



AAGBI SAFETY GUIDELINE

Immediate Post-anaesthesia Recovery 2013

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21 Portland Place, London, W1B 1PY
Telephone 020 7631 1650 Fax 020 7631 4352
info@aagbi.org
www.aagbi.org

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Guidelines

Immediate post-anaesthesia recovery 2013 Association of Anaesthetists of Great Britain and Ireland

Membership of the Working Party: D. K. Whitaker (Chair),
H. Booth,³ P. Clyburn, W. Harrop-Griffiths, H. Hosie,¹
B. Kilvington,³ M. MacMahon, P. Smedley² and R. Verma⁴

1 Scottish Multiprofessional Anaesthetic Assistants Development Group

2 British Anaesthetic and Recovery Nurses Association

3 College of Operating Department Practitioners

4 Royal College of Anaesthetists

Summary

- 1 After general, epidural or spinal anaesthesia, all patients should be recovered in a specially designated area (henceforth 'post-anaesthesia care unit', PACU) that complies with the standards and recommendations described in this document.
- 2 The anaesthetist must formally hand over the care of a patient to an appropriately trained and registered PACU practitioner.
- 3 Agreed, written criteria for discharge of patients from the PACU to the ward should be in place in all units.
- 4 An effective emergency call system must be in place in every PACU and tested regularly.

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- 5 No fewer than two staff (of whom at least one must be a registered practitioner) should be present when there is a patient in a PACU who does not fulfil the criteria for discharge to the ward.
- 6 All registered practitioners should be appropriately trained in accordance with the standards and competencies detailed in the UK National Core Competencies for Post Anaesthesia Care.
- 7 All patients must be observed on a one-to-one basis by an anaesthetist or registered PACU practitioner until they have regained control of their airway, have stable cardiovascular and respiratory systems and are awake and able to communicate.
- 8 All patients with tracheal tubes in place in a PACU should be monitored with continuous capnography. The removal of tracheal tubes is the responsibility of the anaesthetist.
- 9 There should be a specially designated area for the recovery of children that is appropriately equipped and staffed.
- 10 All standards and recommendations described in this document should be applied to all areas in which patients recover after anaesthesia, to include those anaesthetics given for obstetric, cardiology, imaging and dental procedures, and in psychiatric units and community hospitals. Only registered PACU practitioners who are familiar with these areas should be allocated to recover patients in them as and when required.
- 11 Patients' dignity and privacy should be respected at all times but patients' safety must always be the primary concern.
- 12 When critically ill patients are managed in a PACU because of bed shortages, the primary responsibility for the patient lies with the hospital's critical care team. The standard of nursing and medical care should be equal to that in the hospital's critical care units.
- 13 Audit and critical incident reporting systems should be in place in all PACUs.

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This is a consensus document produced by expert members of a Working Party established by the Association of Anaesthetists of Great Britain and Ireland (AAGBI). It has been seen and approved by the AAGBI Council.

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- *What other guideline statements are available on this topic?*
This guidance replaces previous guidelines issued by the Association of Anaesthetists of Great Britain and Ireland (AAGBI) published in 2002 [1]. European guidance was published in 2009 [2].
- *Why was this guideline developed?*
The AAGBI Council decided to update its previous guidance as part of the AAGBI's process of regular review of its guidelines, in the light of recent developments and advances.
- *How and why does this statement differ from existing guidelines?*
The guideline uses the widely used term 'post-anaesthesia care unit' (PACU) to refer to all areas that would formerly have been called 'recovery rooms'. The guideline recommends that all PACU staff should be trained to nationally recognised standards and be familiar with relevant safeguarding/child protection procedures as appropriate, and that all patients with tracheal tubes in place in PACUs should be monitored with continuous capnography. These recommendations align this guideline with other recent guidance on these and related topics.

In 1985, the AAGBI published recommendations for the improvement and management of recovery facilities in hospitals. These were updated in 1993 and 2002 [1]. However, many changes in practice, workload, expectations and staff training have occurred in the last 10 years, and the recommendations in this new document reflect these changes.

Another change that has taken place in this time is the use of the term PACU in some hospitals as an abbreviation for 'post-anaesthesia care unit' and in others, post-anaesthesia recovery unit (PARU). This document primarily considers care delivered in the immediate post-operative period and will use the term PACU to refer to all areas that would formerly have been called 'recovery rooms'.

Every patient undergoing general anaesthesia or central neuraxial blockade for surgery should be recovered in a designated area as described in this document. These recommendations are not concerned with those patients recovering from sedation, as guidelines with respect to this area of practice have been published separately [3].

The PACU facility

As the number and complexity of surgical procedures have increased, immediate postoperative care has developed from a brief period of

observation in a convenient area near the operating theatre suite to a more prolonged and active period of monitoring and intervention in a specifically designed clinical environment.

The NHS Estates Agency of the Department of Health issues regulations and guidelines with respect to the design and building of hospitals and their facilities. Health Building Note (HBN) 26 refers to operating departments, and includes advice on the design of PACUs [4]. Other factors involved in design include guidance on fire precautions (Health Technical Memoranda, Fire Practice Notes), operational management (Health Guidance Notes), specialised building systems (Health Technical Memoranda), engineering services (Model Engineering Specifications), contracts and commissioning (Concode) and recommendations on energy, water and waste [4, 5].

The PACU should be in a central position within the theatre complex enabling ease of access from the operating theatre but with a separate outside access for transfer of patients to the ward. Health Building Note 26 relates the size of a PACU to the number of operating theatres served, e.g. a recovery area for a typical department of eight theatres would have 16 bays, 12 of 13.5 m² and four larger ones of 26 m² [4]. However, it recognises that the size and number of beds should also reflect the number of cases per session and the average time spent in the PACU. The ratio of PACU beds to operating theatres should not be less than two. The bed spaces should allow unobstructed access for trolleys, x-ray equipment, resuscitation carts and clinical staff. The facility should be open-plan, allowing each recovery bay to be observed but with the provision of curtains for patient privacy. The PACU should be mechanically ventilated, as the environment is potentially polluted by anaesthetic gases. Other facilities should include storage areas for equipment, a dirty utility room, a secure supply of drugs, easy access to sinks and space for information technology equipment and clerical activities.

All PACU bed spaces should have 12 electrical socket outlets (six each side of the bed), one oxygen pipeline outlet, one medical air outlet, two vacuum outlets, an adjustable examination light, a push-button emergency call system, and physiological monitors with a display screen and recording system for patient data [6]. An exhaled gas scavenging system must be available for the occasional use of an anaesthetic machine. The décor should provide an attractive ambiance and, if possible, windows should be present. Lighting should not be harsh and should comply with recommended standards [4]. Local lighting to assist clinical examination must also be available. Noise levels should be kept

as low as possible and the ceiling should be sound absorbent. Good communication systems linking PACU staff with the operating theatres, wards and other clinical facilities are essential. An effective emergency call system must be in place, with alarm and telephone or intercom links to operating theatres and rest areas. All members of staff must be aware of this system and it should be tested at least weekly. At least two separate landline telephones are recommended to facilitate both incoming and outgoing calls during incidents, as in all important clinical areas.

There should be access to a staff rest area near to, but outside, the immediate recovery area. Other facilities should include toilets, showers, clean duty clothes and secure storage for personal possessions. Patient and staff safety should be assured by appropriate security systems, especially at night.

Monitoring, equipment and drugs

An appropriate standard of monitoring should be maintained until the patient is fully recovered from anaesthesia [6]. Clinical observation should therefore be supplemented as in the operating theatre by a minimum of pulse oximetry, non-invasive blood pressure monitoring, ECG and, if patients' tracheas remain intubated or they have their airways maintained with a supraglottic or other similar airway device, continuous capnography [7, 8]. Difficult airway equipment [9], a nerve stimulator for assessing neuromuscular blockade, a thermometer and patient warming devices should be immediately available. It is recommended that there should be full compatibility between operating theatre, PACU and ward monitoring equipment.

All drugs, equipment, fluids and algorithms required for resuscitation and management of anaesthetic and surgical complications should be immediately available. Consideration should be given to providing dedicated trolleys or carts for this purpose.

PACU staff

No fewer than two staff (of whom at least one must be a registered practitioner) should be present when there is a patient in the PACU who does not fulfil the criteria for discharge to the ward. Staffing numbers should allow one-to-one observation of every patient by an anaesthetist, registered PACU practitioner or other properly trained member of staff until they have regained airway control, respiratory and cardiovascular stability, and are able to communicate. In addition, there

should be an anaesthetist who is supernumerary to requirements in the operating theatres immediately available for patients in PACU. There should be a consultant anaesthetist lead for the PACU appointed, with appropriate time allocated in his/her job plan [10], and dedicated anaesthetic sessions in the PACU should be considered in large, busy units. The provision of a satisfactory quality of care during recovery from anaesthesia and surgery relies heavily on investment in the education and training of PACU staff. Maintenance of standards requires continuous updating, e.g. resuscitation skills, new airway techniques and advances in pain management. Regular team rehearsal of emergency scenarios should be considered. PACU staff are specialist and often play a key role in the education of others, including theatre staff, ward-based nurses, midwives and trainee doctors.

All specialist staff should have received appropriate training to nationally recognised standards such as the *UK National Core Competencies for Post-anaesthesia Care* [11]. Training should be tailored to meet the needs of the individual staff member and the PACU, but practical training and maintenance of skills must supplement theoretical knowledge. At all times, at least one member of staff present should be a certified Acute Life Support (ALS) provider and, for children, hold an appropriate paediatric life support qualification. All staff should be encouraged to attain and maintain at least one such life support qualification, e.g. ALS, APLS, PLS, PILS.

Continued professional development and the training of other staff is facilitated by activities such as the establishment of lead practitioners in certain areas, e.g. pain relief, life support, infection control, paediatrics, liaison with ward staff, health and safety matters, and training co-ordination. PACUs should consider rotation of duties with the local high dependency units (HDUs) and intensive care units (ICUs), an audit programme, educational posters, journal clubs and tutorials.

Specialist PACU staff normally work as part of a team in large PACUs attached to main operating theatre suites, but many hospitals have isolated PACUs, e.g. for obstetrics, cardiac catheter laboratories and facilities for electroconvulsive therapy, which may only be used intermittently, although sometimes for high-risk patients. Patient safety considerations dictate that patients recovering in these environments should only be cared for by registered PACU practitioners who are members of the hospital's core PACU team and who are familiar with these areas and allocated to work in them as and when required.

Transfer and handover of care to the PACU team

The transfer of patients from the operating theatre to the PACU and elsewhere has been considered in two publications by the AAGBI [6, 12]. Before transfer, the anaesthetist should be satisfied that the PACU staff are competent and able to take responsibility for the patient. If this cannot be assured, the anaesthetist should stay with the patient, either in the operating theatre or the PACU, until the patient is fit to return to the ward. It is essential that the anaesthetist formally hands over care of the patient to an appropriately trained and registered PACU practitioner. Formal handover checklists can improve the safety of handovers and should be developed for local use.

The patient should be physiologically stable on departure from the operating theatre, and the anaesthetist must decide on the extent of monitoring during transfer. This will depend on factors such as proximity to the PACU, the patient's level of consciousness and both respiratory and cardiovascular status. If the PACU is not immediately adjacent to the operating theatre, or if the patient's condition is poor, adequate mobile monitoring is required, i.e. a minimum of pulse oximetry and non-invasive blood pressure, ECG and capnography if the trachea is intubated, with the immediate availability of a nerve stimulator, and a means of measuring body temperature [6]. The anaesthetist is responsible for ensuring that this transfer is accomplished safely. Supplemental oxygen should be administered to all patients during transfer unless the patient did not receive supplemental oxygen during surgery. All lines should be flushed to remove any residual anaesthetic drugs if necessary and checked to be patent, adequately secured and protected. Details of any difficulties experienced during intubation or other relevant procedures should be included in the handover [9].

Management of patients in the PACU

Patients must be observed on a one-to-one basis by an anaesthetist, registered PACU practitioner or other properly trained member of staff until they have regained airway control, respiratory and cardiovascular stability, and are able to communicate. This recommendation is paramount and must be observed, even if it causes delay in the throughput of patients. All PACUs must be staffed to a level that allows this to be routine practice, even at times of peak activity. Life-threatening complications may occur during this period [13], and failure to provide adequate care may prove catastrophic for patients, their relatives and the

Table 1 Minimum information to be recorded for patients in the post-anaesthesia care unit.

- Level of consciousness
- Patency of the airway
- Respiratory rate and adequacy
- Oxygen saturation
- Oxygen administration
- Blood pressure
- Heart rate and rhythm
- Pain intensity on an agreed scale
- Nausea and vomiting
- Intravenous infusions
- Drugs administered
- Core temperature
- Other parameters depending on circumstances, e.g. urinary output, central venous pressure, expired CO₂, surgical drainage volume.

staff involved, and may have serious medicolegal consequences. Patients must be kept under clinical observation at all times, and all measurements should be recorded, preferably by an automatic recording system networked with theatre systems. The frequency of observations will depend upon the stage of recovery, the nature of the surgery and clinical condition of the patient. The frequency of the observations and the quality of record keeping should not be influenced by staffing levels. Certain information should be recorded as a minimum (Table 1).

For all patients, the National Patient Safety Agency (NPSA) recommended dataset of their last name, first name, date of birth and NHS number [14] should be recorded in that order, together with their time of admission, time of fitness for discharge, time of discharge and destination in a central register.

Pain, nausea and vomiting

No patient should be returned to the ward until control of postoperative nausea and vomiting and pain is satisfactory. All PACU staff should be specifically trained in the management of patients with patient-controlled analgesia, epidurals, spinals and peripheral nerve blockade. Nurse administration of intravenous analgesics, e.g. paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs) and opioids prescribed by the anaesthetists as part of a specific protocol, facilitates rapid and flexible pain

control. Such protocols should incorporate precise instructions on the administration of the drugs and the recognition and management of their side-effects. Nurse administration of intravenous opioids should not occur unless there is the immediate availability of an anaesthetist. All syringes containing drugs should be clearly labelled.

Tracheal tubes and other airway devices

On many occasions, patients will be handed over to the PACU nurse with a laryngeal mask airway or other supraglottic airway device in place. The nurse must be specifically trained in the management of these patients and in the removal of the airway device. An anaesthetist should be immediately available to assist if problems occur while the airway device is in place or when it is removed by a qualified member of the PACU staff.

The incidence of upper airway obstruction that may lead to post-obstructive pulmonary oedema and severe hypoxia can be minimised by the use of oropharyngeal airways, bite blocks, airway devices incorporating them or similar devices [9].

The removal of tracheal tubes from patients in the PACU is the responsibility of the anaesthetist, who may delegate the removal to an appropriately trained member of the PACU team who is prepared to accept this responsibility.

Discharge from the PACU

Every PACU should have well-defined minimum criteria for fitness for the discharge of patients to the general ward or other clinical areas (Table 2).

Discharge from the PACU is the responsibility of the anaesthetist but the adoption of strict discharge criteria allows this to be delegated to PACU staff. If the discharge criteria are not met, the patient should remain in the PACU and the anaesthetist should be informed. An anaesthetist must be available at all times when a patient who has not reached the criteria for discharge is present in the PACU. Patients who have potential airway problems or complications should be reassessed by the responsible anaesthetist before discharge from the PACU [9].

If there is any doubt as to whether a patient fulfils the criteria, or if there has been a problem during the recovery period, the anaesthetist who gave the anaesthetic (or another anaesthetist with special duties in the PACU) must assess the patient. After medical assessment, patients who do not fulfil the discharge criteria may be transferred to an appropriate HDU or ICU.

Table 2 Minimum criteria for discharge of patients from the post-anaesthesia care unit.

- The patient is fully conscious, able to maintain a clear airway and has protective airway reflexes
- Breathing and oxygenation are satisfactory
- The cardiovascular system is stable, with no unexplained cardiac irregularity or persistent bleeding. The specific values of pulse and blood pressure should approximate to normal pre-operative values or be at an acceptable level, ideally within parameters set by the anaesthetist, and peripheral perfusion should be adequate
- Pain and postoperative nausea and vomiting should be adequately controlled, and suitable analgesic and anti-emetic regimens prescribed
- Temperature should be within acceptable limits [15]. Patients should not be returned to the ward if significantly hypothermic
- Oxygen therapy should be prescribed if appropriate
- Intravenous cannulae should be patent, flushed if necessary to ensure removal of any residual anaesthetic drugs and intravenous fluids should be prescribed if appropriate
- All surgical drains and catheters should be checked
- All health records should be complete and medical notes present.

Handing over to ward staff

Patients should be transferred to the ward accompanied by two members of staff, at least one of whom should be suitably trained. The anaesthetic record, together with the recovery and prescription charts, must accompany the patient and clearly indicate to the ward staff the details of relevant drugs administered in theatre and PACU, e.g. analgesics and antibiotics. The PACU nurse must ensure that full clinical details are relayed to the ward nurse, with particular emphasis on ongoing problems and the management of infusions. Local policies should be developed for the safe handover of infusion devices and syringe pumps, e.g. the collecting ward nurse checking and signing for the pump settings. Formal handover checklists can improve the safety of handovers and should be developed for local use.

Local anaesthesia and regional anaesthesia

The principles of management of any patient undergoing local anaesthesia, either alone or in addition to general anaesthesia, are the same as for any other patient. Information given on handover to PACU staff

should include the site and type of local block, drug, dosage, time of administration and anticipated duration of action. Instructions for ward staff should include further pain relief and any particular positional requirements for the patient. Information for the patient includes the anticipation of return of sensation and motor function, care with hot and cold items and weight-bearing.

Considerations after spinal and epidural anaesthesia include noting the level of analgesia achieved, the time and dose of drug administered, cardiovascular status, bladder care, details of any continuous infusions, degree of motor block and the time of anticipated motor and sensory recovery. Many of these considerations apply also to plexus blocks and major nerve trunk blocks. All PACU staff should be trained in the recognition and management of local anaesthetic toxicity and have immediate access to a supply of Intralipid [16].

Children

Children have special needs reflecting fundamental psychological, anatomical and physiological differences from adults. These needs are best met by having a designated, separate paediatric recovery area that is child-friendly and staffed by nurses trained in the recovery of babies, children and young people. The area should be kept warm to prevent hypothermia and provision should be made for a parent or carer to rejoin the child in the recovery area as soon as they are awake [17].

All staff working in PACU should be familiar with the relevant procedures and personnel if there are Safeguarding or Child Protection concerns that arise whilst the child is in theatre [18, 19].

Equipment must include a full range of sizes of facemasks, breathing systems, airways, nasal prongs and tracheal tubes. Essential monitoring equipment includes a full range of paediatric non-invasive blood pressure cuffs and small pulse oximeter probes. Capnography should also be available.

All drugs, equipment, fluids required for paediatric resuscitation and other emergencies should be immediately available. Consideration should be given to providing a separate dedicated paediatric trolley for this purpose. Guidelines and commonly used algorithms for paediatric emergencies should be readily available and regularly rehearsed.

Children are more likely to become restless or disorientated after surgery and require one-to-one supervision throughout their PACU

stay. Provision should be made to protect a child from injury in this situation by supplying washable cot or bed protectors. Postoperative vomiting, bradycardia and laryngeal spasm are more common. The latter can result in major life-threatening desaturation, as infants and small children become hypoxaemic 2–3 times more quickly than adults.

Children should not be denied adequate pain relief because of a fear of side-effects. It can be difficult to assess pain, especially in the pre-verbal child. However, suitable techniques are available and protocols for pain management in children should be readily available [20, 21]. When intravenous and epidural analgesic drugs are given to babies and children, systems must be in place to double-check doses, which may be less familiar if used infrequently.

Before discharge from the PACU, the need to ensure that the dead space of all intravenous cannulae is flushed and patent is particularly important in children [22].

Patients' perspective

The written information given to patients before their admission to hospital should explain the purpose and nature of the PACU. *Anaesthesia and Anaesthetists: Information for Patients and their Relatives* published by the Royal College of Anaesthetists and the AAGBI is an example of this [23]. Information for children and young people of all ages about anaesthesia is also available [24].

Although the design of recovery facilities is, by necessity, open-plan, there should be provision for patients' privacy and dignity, e.g. curtains. However, safety considerations override their use during resuscitation and the management of other crises. If other awake patients are also present in the PACU, curtains should only be closed around the awake patients and not the patient who is being resuscitated. Most patients find PACUs unpleasant, and they should be transferred out as soon as discharge criteria are met.

Staff in some hospitals may require access to interpreters and translators to facilitate communication with non-English speaking patients.

Anaesthesia and recovery in special areas

Anaesthesia is often administered in areas such as obstetric, x-ray, cardiology, dental and psychiatric units, and in community hospitals. All standards and guidelines described in this document must be completely fulfilled at any site in which anaesthesia is administered and immediate postanaesthesia recovery planned.

Critically ill patients

The primary goal of a PACU is to provide postoperative patients with the optimum standard of care during the initial period of their recovery from anaesthesia and surgery. During times of bed or staff shortages in critical care areas, and because of the resources available, PACUs are occasionally used for the contingency management of and delivery of care to critically ill patients [25]. During such times, it must be recognised that the primary responsibility for the patient lies with the consultant in charge of the ICU and his/her team. An ICU-trained nurse must care for the patient on a one-to-one basis, with immediate access to senior ICU nursing assistance. The standard of medical and nursing care should be equal to that within the ICU, and a specific action plan should be formulated by the critical care team to facilitate discharge to a more appropriate area as soon as possible. The delivery of critical care in a PACU for longer than 4 h should trigger the collection of a Critical Care Minimum Data Set (CCMDS) [25]. There should be a mechanism in place for PACU personnel either to collect this data set or to request its collection.

End of life care in the PACU

Occasionally, a patient who is expected to die imminently will be taken to the PACU. The patient should be managed according to an end-of-life care pathway, in isolation from others who should ideally be unaware of the situation. Relatives must be able to be present and a dedicated nurse should be available [26].

Audit and quality control in the PACU

The recording of key quality and outcome data from all patients passing through the PACU should be routine for all hospitals [27]. The data recorded from PACU patients should be compared with national and local benchmarks with the express aim of improving and maintaining the quality of pre-, intra- and postoperative care, and measuring compliance with national standards. The AAGBI recommends that a minimum dataset should be recorded for all patients admitted to a PACU (Table 3). In addition to these, some PACUs may wish to record data relating to patients' satisfaction with their care in the PACU.

Some of these data should be available from Trust and Health Board IT systems, and resources should be made available to integrate these systems with recording of PACU data to facilitate PACU data

Table 3 Minimum dataset to be recorded for all patients admitted to a post-anaesthesia care unit.

- Last name, first name, date of birth and NHS number
- Gender
- ASA physical status
- Surgical procedure performed
- Names of anaesthetist and surgeon
- Type of anaesthesia
- Time of admission
- Core temperature on admission to the PACU
- Incidence and severity of postoperative nausea and vomiting
- Severity of pain experienced in the PACU
- Analgesia given in the PACU
- Time of fitness for discharge from the PACU
- Time of discharge from the PACU
- Complications

entry, storage and interpretation. Information derived from this data collection should be analysed and fed back to anaesthetists and theatre teams in a way that will allow individuals and teams to compare their performance with others. Interpretation of these data by experienced anaesthetists is important, and both patients' characteristics and the nature of the surgery should be taken into account before conclusions are drawn. Local clinical governance arrangements will usually require discussion of any incidents at regular multidisciplinary PACU team meetings.

In addition to these data, there should be a list of adverse incidents that should be recorded and fed into a clinical governance programme that records and disseminates the incidence of adverse incidents, and can investigate individual incidents if appropriate. These might include:

- Cardiopulmonary arrest
- Major airway complications
- Death
- Severe pain that is difficult to treat
- Prolonged stay (> 2 h)
- Significant hypothermia (< 35 °C)
- Need to call an anaesthetist to review a patient
- Need for ventilatory support (CPAP, tracheal intubation, lung ventilation)

- Need for cardiovascular support (inotropes, vasoconstrictors, anti-arrhythmics)
- Return to the operating theatre before discharge from PACU
- Inadequate reversal of neuromuscular blocking drugs.

Reports of such incidents should be accompanied by clinical information that will allow further analysis.

The PACU is also a useful area in which to monitor compliance with Trust initiatives that seek to improve patient care and safety. These might include:

- Compliance with WHO checklist performance
- Administration of antibiotics
- Thrombo-embolic prophylaxis
- Compliance with analgesic and anti-emetic protocols
- Completion of postoperative instructions relating to oxygen therapy, pain therapy, fluid management, wound and drain management, restarting of oral intake and other elements of early postoperative care.

Competing interests

DKW is a Past President of the AAGBI and is currently Chairman of the European Board of Anaesthesiology Safety Committee, and a member of the European Board of Anaesthesiology/European Society of Anaesthesiology Patient Safety Task Force. No external funding or competing interests declared.

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THE ASSOCIATION OF ANAESTHETISTS
of Great Britain & Ireland

21 Portland Place, London, W1B 1PY

Tel: 020 7631 1650

Fax: 020 7631 4352

Email: info@aagbi.org

www.aagbi.org