the document to receive accreditation from the RCoA. This is confirmed during a visit to the department by a group of four ACSA reviewers (two clinical reviewers, a lay reviewer and an administrator), who submit a report back to the ACSA committee.

The ACSA committee has committed to building a 'good practice library' (GPL), which will be used to collect and share documentation such as policies and checklists, as well as case studies of how departments that have overcome barriers to implementation of the standards, or have implemented the standards in innovative ways.

One of the outcomes of the ACSA process is to test the standards, and by extension the GPAS recommendations, to ensure that they are able to be implemented by departments of anaesthesia and consider any difficulties that may result from implementation. The ACSA committee has committed to measuring and reporting feedback of this type from departments engaging in the scheme back to the CDGs updating the guidance via the GPAS technical team.

9 Patient information

Information for patients, relatives and carers

- 9.1 Patient information leaflets on hip fractures should be available for patients, relatives and carers.⁴⁶
- 9.2 For patients with complex trauma, including spinal cord injuries and traumatic brain injury, there should be rapid access to key professionals and regional specialists.³⁷ Patients, relatives

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and carers should be directed to appropriate support groups where relevant e.g. the Spinal Injuries Association.⁹²

- 9.3 Enhanced Recovery Programmes for patients undergoing primary arthroplasty surgery should provide comprehensive details of the patient journey including MDT led hip and knee school and expectations in terms of early mobilisation postoperative physiotherapy. Information provided should be comprehensive and include details of regional anaesthesia.

Consent

In order to give valid informed consent, patients need to understand the nature and purpose of the procedure. Full guidance, including on providing information to vulnerable patients, can be found in chapter 2.

- 9.4 Informed consent may not be possible for many patients undergoing hip fracture and major trauma surgery, owing to delirium, dementia, altered conscious level, severe pain or the effects of sedative drugs. Patients should not be asked to sign a consent form if they do not have capacity to do so. Standard operating procedures must be compliant with the Mental Capacity Act 2005. A high level of integrity should be maintained, and good documentation is essential.^{11,93,94,95}

End of life care

- 9.5 Early communication with patients and their families is essential. On occasions, explanations and detailed discussion should be deferred or delegated to others, so that emergency treatment can proceed without delay.
- 9.6 When it is considered appropriate for a do not to attempt resuscitation in the event of a cardiopulmonary arrest (DNACPR) order, it should be discussed with capacitous patients, including those who have expressed their own wish not to be resuscitated.^{96,97} In patients not capacitous to consent, every attempt should be made to discuss this with next of kin and/or patient advocates holding power of attorney (or an independent mental capacity advocate), according to local trust guidelines.

Areas for future development

Following the systematic review of the evidence, the following areas of research are suggested:

Prehospital care – Auditing longterm outcomes on fractured neck of femur and revision of major joint surgeries using a validated objective tool.

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Abbreviations

ACSA	Anaesthesia Clinical Services Accreditation
CDG	Chapter Development Group
DAS	Difficult Airway Society
DNACPR	do not to attempt resuscitation in the event of a cardiopulmonary arrest
ED	Emergency department
GMC	General Medical Council
GPAS	Guidelines for the Provision of Anaesthetic Services
LEH	Local emergency hospital
MDT	Multidisciplinary team
MRI	Magnetic resonance imaging
MTC	Major trauma centre
NICE	National Institute for Health and Care Excellence
NSCID	National Spinal Cord Injury Database
NSCIS	NHS Spinal Cord Injury Service
POCUS	point of care ultrasound
RCoA	Royal College of Anaesthetists
SAS	Staff grade, associate specialist and specialty
TARN	Trauma Audit and Research Network
TU	Trauma unit
WHO	World Health Organization

Glossary

Clinical lead – SAS doctors undertaking lead roles should be autonomously practicing doctors who have competence, experience and communication skills in the specialist area equivalent to consultant colleagues. They should usually have experience in teaching and education relevant to the role and they should participate in Quality Improvement and CPD activities. 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

Triage positive – Identified as severe injuries by the ambulance team using prehospital triage system.

Triage negative – Not identified as severe injuries by the ambulance team using prehospital triage system.

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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	GPP	Strong
1.2	GPP	Strong
1.3	C	Strong
1.4	GPP	Strong
1.5	GPP	Strong
1.6	C	Weak
1.7	GPP	Strong
1.8	GPP	Strong
1.9	C	Strong
1.10	C	Strong
1.11	GPP	Strong
1.12	GPP	Strong
1.13	C	Strong
1.14	GPP	Strong
1.15	C	Strong
2.1	GPP	Strong
2.2	GPP	Strong
2.3	C	Strong
2.4	C	Strong
2.5	C	Strong
2.6	GPP	Strong
2.7	C	Strong
2.8	GPP	Strong
2.9	C	Strong
2.10	GPP	Strong
2.11	GPP	Weak
2.12	GPP	Strong
2.13	GPP	Strong
2.14	GPP	Strong
2.15	B	Strong
2.16	M	Mandatory
2.17	C	Strong
2.18	A	Strong

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Recommendation Number	Level of Evidence	Strength of Recommendation
2.19	GPP	Strong
2.20	C	Strong
2.21	GPP	Strong
2.22	C	Weak
2.23	C	Strong
2.24	C	Strong
2.25	GPP	Strong
2.26	GPP	Strong
3.1	C	Strong
3.2	GPP	Strong
3.3	C	Strong
3.4	GPP	Strong
3.5	GPP	Strong
3.6	GPP	Strong
3.7	C	Strong
3.8	C	Strong
3.9	C	Strong
3.10	M	Strong
3.11	C	Strong
3.12	C	Strong
3.13	B	Strong
3.14	GPP	Strong
3.15	C	Strong
3.16	GPP	Strong
3.17	C	Strong
3.18	C	Strong
3.19	GPP	Strong
4.1	GPP	Strong
4.2	GPP	Strong
4.3	GPP	Strong
4.4	GPP	Strong
4.5	GPP	Strong
4.6	GPP	Strong
4.7	GPP	Strong
4.8	GPP	Strong
4.9	GPP	Strong
4.10	GPP	Strong

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Recommendation Number	Level of Evidence	Strength of Recommendation
4.11	GPP	Strong
4.12	GPP	Strong
4.13	GPP	Strong
4.14	GPP	Strong
4.15	A	Strong
5.1	C	Strong
5.2	C	Strong
5.3	C	Strong
5.4	C	Strong
5.5	GPP	Strong
5.6	C	Strong
5.7	GPP	Strong
5.8	GPP	Strong
5.9	C	Strong
5.10	GPP	Strong
5.11	B	Strong
5.12	GPP	Strong
5.13	GPP	Strong
5.14	GPP	Strong
5.15	GPP	Weak
5.16	B	Strong
5.17	C	Strong
5.18	A	Strong
5.19	C	Strong
5.20	GPP	Strong
5.21	GPP	Strong
5.22	C	Strong
5.23	GPP	Strong
5.24	B	Strong
5.25	C	Strong
5.26	C	Strong
5.27	GPP	Strong
5.28	GPP	Strong
5.29	GPP	Strong
5.30	B	Strong
5.31	B	Strong

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Recommendation Number	Level of Evidence	Strength of Recommendation
5.32	C	Strong
5.33	GPP	Strong
5.34	GPP	Strong
5.35	GPP	Strong
5.36	C	Strong
5.37	GPP	Strong
6.1	C	Weak
7.1	GPP	Strong
7.2	GPP	Strong
7.3	C	Strong
7.4	C	Strong
7.5	C	Strong
7.6	C	Strong
7.7	GPP	Strong
7.8	GPP	Strong
7.9	B	Strong
7.10	B	Strong
9.1	C	Strong
9.2	C	Strong
9.3	GPP	Strong
9.4	M	Strong
9.5	GPP	Strong
9.6	C	Strong

About these guidelines

Methodology

The process by which this chapter has been developed has been documented within the [GPAS Chapter Development Process Document](#).

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 day surgery 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 trauma and orthopaedic chapter search protocol please

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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 September 2016.

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 trauma and orthopaedic anaesthesia, 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 trauma and orthopaedic anaesthesia 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.

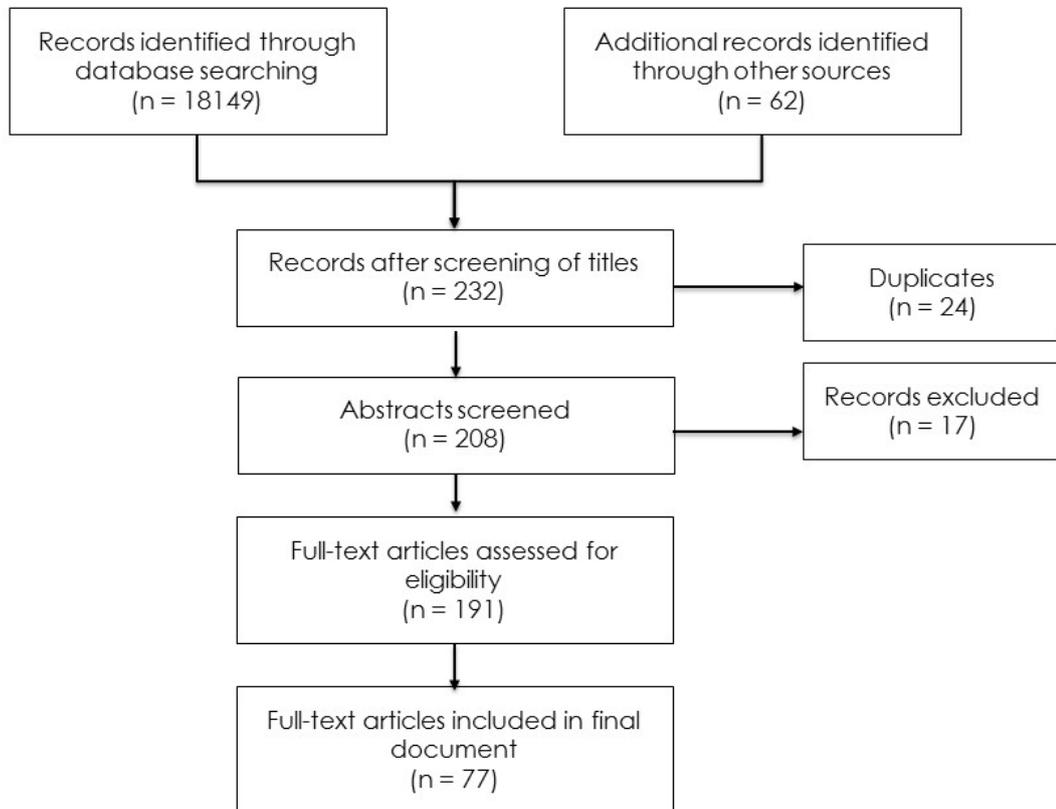
The patient characteristics data extracted were: age, gender and type of surgery. The analysis considers studies that included any clinical outcome, including (but not restricted to) survival, length of stay – critical care or hospital, morbidity, adverse effects and complications.

The results of the literature review can be seen below:

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Preferred Reporting Systems for Systematic Review and Meta-analysis (PRISMA) flow chart



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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.

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Strengths and limitations of body of evidence

Most of the published evidence on trauma and orthopaedic 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 (see [GPAS Chapter Development Process Document](#)).

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	Wording should include 'should be considered'

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	include caveats on the quality or size of evidence base or patient preferences	
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'
Equipose	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](#) 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 Professional Standards Committee (PSC). 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 the College's PSC and the College's Lay 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 15 January to 12 February 2018. 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

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[GPAS Chapter Development Process Document](#). 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 lay 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 College's Lay 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 2021.

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 2023.

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.



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