

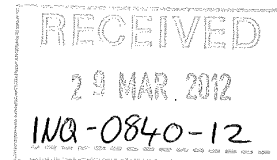
2 Franklin Street, Belfast, BT2 8DQ
DX 2842 NR Belfast 3

Your Ref:
BPC-0117-12

Our Ref:
HYP B04/01

Date:
26.03.12

Mr B Cullen
Solicitor to the Inquiry
Arthur House
41 Arthur Street
Belfast
BT1 4GB



Dear Sir,

RE: INQUIRY INTO HYPONATRAEMIA RELATED DEATHS

I refer to the above and your letter of 30th January 2012. I now enclose the following for your attention: -

- 1) Checklist for Anaesthetic Equipment 2004 (The Association of Anaesthetists of Great Britain and Ireland).
- 2) Recommendations for standards of monitoring during anaesthesia and recovery (The Association of Anaesthetists for Great Britain and Ireland, March 2007, 4th edition).
- 3) Addendum dated 18th April 2011.

In relation to drug administration I am instructed that it is the anaesthetists' practice to administer drugs in appropriate doses. On occasion drugs prescribed by others (e.g. surgeon, physician, radiologists) may be requested to be administered by the anaesthetist during the anaesthetic.

Yours faithfully,



Joanna Bolton
Solicitor Consultant

Email: [REDACTED]

Tel: [REDACTED]

Providing Support to Health and Social Care



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THE ASSOCIATION OF ANAESTHETISTS
of Great Britain & Ireland

CHECKLIST FOR ANAESTHETIC EQUIPMENT 2004

The following checks should be made prior to each operating session. In addition, checks 2, 6 and 9 (Monitoring, Breathing System and Ancillary Equipment) should be made prior to each new patient during a session.

1. **Check that the anaesthetic machine is connected to the electricity supply (if appropriate) and switched on.**
Note: Some anaesthetic workstations may enter an integral self-test programme when switched on; those functions tested by such a programme need not be retested.
 - Take note of any information or labelling on the anaesthetic machine referring to the current status of the machine. Particular attention should be paid to recent servicing. Servicing labels should be fixed in the service logbook.
2. **Check that all monitoring devices, in particular the oxygen analyser, pulse oximeter and capnograph, are functioning and have appropriate alarm limits.**
 - Check that gas sampling lines are properly attached and free of obstructions.
 - Check that an appropriate frequency of recording non-invasive blood pressure is selected.
(Some monitors need to be in stand-by mode to avoid unnecessary alarms before being connected to the patient)
3. **Check with a "tug test" that each pipeline is correctly inserted into the appropriate gas supply terminal.**
Note: Carbon dioxide cylinders should not be present on the anaesthetic machine unless requested by the anaesthetist. A blanking plug should be fitted to any empty cylinder yoke.
 - Check that the anaesthetic machine is connected to a supply of oxygen and that an adequate supply of oxygen is available from a reserve oxygen cylinder.
 - Check that adequate supplies of other gases (nitrous oxide, air) are available and connected as appropriate.
 - Check that all pipeline pressure gauges in use on the anaesthetic machine indicate 400 - 500kPa.
4. **Check the operation of flowmeters (where fitted).**
 - Check that each flow valve operates smoothly and that the bobbin moves freely throughout its range.
 - Check the anti-hypoxia device is working correctly.
 - Check the operation of the emergency oxygen bypass control.

Continued overleaf

5. **Check the vaporizer(s):**
 - Check that each vaporizer is adequately, but not over, filled.
 - Check that each vaporizer is correctly seated on the back bar and not tilted.
 - Check the vaporizer for leaks (with vaporizer on and off) by temporarily occluding the common gas outlet.
 - Turn the vaporizer(s) off when checks are completed.
 - Repeat the leak test immediately after changing any vaporizer.

6. **Check the breathing system to be employed.**

Note: A new single use bacterial/viral filter and angle-piece/catheter mount must be used for each patient. Packaging should not be removed until point of use.

 - Inspect the system for correct configuration. All connections should be secured by "push and twist".
 - Perform a pressure leak test on the breathing system by occluding the patient-end and compressing the reservoir bag. Bain-type co-axial systems should have the inner tube compressed for the leak test.
 - Check the correct operation of all valves, including unidirectional valves within a circle, and all exhaust valves.
 - Check for patency and flow of gas through the whole breathing system including the filter and angle-piece/catheter mount.

7. **Check that the ventilator is configured appropriately for its intended use.**
 - Check that the ventilator tubing is correctly configured and securely attached.
 - Set the controls for use and ensure that an adequate pressure is generated during the inspiratory phase.
 - Check the pressure relief valve functions.
 - Check that the disconnect alarms function correctly.
 - Ensure that an alternative means to ventilate the patient's lungs is available. (see 10. below)

8. **Check that the anaesthetic gas scavenging system is switched on and is functioning correctly.**
 - Check that the tubing is attached to the appropriate exhaust port of the breathing system, ventilator or workstation.

9. **Check that all ancillary equipment which may be needed is present and working.**
 - This includes laryngoscopes, intubation aids, intubation forceps, bougies etc. and appropriately sized facemasks, airways, tracheal tubes and connectors, which must be checked for patency.
 - Check that the suction apparatus is functioning and that all connectors are secure.
 - Check that the patient trolley, bed or operating table can be rapidly tilted head down.

10. **Check that an alternative means to ventilate the patient is immediately available. (eg self-inflating bag and oxygen cylinder)**
 - Check that the self-inflating bag and cylinder of oxygen are functioning correctly and the cylinder contains an adequate supply of oxygen.

11. **Recording**
 - Sign and date the logbook kept with the anaesthetic machine to confirm the machine has been checked.
 - Record on each patient's anaesthetic chart that the anaesthetic machine, breathing system and monitoring has been checked.

This check list is an abbreviated version of the Association of Anaesthetists publication "Checking Anaesthetic Equipment 3 2004"

(Endorsed by the Chief Medical Officer and the Royal College of Anaesthetists)



**RECOMMENDATIONS FOR STANDARDS
OF MONITORING DURING
ANAESTHESIA AND RECOVERY**

4th Edition

Published by
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March 2007

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This document will be reviewed regularly and may be revised or updated before the formal publication of a new edition. For the latest version, please refer to the AAGBI website: <http://www.aagbi.org>

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SECTION I: SUMMARY

The Association of Anaesthetists of Great Britain and Ireland regards it as essential that certain core standards of monitoring must be used whenever a patient is anaesthetised. These minimum standards should be uniform irrespective of duration, location or mode of anaesthesia.

1. The anaesthetist must be present and care for the patient throughout the conduct of an anaesthetic. *
2. Monitoring devices must be attached before induction of anaesthesia and their use continued until the patient has recovered from the effects of anaesthesia.
3. The same standards of monitoring apply when the anaesthetist is responsible for a local /regional anaesthetic or sedative technique for an operative procedure.
4. A summary of information provided by monitoring devices should be recorded on the anaesthetic record. Electronic record keeping systems are now recommended.
5. The anaesthetist must ensure that all equipment has been checked before use. Alarm limits for all equipment must be set appropriately before use. Audible alarms must be enabled during anaesthesia.
6. These recommendations state the monitoring devices which are essential and those which must be immediately available during anaesthesia. If it is necessary to continue anaesthesia without a device categorised as 'essential', the anaesthetist must clearly note the reasons for this in the anaesthetic record.

* In hospitals employing Anaesthetic Practitioners (APs), this responsibility may be delegated to an AP supervised by a consultant anaesthetist in accordance with guidelines published by the Royal College of Anaesthetists (www.rcoa.ac.uk).

7. Additional monitoring may be necessary as deemed appropriate by the anaesthetist.
8. A brief interruption of monitoring is only acceptable if the recovery area is immediately adjacent to the operating theatre. Otherwise monitoring should be continued during transfer to the same degree as any other intra- or inter-hospital transfer.
9. Provision, maintenance, calibration and renewal of equipment is an institutional responsibility.

SECTION II: INTRODUCTION

The presence of an appropriately trained and experienced anaesthetist is the main determinant of patient safety during anaesthesia. However, human error is inevitable, and many studies of critical incidents and mortality associated with anaesthesia have shown that adverse incidents and accidents are frequently attributable, at least in part, to error by anaesthetists^{1,2}.

Monitoring will not prevent all adverse incidents or accidents in the perioperative period. However, there is substantial evidence that it reduces the risks of incidents and accidents both by detecting the consequences of errors, and by giving early warning that the condition of a patient is deteriorating for some other reason³⁻⁹.

The introduction of routine monitoring in anaesthesia coincided with numerous improvements in clinical facilities, training and other factors likely to affect patient outcomes. The progressive reduction in anaesthesia-related morbidity and mortality is therefore linked to instrumental monitoring by association rather than proof from prospective randomised trials.

The overwhelming view is that such studies would today be unethical and the circumstantial evidence that is already available indicates clearly that the use of such monitoring improves the safety of patients. Consequently, it is appropriate that the AAGBI should make clear recommendations about the standards of monitoring which anaesthetists in the United Kingdom and Ireland must use. New monitoring modalities such as those describing depth of anaesthesia have not yet become established as 'routine' and the opportunity exists to critically evaluate their utility before general introduction. A clear distinction may reasonably be made between consensus-based recommendations for 'core' monitoring and requiring that new monitoring techniques be shown by clinical trials to improve patient outcomes¹⁰.

SECTION III: THE ANAESTHETIST'S PRESENCE DURING ANAESTHESIA

An anaesthetist of appropriate experience must be present throughout general anaesthesia, including any period of cardiopulmonary bypass. Using clinical skills and monitoring equipment, the anaesthetist must care for the patient continuously. The same standards must apply when an anaesthetist is responsible for a local/regional anaesthetic or sedative technique for an operative procedure. When there is a known potential hazard to the anaesthetist, for example during imaging procedures, facilities for remotely observing and monitoring the patient must be available¹¹.

Accurate records of the measurements provided by monitors must be kept. It has become accepted that core data (heart rate, BP and peripheral oxygen saturation) should be recorded at intervals no longer than every five minutes, and more frequently if the patient is clinically unstable. It is recognised that contemporaneous records may be difficult to keep in emergency circumstances. Electronic record keeping systems are now available, and the Association recommends that departments consider their procurement. It is likely that their use will become routine.

Local circumstances may dictate that handing over of responsibility for patient care under anaesthetic may be necessary. If so, hand-over time must be sufficient to apprise the incoming anaesthetist of all information concerning the patient's anaesthesia and the time and details must be noted in the anaesthetic record.

Very occasionally, an anaesthetist working single-handedly may be called upon to perform a brief life-saving procedure nearby. Leaving an anaesthetised patient in these circumstances is a matter for individual judgement. If this should prove necessary, the surgeon must stop operating until the anaesthetist returns. Observation of the patient and monitoring devices must be continued by a trained anaesthetic assistant. Any problems should be reported to available medical staff.

SECTION IV: MONITORING THE ANAESTHETIC EQUIPMENT

It is the responsibility of the anaesthetist to check all equipment before use as recommended in *Checking Anaesthetic Equipment*¹². Anaesthetists must ensure that they are familiar with all equipment that they intend to use and that they have followed any specific checking procedure recommended by individual manufacturers. More complex equipment will require more formal induction and training in its use.

Oxygen Supply

The use of an oxygen analyser with an audible alarm is essential during anaesthesia. It must be placed in such a position that the composition of the gas mixture delivered to the patient is monitored continuously. The positioning of the sampling port will depend on the breathing system in use.

Breathing Systems

During spontaneous ventilation, observation of the reservoir bag may reveal a leak, disconnection, high pressure or abnormalities of ventilation. Carbon dioxide concentration monitoring will detect most of these problems. Capnography is therefore an essential part of routine monitoring during anaesthesia.

Vapour Analyser

The use of a vapour analyser is essential during anaesthesia whenever a volatile anaesthetic agent is in use.

Infusion Devices

When any component of anaesthesia (hypnotic, analgesic, muscle relaxant) is administered by infusion, the infusion device unit must be checked before use. Alarm settings and infusion limits must be verified and set to appropriate levels before commencing anaesthesia. It is essential to verify that these drugs are delivered to the patient. The infusion site should be secure and preferably visible.

Alarms

Anaesthetists must ensure that all alarms are set at appropriate values. The default alarm settings incorporated by the manufacturer are often inappropriate and during the checking procedure the anaesthetist must review and reset the upper and lower limits as necessary. Audible alarms must be enabled when anaesthesia commences.

When intermittent positive pressure ventilation is used during anaesthesia, airway pressure alarms must also be used to detect excessive pressure within the airway and also to give warning of disconnection or leaks. The upper and lower alarm limits must be reviewed and set appropriately before anaesthesia commences.

Provision, maintenance, calibration and renewal of equipment are institutional responsibilities.

SECTION V: MONITORING THE PATIENT

During anaesthesia, the patient's physiological state and depth of anaesthesia need continual assessment. Monitoring devices supplement clinical observation in order to achieve this. Appropriate clinical observations may include mucosal colour, pupil size, response to surgical stimuli and movements of the chest wall and/or the reservoir bag. The anaesthetist should undertake palpation of the pulse, auscultation of breath sounds and, where appropriate, measurement of urine output and blood loss. A stethoscope must always be available.

Monitoring Devices

The following monitoring devices are essential to the safe conduct of anaesthesia. If it is necessary to continue anaesthesia without a particular device, the anaesthetist must clearly record the reasons for this in the anaesthetic record.

A - Induction and Maintenance of Anaesthesia

1. Pulse oximeter
2. Non invasive blood pressure monitor
3. Electrocardiograph
4. Airway gases: oxygen, carbon dioxide and vapour
5. Airway pressure

The following must also be available

- A nerve stimulator whenever a muscle relaxant is used
- A means of measuring the patient's temperature

During induction of anaesthesia in children and in unco-operative adults it may not be possible to attach all monitoring before induction. In these circumstances monitoring must be attached as soon as possible and the reasons for delay recorded in the patient's notes.

B - Recovery from Anaesthesia

A high standard of monitoring should be maintained until the patient is fully recovered from anaesthesia. Clinical observations must be supplemented by the following monitoring devices.

1. Pulse oximeter
2. Non-invasive blood pressure monitor

The following must also be immediately available

- Electrocardiograph
- Nerve stimulator
- Means of measuring temperature
- Capnograph

If the recovery area is not immediately adjacent to the operating theatre, or if the patient's general condition is poor, adequate mobile monitoring of the above parameters will be needed during transfer. The anaesthetist is responsible for ensuring that this transfer is accomplished safely.

Facilities and staff needed for the recovery area are detailed in the Association booklets, *The Anaesthesia Team and Immediate Post Anaesthetic Recovery*^{13, 14}.

C - Additional Monitoring

Some patients will require additional, mainly invasive, monitoring, e.g. vascular or intracranial pressures, cardiac output, or biochemical variables.

Specific devices designed to monitor loss of consciousness using adaptations of either surface EEG monitoring or auditory evoked potentials have become available. However, their routine use has yet to be fully considered as part of our recommended minimum monitoring standards. The American Society of Anesthesiologists (ASA) recently published a report from a task force set up to assess the use of brain function monitoring to prevent intra-operative awareness¹⁵. This report summarised the state of the literature and reported the opinions

derived from task force members, expert consultants, open forums and public commentary. It concluded that "brain function monitoring is not routinely indicated for patients undergoing general anaesthesia, either to reduce the frequency of intra-operative awareness or to monitor depth of anaesthesia." It was the consensus of the task force that the decision to use a brain function monitor should be made on a case-by-case basis by the individual practitioner for selected patients. The task force reported that patients have experienced intra-operative awareness in spite of monitored values which would imply an adequate depth of anaesthesia. The AAGBI endorses the views of the ASA taskforce.

D - Regional Techniques & Sedation for Operative Procedures

Patients must have appropriate monitoring, including a minimum of the following devices.

1. Pulse oximeter
2. Non-invasive blood pressure monitor
3. Electrocardiograph

SECTION VI: MONITORING DURING TRANSFER WITHIN THE HOSPITAL

It is essential that the standard of care and monitoring during transfer is as high as that applied in the controlled operating theatre environment and that personnel with adequate knowledge and experience accompany the patient^{16 17}.

The patient should be physiologically as stable as possible on departure. Prior to transfer, appropriate monitoring must be commenced. Oxygen saturation and arterial pressure should be monitored in all patients and an ECG must be attached. Intravascular or intracranial pressure monitoring may be necessary in special cases. A monitored oxygen supply of known content sufficient to last the maximum duration of the transfer is essential for all patients. If the patient's lungs are ventilated, expired carbon dioxide should be monitored continuously. Airway pressure, tidal volume and respiratory rate must also be monitored when the lungs are mechanically ventilated.

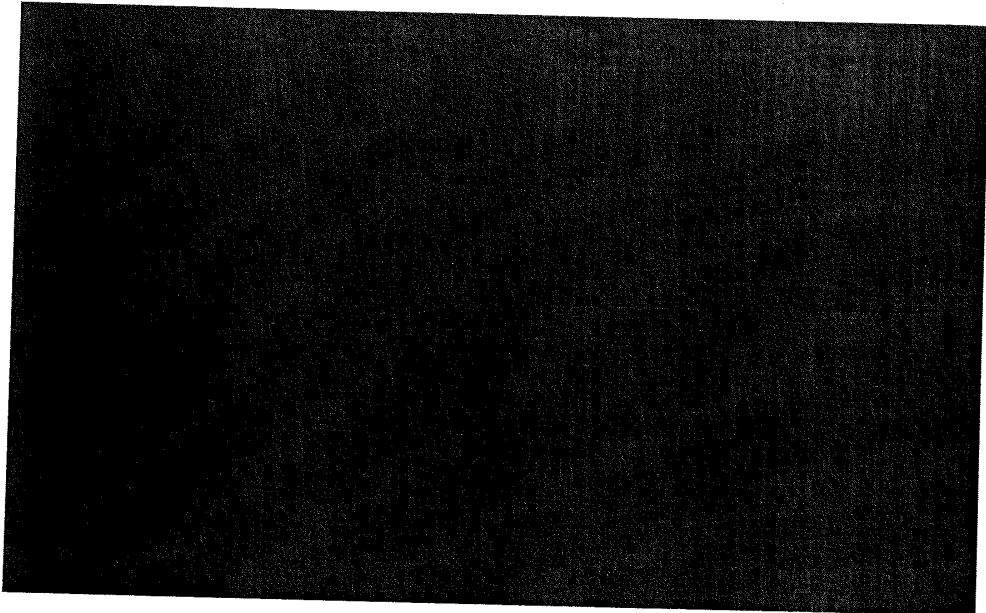
SECTION VII: ANAESTHESIA OUTSIDE HOSPITAL

The Association's view is that the standards of monitoring used during general and regional analgesia and sedation should be exactly the same in all locations.

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Addendum to Standards of Monitoring During Anaesthesia and Recovery (4) 2007
regarding the non-invasive blood pressure monitors

AAGBI Council has approved the following as an addendum to this guideline:

The AAGBI recommends that any monitor providing continuous values, such as SpO2 and ECG, should only display a static non-invasive blood pressure value for a maximum of five minutes, after which the value should blink or disappear altogether. The value should remain stored.

18 April 2011



THE ASSOCIATION OF ANAESTHETISTS
of Great Britain & Ireland

AAGBI SAFETY STATEMENT

The use of capnography outside the operating theatre

Updated statement from the Association of Anaesthetists of Great Britain & Ireland (AAGBI) May 2011

The AAGBI publications 'Recommendations for standards of monitoring during anaesthesia and recovery' (4th edition) 2007 (1) and 'Capnography outside the operating room' 2009 (2) recommend continuous capnography in all patients who are anaesthetised or intubated, regardless of their location in the hospital, or the type of airway device used. In addition, continuous capnography is recommended for all patients undergoing deep sedation or any sedation where the airway cannot be directly observed, and should be immediately available during the treatment of cardiac arrest.

Whilst the use of capnography is routine in the operating theatre, this is not so in other areas of hospital practice, and the AAGBI recognises that the practice of moderate sedation using agents such as propofol is increasing. The AAGBI would also like to alert the membership to two important recent publications and to strengthen our recommendations on the routine use of capnography. This has the potential to have a major impact on deaths due to airway complications outside the operating theatre (5).

1. The 2010 International Consensus Guidelines on Cardiopulmonary Resuscitation (3) and the Resuscitation Council UK Resuscitation Guidelines 2010 (4) emphasise the importance of capnography during cardiopulmonary resuscitation to continually monitor tracheal tube placement and quality of CPR and to provide an early indication of return of spontaneous circulation.
2. The fourth National Audit Project 'Major complications of airway management' (NAP4) was published in March 2011 (5) and raised particular concerns about complications of airway management in ICU and the emergency department. At least one in four major airway complications reported to NAP4 was from the ICU or the emergency department and more than 60% of events in the ICU led to death or brain damage. Common factors in both the ICU and emergency department included unrecognised oesophageal intubation or unrecognised displacement of tracheal tubes or tracheostomy tubes after patient movement, intervention, or

during transport. Capnography was frequently absent or a flat capnography trace due to airway displacement was misinterpreted during cardiopulmonary resuscitation. The absence of capnography, or the failure to use it properly, contributed to 80% of deaths from airway complications in the ICU and 50% of deaths from airway complications in the emergency department.

The AAGBI recommends that:

- Continuous capnography should be used in all anaesthetised patients, regardless of the airway device used or the location of the patient.
- Continuous capnography should be used for all patients whose trachea is intubated, regardless of the location of the patient (see note 1).
- Continuous capnography should be used for all patients undergoing moderate or deep sedation, and should be available wherever any patients undergoing anaesthesia or moderate or deep sedation are recovered (see note 2).
- Continuous capnography should be used for all patients undergoing advanced life support (see note 3).

Notes

1. Patients with tracheostomy tubes and who are also breathing spontaneously without ventilator support or continuous positive airway pressure (CPAP) do not normally require continuous capnography.
2. Sedation is a continuum and it is not always possible to predict how an individual patient will respond. **Moderate Sedation/Analgesia ("Conscious Sedation")** is a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. . . **Deep Sedation/Analgesia** is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate (6).
3. The AAGBI recognises that capnography is not yet standard on resuscitation trolleys, but notes that a number of companies produce defibrillators with integrated capnography. The AAGBI recommends that capnography should be available and delivered promptly to any patient undergoing advanced life support.

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