

RECOMMENDATIONS FOR PATIENT SAFETY AND MINIMAL MONITORING STANDARDS DURING ANAESTHESIA AND RECOVERY (4TH EDITION) 2013



**COLLEGE OF ANAESTHESIOLOGISTS
ACADEMY OF MEDICINE OF MALAYSIA**

IN COLLABORATION WITH



MALAYSIAN SOCIETY OF ANAESTHESIOLOGISTS

RECOMMENDATIONS FOR PATIENT SAFETY AND MINIMAL MONITORING STANDARDS DURING ANAESTHESIA AND RECOVERY (4TH EDITION) 2013

Committee

Dr Lim Wee Leong (Chairman)

Dr Sushila Sivasubramaniam

Professor Karis Misiran

Dr Thong Chwee Ling

Associate Professor Raha Abdul Rahman

Professor Lim Thiam Aun

Dr Thohiroh Abd Razak

Published by

**College of Anaesthesiologists
Academy of Medicine of Malaysia**

In collaboration with

Malaysian Society of Anaesthesiologists

2014

CONTENTS

Section 1: Principles of Anaesthesia Care

Section 2: The Anaesthetic Machine / Apparatus

Section 3: Intraoperative Monitoring of the Patient

Section 4: Recovery from Anaesthesia

Section 5: Anaesthesia Administered Outside the Operating Rooms

Section 6: Regional Anaesthesia

Section 7: Monitored Anaesthesia Care and Monitored Sedation

Section 8: Pre-anaesthetic Consultation

Section 9: Resuscitation Facilities

References

PREFACE TO 4TH EDITION

The members of this committee were appointed in 2012 to review and replace the 3rd edition of our college guidelines which was published in 2008. The College of Anaesthesiologists of Malaysia is well aware that an update on this document would be timely and necessary in view of the recent interest that has arisen with regards to patient safety. Hence, this edition of the college guidelines on safety standards and patient monitoring during anaesthesia has emerged with small but significant changes as compared to the previous document. Foremost, the document is now entitled “Recommendations for Patient Safety and Minimal Monitoring Standards during Anaesthesia and Recovery” to reflect the current demands for safe anaesthesia and the anaesthesiologist’s duty of care to our patients. As demands for quality and safety increases, likewise the standards of care recommended by the college must change in accordance to our commitment to achieve a high quality of anaesthesia practice in the country.

The committee members were aware of their great responsibility when producing this document as not only serves as a guide to how anaesthesiologists are to deliver care to their patients but carries along a medico-legal implication if those standards are not adhered to. Along with evaluating the usefulness of technological innovations in patient monitoring during anaesthesia is the cost implications when we insist that they must be used routinely in modern practice of anaesthesia. Safety, affordability and practicability are issues that we needed to factor in when reviewing journal reports and quality standards across the world in our process of drawing up standards that we deem to be applicable in our society.

The members of the committee represents the spectrum of service providers working in different hospital settings, that is, public institutions, universities and care providers from private hospitals. They represent not only views from anaesthesiologists working in differing institutional backgrounds but also address the challenges faced in meeting the patient safety standards and monitoring standards in their areas. Minimum quality standards must be consistent and maintained across the different healthcare institutions if we believe it to be the right of the patient to be assured that they can receive healthcare service that is safe and dependable. It is noteworthy to learn that the Malaysian Society of Quality and Healthcare refers to this document when conducting hospital accreditation surveys for purposes of quality standard certifications. Thus this document is not only intended for the practicing anaesthesiologist but also for health care providers and stakeholders of hospitals committed to quality care in Malaysia.

SECTION 1: PRINCIPLES OF ANAESTHESIA CARE

- 1.1 Anaesthesiologist in this document refers to registered medical practitioner who is either a qualified specialist anaesthesiologist or a medical officer/trainee who administers an anaesthetic.
- 1.2 All anaesthetics should be administered by a registered medical practitioner with recognized certified training in anaesthesia and resuscitation or by medical officers under adequate supervision of qualified specialist anaesthesiologist. The specialist anaesthesiologist shall be responsible for the overall anaesthetic care / monitored anaesthesia care of the patient.
- 1.3 The anaesthesiologist cannot provide direct care for more than one patient receiving anaesthesia or sedation. The anaesthesiologist should be present with the patient from induction until safe transfer to the recovery room or the intensive care unit has been accomplished.
- 1.4 However, the anaesthesiologist may delegate, temporarily, the monitoring of the patient to an appropriately qualified person who is judged by the anaesthesiologist to be competent for the task. The anaesthesiologist may leave only if the patient is stable and no potentially adverse event is likely to occur, and must be available to return at short notice. The presence of a skilled assistant is no substitute for the anaesthesiologist.
- 1.5 Every patient presenting for anaesthesia should have pre-anaesthetic consultation by a registered medical practitioner who has appropriate training in anaesthesia. It is the duty of the anaesthesiologist to obtain informed consent from the patient or guardian for administration of anaesthesia. This should be carried out in accordance to guidelines provided by the Malaysian Medical Council.
- 1.6 The anaesthesiologist must provide an adequate and legible record of the anaesthesia and this must be part of the patient's medical records.
- 1.7 Skilled assistance for the anaesthesiologist must be available at all times during the conduct of the anaesthesia.

- 1.8 The anaesthesiologist must ensure that all equipment used for the administration of anaesthesia is functioning properly before the start of each anaesthetic. However, the health facility shall be responsible for maintenance and servicing of anaesthetic equipment used.
- 1.9 There must be adequate manpower assistance for transfer and positioning of the patient on the operating table with the anaesthesiologist having the main responsibility for care of patient's airway, head and neck. The use of proper devices that allows horizontal transfer of patients without lifting of the patient is recommended to avoid injury to staff.
- 1.10 Pre-anaesthetic consultation is an integral part of safe anaesthetic practice is essential for the medical assessment of a patient prior to anaesthesia for surgery or any other procedure. It serves to identify and associated medical illness and anaesthetic risks with the ultimate aim of reducing morbidity and mortality associated with anaesthesia and surgery.
- 1.11 Explanations on the anaesthetic technique and risks involved should be made known to the patient or guardian and an informed consent obtained during pre-anaesthetic consultation.

SECTION 2: THE ANAESTHETIC MACHINE / APPARATUS

- 2.1 The anaesthetic machine or apparatus should be regularly maintained and functioning properly before the start of each operation. It is the responsibility of the anaesthesiologist to ensure that the anaesthetic machine, the airway devices and airway adjuncts, anaesthetic breathing system and monitoring devices are functioning before the start of each anaesthetic.

There must be an alternative means of ventilating the patient (e.g. self inflating bag) in the event that the anaesthetic machine fails and has to be eliminated. The oxygen supply for this device must be independent of the anaesthetic machine.

- 2.2 The oxygen supply to the anaesthetic machine must be fitted with a device for immediate warning (for example an audible alarm) of failures in the oxygen supply.
- 2.3 The anaesthetic machine should be fitted with a system that will prevent the delivery of hypoxic mixtures to the patient (anti-hypoxic device).
- 2.4 The anaesthetic breathing system should contain an analyser with an alarm to monitor the oxygen concentration of the anaesthetic gas mixture being delivered to the patient.
- 2.5 The anaesthetic breathing system should contain a device such as a pressure gauge to detect and display abnormal changes in airway pressures such as caused by disconnection, leaks and overpressure.
- 2.6 The use of device with an audible alarm to detect disconnection of the anaesthetic breathing system is essential when the patient is connected to a ventilator.
- 2.7 A properly functioning suction apparatus must be available together with the anaesthetic machine.
- 2.8 All anaesthetic machines should be fitted with anaesthetic scavenging system. The use of an active anaesthetic scavenging system is encouraged.

SECTION 3: INTRAOPERATIVE MONITORING OF THE PATIENT

- 3.1 The anaesthesiologist should ensure proper functioning of anaesthetic equipment, monitor the depth of anaesthesia, oxygenation, adequacy of ventilation and circulation from induction of anaesthesia until transfer to the recovery room or post anaesthesia care unit.
- 3.2 Clinical observations of essential vital signs must be supplemented by appropriate monitoring equipment wherever possible.
- 3.3 The following parameters in the patient are essential and must be monitored at all times; oxygenation, circulation and ventilation.
- 3.4 Oxygenation
 - 3.4.1 Oxygenation may be monitored by noting the colour of the patient's mucous membranes and colour of the operative site. The use of pulse oximeter to supplement clinical observations is mandatory. The pulse oximeter shall have a variable pulse tone and a low alarm limit that shall be audible to the anaesthetist or the anaesthesia care personnel.
 - 3.4.2 The oxygen concentration of the anaesthetic gas mixture must be continuously monitored when a general anaesthetic is administered.
- 3.5 Circulation
 - 3.5.1 The circulation must be monitored by observation of the pulse, heart rate, and blood pressure.
 - 3.5.2 The blood pressure and heart rate must be measured and recorded regularly at a frequency appropriate to the clinical condition of the patient.
 - 3.5.3 The electrocardiogram should be continuously displayed throughout the anaesthetic. It is recognised that a normal electrocardiogram may be present even when the circulation or oxygenation is grossly inadequate. However the electrocardiogram may provide early warning of impending circulatory failure due to arrhythmias and myocardial ischaemia.

3.6 Ventilation

- 3.6.1 The adequacy of ventilation must be monitored at all times by noting
- Excursion of the chest wall
 - Movement of the reservoir bag
 - Auscultation of breath sounds by a pre-cordial or oesophageal stethoscope
 - A tidal volume monitor
- 3.6.2 The use of capnography / capnometer is mandatory when a general anaesthetic is administered:
- As a quantitative assessment of ventilation
 - As a detector of adverse clinical events such as air embolism or pulmonary embolism
 - As an indicator of correct placement of a tracheal tube or laryngeal mask airway
 - As an indicator of the presence or absence of circulation

3.7 Temperature

- 3.7.1 The means to measure body temperature should be readily available and body temperature must be monitored in situations where change of temperature is intended, anticipated or suspected. Body temperature must be continually monitored in all neonatal, paediatric patients and in all patients where an active warming device (e.g. forced air warming, radiant heater) is used.

3.8 Neuromuscular function

- 3.8.1 Where muscle relaxants are used, a device to monitor neuromuscular function such as a peripheral nerve stimulator should be available.

3.9 Anaesthetic Effect on the Brain

- 3.9.1 Equipment to monitor the anaesthetic effect on the brain should be available for use on all patients when clinically indicated.
- 3.9.2 Anaesthetic gas concentration monitoring with a minimum alveolar concentration indicator must be available to detect depletion of inhalational anaesthetic agents.

3.9.3 Depth of anaesthesia monitoring (e.g. BiSpectral Index, Auditory Evoked Potential, Entropy) should be considered as a supplement to the current modalities of monitoring, especially:

- In patients who are at high risk of developing awareness.
- When the anaesthetic agent cannot be accurately measured (inhalational agent) or predicted (intravenous agent).

3.10 Specialised Monitors

3.10.1 Specialised monitoring may be required under certain circumstances, for example;

- In complicated operations or specialised procedures
- During special techniques such as induced hypotension or one lung ventilation
- In patients with coexisting medical diseases

3.10.2 Specialised monitoring includes:

- Invasive arterial and central venous pressure monitoring.
- Neurological function monitoring (e.g. somato-sensory evoked potential monitoring in spine surgery)
- Transoesophageal echocardiography (e.g. in cardiac surgery, or patients with severe cardiac disease)
- Relevant biochemical and haematological investigations.

3.11 Caveats

3.11.1 It is recognised that brief interruptions of continuous monitoring may be unavoidable. It is recommended when this occurs appropriate documentation must be made in the patient's anaesthetic record.

3.11.2 In certain rare or unusual circumstances some of these methods of monitoring may be clinically impractical and appropriate notations must be made in the patient's anaesthetic record to reflect this.

3.11.3 It is recognised that the use of these methods of monitoring is to encourage quality patient care and even when appropriately used may fail to detect untoward clinical developments and observing them cannot guarantee any specific outcome.

SECTION 4: RECOVERY FROM ANAESTHESIA

- 4.1 Recovery of the patient from anaesthesia should be carried out in a designated area (i.e. the recovery area / bay) which is appropriately staffed and equipped. The minimum staffing ratio should be appropriate for the planned number of beds that are operational.
- 4.2 The minimum requirements for recovery area / bay are:
- Suitable beds / trolleys which are capable of head down tilt
 - Oxygen supply with appropriate delivery equipment e.g. masks, laryngeal masks, endotracheal tubes, etc
 - Facilities for anaesthetizing patients if necessary (e.g. Anaesthetic machine)
 - Facilities for ventilation if necessary
 - Equipment and drugs for resuscitation including access to a defibrillator
 - Easy access to monitoring equipment similar to the operating room. (refer section 3)
 - Suction apparatus
 - Patient warming devices (e.g. forced air warmer, radiant heater) and temperature monitor devices
 - Fluid and blood warming devices
 - Permanent and dedicated staff
 - Facilities for easy and rapid communication to summon for medical help.
- 4.3 All patients in the recovery area / bay must be appropriately monitored according to patient's condition (See Section 3).
- 4.4 There should be a proper handover for the transfer of patient's care.
- From operating room staff to recovery area / bay staff
 - From the recovery area / bay staff to the ward staff
- 4.4.1 The handover of the patient's care should include clear instructions on
- Monitoring for that patient
 - Line of management for unexpected and expected complications

- 4.4.2 Discharge from recovery.
 - Patient must be reviewed by the anaesthesiologist before discharge from recovery
 - The use of recovery scoring system is encouraged.
- 4.5 Medical assistance should be immediately available in case of an emergency in the recovery area.
- 4.6 The patient should be reviewed by an anaesthesiologist before discharge from the recovery area.
- 4.7 Transport of patient:
 - 4.7.1 From the operation theatre to the recovery area.
 - Transfer of the patient from theatre to recovery should be under the supervision of the anaesthetist.
 - Supplemental oxygen should be provided, if necessary.
 - The bed or trolley should have supportive side rails and a mechanism for placing the patient in a head-down position.
 - 4.7.2 From the recovery area to the ward or Intensive Care Unit.
 - A checklist should be established to document that patient is fit to be discharged from the recovery area safely. The patient should be received by a qualified nurse during the handover and with documentation.

SECTION 5: ANAESTHESIA ADMINISTERED OUTSIDE THE OPERATING ROOMS

- 5.1 In many instances where anaesthetics are administered outside the operating room environment, the anaesthesia may be associated with greater risks to the patient. This may be due to physical separation from the patient e.g. radiological suites, specific hazardous environment e.g. radiotherapy or inability to use certain monitors e.g. MRI rooms. For this reason greater vigilance by the anaesthesiologist is required to maintain safety for the patient.
- 5.2 Patients are entitled to receive the equivalent standard of care of monitoring during anaesthesia and recovery as they would receive within the operating room.
- 5.3 Where general anaesthesia is provided, skilled and dedicated assistance for the anaesthesiologist is essential. In addition, appropriate locations with adequate monitoring facilities need to be identified for the post-anaesthetic recovery of the patient.
- 5.4 Where close physical monitoring is not possible due to specific hazard (e.g. radiation, magnetic resonance imaging) suitable adaptations of techniques and equipment to monitor the patient is required to provide an adequate level of anaesthetic care and safety for the patient.

SECTION 6: REGIONAL ANAESTHESIA

- 6.1 Patients who undergo regional anaesthesia must receive the equivalent standard of care and monitoring as for those undergoing general anaesthesia throughout the perioperative period.
- 6.2 Pre-operative assessment
 - 6.2.1 Apart from the routine preoperative assessment, enquiry into any possible contraindications to regional anaesthesia should be undertaken. Patient's refusal is an absolute contraindication for regional anaesthesia.
- 6.3 Ultrasound guidance with or without nerve stimulator is encouraged for the safe conduct of regional blocks when necessary.

SECTION 7: MONITORED ANAESTHESIA CARE AND MONITORED SEDATION

The main objectives of sedating a patient are to bring about anxiolysis, produce a degree of amnesia and maintain co-operation of the patient so that uncomfortable diagnostic and minor surgical procedures may be performed.

- 7.1 A patient who is to be given any form of sedation for a procedure should be assessed and informed consent must be obtained.
- 7.2 The person administering sedation must have adequate knowledge of the pharmacology of drugs used. He or she should be able to detect and manage appropriately any complications due to the actions of these drugs. The person administering these drugs should be the one monitoring the patient and must not assume the additional role of the operator.
- 7.3 The procedure should be performed in a location which is suitable in size and environment. It should be staffed and equipped to deal with any cardiopulmonary emergency. The following facilities should be available:
 - a. An operating table or trolley which can be tilted to Trendelenburg position
 - b. Adequate lighting and suction equipment
 - c. Supply of oxygen and oxygen delivery devices
 - d. Equipment to monitor the patient i.e. blood pressure (BP), pulse-oximeter, heart rate and electrocardiogram (ECG). The use of respiratory monitors such as capnography or chest wall impedance is highly recommended
 - e. Equipment for laryngoscopy, endotracheal intubation and ventilation
 - f. Appropriate drugs for cardiopulmonary resuscitation and equipment for administration of drugs.
- 7.4 A written record of the time and dosages of the drugs used must be kept as part of the patient's records. This record must also note the monitored values of the patient's vital signs.

- 7.5 There should be a protocol on the handing over of care of the patient from the operating room staff to the recovery room staff, and from the recovery room staff to the ward staff or discharge. This should include further instructions on monitoring and management of expected and unexpected complications.
- 7.6 Extra medical staff should be immediately available in case of an emergency.
- 7.7 The patient should be reviewed by the doctor before discharge from the recovery room.

SECTION 8: PRE-ANAESTHETIC CONSULTATION

While the main purpose of the consultation is to assess and ensure that the patient is optimised before surgery, it also includes other aspects of care listed in this section. The skills and judgment required are different and additional to those involved in the administration of anaesthesia.

- 8.1 The pre-anaesthetic consultation should preferably be performed by the anaesthesiologist who is to administer the anaesthetic. If that is not possible, there must be some means for the findings of the consultation to be conveyed to the anaesthesiologist administering the anaesthetic.
- 8.2 The consultation should take place at an appropriate time before surgery and anaesthesia to allow for adequate assessment, reviewing results of investigations ordered and optimisation of medical conditions. This is especially important if there are significant co morbidities, patients undergoing major surgery or where there are specific anaesthetic concerns. The pre-anaesthetic consultation may be performed in the Anaesthetic clinic, ward or at the operating theatre.
- 8.3 For daycare surgery or day of admission surgery, the pre-anaesthetic consultation should preferably be done prior to admission e.g. Anaesthetic Clinic. Otherwise there should be allowance of adequate time for assessment prior to surgery.
- 8.4 The pre-anaesthetic consultation should include the following;
 - Relevant present and past medical history
 - Review of current and past medication including any herbal medication
 - Allergies
 - A clinical examination of the patient.
 - Review of laboratory, radiological and other investigations. If necessary the anaesthesiologist may request for further investigations
 - Therapeutic measures if necessary should be ordered and carried out to optimise the patient
 - Discussion on the anaesthetic plan, technique and pain management with the patient and / or guardian.

- 8.5 An informed consent should be taken which encompasses details of the anaesthetic technique, risk of anaesthesia and any other risk relevant to the patient's condition and type of surgery.
- 8.6 There should be consultation with colleagues in other disciplines where appropriate.
- 8.7 A written summary of the pre-anaesthetic consultation should be available and becomes part of the patient's medical records.

SECTION 9: RESUSCITATION FACILITIES

General

It is recognized that there should be adequate resuscitation facilities provided for the patient being managed in critical care areas outside the operating room and intensive care. These include the recovery area / bays, areas where procedures are carried out under monitored sedation anywhere in the hospital and clinic procedures done under local anaesthesia. These facilities should include a range of emergency drugs and resuscitation equipment. The list given is only a guide and may be modified according to local circumstances.

9.1 Emergency Drugs

1. Adenosine
2. Adrenaline
3. Amiodarone
4. Atropine
5. Calcium Chloride / Gluconate
6. Dantrolene Sodium (for malignant hyperthermia)*
7. Dextrose 50%
8. Dopamine
9. Ephedrine
10. Flumazaniil
11. Frusemide
12. Hydrocortisone
13. Hydralazine
14. Intralipid 10% (for LA toxicity)
15. IV Fluids: Crystalloids and Colloids
16. Labetolol
17. Lignocaine
18. Magnesium Sulphate
19. Naloxone
20. Nitroglycerin
21. Phenylephrine
22. Salbutamol
23. Sodium Bicarbonate 8.4%

** Dantrolene sodium should be readily available for immediate use when required. However in smaller hospitals where it is impractical to keep the stock of dantrolene in the facility, the management must ensure that provisions have been made to obtain the dantrolene immediately from another facility.*

9.2 Equipment

1. Syringes and needles of various sizes
2. Intravenous cannulae of various sizes
3. Chest tubes and drainage sets of various sizes
4. Oropharyngeal, nasopharyngeal airways and supraglottic airway devices (e.g. laryngeal mask airway) of various sizes
5. Laryngoscopes and blades of different sizes
6. Endotracheal tubes of various sizes
7. Self-inflating bag with face masks of various sizes
8. Oxygen supply and means of oxygen delivery via flow meters
9. Nasogastric tubes of various sizes
10. Suction facilities
11. Access to monitoring equipment such as pulse oximeter and ECG
12. Access to a defibrillator.

REFERENCES

1. Malaysian Medical Council. Consent for treatment of patients by registered medical practitioners, 2013.
2. Merry AF, Soyannwo O, Wilson IH, Eichhorn JH. International Standards for a safe practice of anaesthesia 2010. *Can J Anesth* 2010;57:1027-1034.
3. Sinclair CM, Thadsad MK, Baker I. Modern Anaesthesia Machine. Continuing Education in Anaesthesia, Critical Care and Pain. *Oxford Journals* 2006;6:75-78.
4. Australian and New Zealand College of Anaesthetists (ANZCA) Professional Document on Recommendations on Monitoring During Anaesthesia,. *Recommendations on Monitoring During Anaesthesia*. PS18;2008.
5. The Association of Anaesthetists of Great Britain & Ireland. *Guidelines for the Provision of Anaesthetic Services: Anaesthetic Care in the Non-Theatre Environment*, Revised 2011.
6. Australian and New Zealand College of Anaesthetists (ANZCA) *Recommendations on Minimum Facilities for Safe Administration of Anaesthesia in Operating Suites and Other Anaesthetising Locations*. PS55;2012.
7. Australian and New Zealand College of Anaesthetists (ANZCA). *Guidelines for the Management of Major Regional Block*. PS03;2011.
8. James R. Hebl. The Importance and Implications of Aseptic, Techniques During Regional Anesthesia. *American Society of Regional Anesthesia and Pain Medicine*. Vol.31 No.4 July-August 2006.
9. Australian and New Zealand College of Anaesthetists (ANZCA). *Recommendations for the Pre- Anaesthesia Consultation*. PS7;2008.
10. The Hong Kong college of Anaesthesiologists. *Guidelines on the Pre- Anaesthetic Consultation*. P113;September 1996 (Reviewed 2002).
11. The Royal College of Anaesthetists, UK. *Guidance on the Provision of anaesthesia services for Pre-operative Care*. Revised 2009.
12. Association of Anaesthetists Great Britain Ireland. *Safety Guidelines. Pre- operative Assessment and Patient Preparation. The Role of the Anaesthetist*. 2010.
13. Academy of Medicine of Malaysia, College of Anaesthesiologists. *Recommendations on Pre-anaesthetic assessment*. 1998, Revised 2012.
14. Association of Anaesthetists of Great Britain & Ireland Safety Guide. *Management of severe local anaesthetic toxicity*. 2010.
15. Brull SJ. Lipid Emulsion for the Treatment of Local Anesthetic Toxicity: Patient Safety Implications. *Anesth Analg* 2008;106:1337-9.
16. Glahn KP, Ellis FR, Halsall PJ, Müller CR, Snoeck MM, Urwyler A, et al. European Malignant Hyperthermia Group. Recognizing and managing a malignant hyperthermia crisis: Guidelines from the European Malignant Hyperthermia Group. *Br J Anaesth* 2010;105:417-20.
17. Association of Anaesthetists of Great Britain & Ireland. *Guidelines for the management of a Malignant Hyperthermia Crisis*. 2007.