



European Board of Anaesthesiology

UEMS Anaesthesiology Section

European Board of Anaesthesiology (EBA) recommendations for minimal monitoring during Anaesthesia and Recovery

INTRODUCTION

The European Board of Anaesthesiology 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. The European Board's view is that the standards of monitoring used during general and regional analgesia and sedation should be exactly the same in all locations including outside the hospital.

The presence of an appropriately trained and experienced anaesthesiologist 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.

An anaesthesiologist of appropriate experience must be present throughout general anaesthesia, including any period of cardiopulmonary bypass. Using clinical skills and monitoring equipment, the anaesthesiologist 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 anaesthesiologist, for example during imaging procedures, facilities for remotely observing and monitoring the patient must be available¹¹.

MONITORING THE ANAESTHETIC EQUIPMENT

It is the responsibility of the anaesthesiologist to check all equipment before use. Anaesthesiologists 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

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.



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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

Anaesthesiologists must ensure that all alarms are set at appropriate values. 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.

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.



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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
3. Electrocardiograph
4. Capnography if patients' tracheas remain intubated or they have their airways maintained with a supraglottic or other similar airway device. 12a.

The following must also be immediately available

- Nerve stimulator
- Means of measuring temperature

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 anaesthesiologist is responsible for ensuring that this transfer is accomplished safely.

Facilities and staff needed for the recovery area should be appropriate.^{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.
patients.



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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
4. Capnography for moderate and deep sedation.^{12a}

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 patients' tracheas remain intubated or they have their airways maintained with a supraglottic or other similar airway device continuous capnography should be used.^{12a}. Airway pressure, tidal volume and respiratory rate must also be monitored when the lungs are mechanically ventilated.

NOTE

In the event of any variation to these recommendations, because of local circumstances, a risk assessment exercise must be carried out to ensure this variation will not reduce patient safety.

For Review in 2018

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