INDIAN SOCIETY OF ANAESTHESIOLOGISTS

MONITORING STANDARDS FOR PROVIDING ANAESTHESIA

Introduction

Administration of any form of anesthesia to a patient undergoing surgery is associated with inherent risks and complications. These risks may be due to anesthetic drugs or techniques, or due to associated surgical disease and may be complicated by coexisting medical problems. Morbidity or even mortality due to anesthesia may not be entirely predictable or preventable. Continuous monitoring of the patient, however, has shown that the risk of unfavorable outcome may be minimized. There is enough evidence and wide acceptance that adoption of good and proper monitoring standards in clinical anesthetic practice has considerably improved the patient safety and outcome.

"Eternal Vigilance" is the motto of American Society of Anesthesiologists (ASA). The same has been accepted and practiced world wide including Indian Society of Anaesthesiologists. The earlier practice of monitoring essentially consisted of clinical monitoring of Pulse, Blood pressure(BP), Respiratory rate, and cyanosis. These clinical indicators were however unsatisfactory to detect hypoxia or inadequate ventilation. Further monitoring of color of skin or mucous membrane for cyanosis depended largely on good illumination. Often they did not indicate true nature of patient condition and changes observed were often late and meant that clinical condition has deteriorated some times to irreversible condition. It was clear that additional sophisticated aids were necessary to supplement the clinical parameter monitoring. Fortunately technological developments resulted in introduction of monitors which would supplement clinical monitoring and often provide reliable information about patient's condition such as hypoxia, hypoventilation much early; so that corrective measures could be implemented before any complications occurred to the patient. The introduction of pulse oximeters and capnographs resulted in immediate acceptance to detect and prevent hypoxic condition and inadequate ventilation and significantly reduced anesthetic mortality. Competition in developments and extensive use of monitors now has resulted in a plethora of monitors being available for clinical use, which provide more detailed information about the condition of patient that was not possible earlier. Monitors are now available for detection of Hypoxia (Pulse Oximeter, Oxygen Analyzers), Hypoventilation (Capnometers), monitoring the cardiac status (ECG, Non-invasive and invasive BP, Central venous pressures), temperature monitoring to detect hypothermia, neuromuscular monitors to facilitate use of muscle relaxants etc. Further specialized monitoring for cardiac hemodynamics (such as stroke volume, cardiac output and systemic resistance measurements, Trans-esophageal Echocardiography), cerebral hemodynamics (such as ICP Monitoring, Cerebral Doppler, cerebral micro dialysis), monitoring depth of anesthesia (by Bispectral Index Monitoring) etc. However, it is well

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recognized that all monitors may not improve patient outcome. For a monitor to be useful, they should be reliable, improve patient safety and also lead to better clinical outcome. Further, they should also be cost-effective. Young and Griffiths observed that availability of more information is not always better and monitoring will only benefit the patient, if there is an effective treatment for the underlying cause. The right information must be collected at the right time, interpreted correctly and acted upon appropriately. It cannot be overemphasized that monitors may not prevent an adverse outcome of anesthesia. They however reduce the risks by early warning of impending or deteriorating condition of the patient. Monitors may also malfunction. It is the man behind the machine, appropriately trained and experienced Anesthesiologists, who has the responsibility of properly interpreting the numbers. Unfortunately, it is recognized that human error may occur and sometimes is inevitable.

The Australian incident monitoring has clearly shown that some of the adverse outcome after anesthesia is often attributed, at least partly, to human error. Therefore, for a good outcome, monitors are essential. Large number of monitors are unlikely to improve the outcome of anesthesia. A set of minimum monitors or “Core or standard monitors” which have proved their reliability and improve safety of anesthetized patient is therefore essential for practice of anesthesia.

Introduction of pulse oximeters and capnographs into the clinical practice during this time and their usefulness became evident right away. The wide acceptance of these monitors in anesthetic safety resulted in formation of a task force under World Federation of Anesthesiologists in 1989. An International Task Force (ITF) was constituted for (a) guidance and assistance to anesthesia providers, professional societies, hospital administrators, and the governments in improving the quality and safety of anesthesia (b) update and improvise minimum mandatory monitory standards as applicable to each country, depending on the medico-legal, cultural norms and customs, racial, endemic and environmental factors. The recommendations of ITF were accepted by WFSA in 1992.

Based on these guidelines, each country has formulated their guidelines or recommendations for monitoring standards that need to be followed for safe conduct of anesthesia. The Indian Society of Anaesthesiologists took guidelines from Recommendations of WFSA for “Monitoring standards”. A committee was constituted to recommend the monitoring standards, which was deliberated at different forums. The recommendations were introduced in general body of Indian Society of Anaesthesiologists in 1999 and adopted as National Standards from then on. The Governing Council of ISA in their midterm meeting in March 2010 decided to review the existing guidelines in view of much changes in practice of anesthesia all over the country and availability of low cost monitors, which can be procured even by smaller hospitals.

A committee has been constituted with following members by Dr.J.Ranganathan, President, ISA National in March 2010.

1. Dr.AL.Meenakshi sundaram, Professor of Anesthesiology, Thanjavur Medical College, Thanjavur, TamilNadu as Chairman
2. Dr.S.C. Parakh, Member
3.Dr.Shivakumar s kumber, Member

India is a country of diversity. The medical practices in India vary extensively. In towns and smaller cities, there are smaller hospitals with fewer anesthetic equipments and Anesthesiologists working alone without help being available. In contrast, the major cities are flourishing with high tech corporate hospitals with state of the art equipments being available. In between there are large number of State Government hospitals,

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medical college hospitals and other hospitals, which may not be equipped with extensive monitoring facilities, but adequate enough to meet the monitoring standards. Fortunately, the situation in smaller hospitals is changing. The introduction of National monitoring standards has made the hospital management to realize the need for procurement of new monitors. The Consumer Protection Act (CPA) has indirectly made the management follow these guidelines seriously.

Keeping these in view, new monitoring standards has been revised to allow safe practice of anesthesia in all types of hospitals. Further the role and responsibilities of Anesthesiologists and hospital management is emphasized clearly.

MONITORING STANDARDS FOR ANAESTHESIA

The standard monitoring practice is discussed under following headings. Each recommendation is given with an explanation. These standards apply to all type of anesthesia care. Though these standards are expected to encourage safe anesthetic practice, it is equally recognized that no specific outcome of anesthesia is guaranteed. These standards are applicable for most of the cases in clinical practice. However, appropriate specialized monitoring devices may be necessary in patients with associated medical diseases and high risk for anesthesia. These monitoring standards do not apply for Labor Analgesia and Pain Therapy.

SECTION I: The Anesthesiologist

1.1 All anesthetic procedure shall be provided by a qualified Anesthesiologist, possessing an anesthetic qualification of Diploma (D.A) or M.D. degree or D.N.B.in Anesthesiology recognized by Medical Council of India .

1.1.1 It may be noted that providing anesthesia has its own morbidity and mortality. In the interest of the patient and his outcome, it should be ensured that only qualified Anesthesiologist, who is well aware of problems and solutions shall provide anesthesia to the patient. The practice of any other persons (by Surgeon himself or nurse or technician) administering anesthesia should strongly be discouraged.

1.2 The hospital management shall be responsible for employing or providing a qualified Anesthesiologist for the surgery

1.2.1 The hospital management should ensure that only qualified Anesthesiologist provide anesthesia in their hospital.

1.3 The hospital management shall provide an assistant to the Anesthesiologist, who may be a trainee Anesthesiologist, or a nurse or an anesthesia technician or a paramedical person trained in that job.

1.3.1 As any anesthetic mishap requires assistance, it should be immediately available to the Anesthesiologists by means of an assistant. In major hospitals and teaching institutions, junior Anesthesiologists or postgraduate trainees in anesthesiology may be available. In other hospitals where junior Anesthesiologists are not available a nurse/anesthesia technician/paramedic who is trained in anesthetic procedure should be available for help.

1.4 The Anesthesiologist providing anesthesia for a patient shall be present throughout the surgical procedure and shift the patient to post-operative ward or Intensive care as the case may be and hand him over to ICU/ward in-charge.

1.4.1 As anesthesia is associated with rapid changes in patient condition, qualified Anesthesiologist should be available throughout the surgery, to monitor the patient. Should a temporary absence of the primary Anesthesiologist is necessary, he should

handover the patient to either another Anesthesiologist or anesthesia trainee or any other trained assistant.

1.4.2 If anesthesia is being provided in a hazardous environment such as Radiation Suite, appropriate monitoring devices should be available so that the patient could be monitored remotely.

1.5 The Anesthesiologist should maintain the same level of monitoring irrespective of type of anesthesia (General/ Regional/sedation/ monitored anesthesia care).

1.5.1 Though utmost care is given while patient is receiving general anesthesia, there should not be any laxity in care during regional or monitored anesthesia care. It should be noted that rapid changes may occur during these procedures as well.

1.6 The Anesthesiologist should maintain and record the monitored data in the anesthetic record system accurately and frequently.

1.6.1 It is recommended that the monitored data should be recorded at intervals not longer than five minutes in rapidly changing situations and not longer 10 minutes in stable patients.

Section II: Monitors and Monitoring the Patient

2.1 During anesthesia, it is mandatory for all patients to be monitored for Oxygenation, Ventilation, and Circulation both clinically and with appropriate monitors.

2.2 It is mandatory to monitor oxygenation of every anesthetized patient

2.2.1 Oxygenation of the patient should be monitored clinically by observation color of the skin and mucous membrane and operating field. There must be adequate, illumination of the patient for proper observation of color.

2.2.2 It is mandatory for Oxygenation to be further monitored by Pulse Oximetry, which displays both the saturation and heart rate in bold form. The pulse oximetry should have variable pitch pulse tone and low oxygen alarm which is audible clearly. Display of pulse plethysmography by the pulse oximeter is strongly recommended.

2.2.3 It is mandatory for all patients to receive an assured Inspired Oxygen concentration of at least 25%. This may be ensured by appropriate Anesthetic machine, which has incorporated a hypoxic guard system set to that effect. These anesthetic machines should also possess visual and audible oxygen failure alarm.

2.2.4 When an anesthetic machine which do not have a hypoxic guard and oxygen failure alarm is used, then the Inspired Oxygen Concentration should be monitored with an Oxygen Analyzer which has alarms for low oxygen in the circuit.

2.3 It is mandatory to monitor ventilation of every anesthetized patient

2.3.1 Ventilation should be monitored clinically by observation of chest movement of the patient/movement of the reservoir bag and auscultation of the breath sounds.

2.3.2 In addition to clinical observation, it is preferable to use capnograph as added safety for monitoring the ventilation.

2.3.3 It would be helpful to monitor Expired tidal or minute volume of the patient in some situations/surgeries.

2.3.4 It is mandatory to check the position of endotracheal tube or Laryngeal mask airway when they are inserted. It could be done clinically or by monitoring a capnograph.

2.3.5 Whenever mechanical ventilation is instituted peroperatively, it is mandatory that there should be an alarm system to detect disconnection of the patient from mechanical ventilation.

2.4 It is mandatory to monitor Circulation of every anesthetized patient

2.4.1 It is mandatory to monitor the pulse by palpation at appropriate places frequently.

2.4.2 It is mandatory to monitor the circulatory function by continuous tracing of electrocardiogram.

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2.4.3 It is mandatory to monitor the blood pressure frequently i.e not longer than five minutes .It could be done either manually or by a Non Invasive Blood Pressure Monitor.

2.4.4 Continuous intra arterial pressure tracing and monitoring is recommended in select situations e-g .major cardiovascular and thoracic procedures, expected rapid hemodynamic changes.

2.4.5 Central venous pressure tracing and monitoring is recommended in select situations e-g major cardiovascular and thoracic procedures, expected rapid hemodynamic changes.

Section III: Additional Monitoring Recommendations

3.1. Patients belonging to High risk category/Pediatric/Geriatric/Requiring large volume replacements may be monitored with temperature monitors.The core body temperature could be monitored with nasopharyngeal or oesophageal or rectal probes.Warming devices should be used as and when the need arises.

3.2. Neuromuscular monitoring may be used in select situations/surgeries e.g. neuromuscular diseases, requirement of large doses of relaxants, delayed recovery

Section IV: Monitoring the Equipment

4.1 The hospital management shall be responsible for procurement, maintenance servicing, and calibration of monitoring and other anesthetic equipments. They should procure the equipments in adequate numbers.

4.2 The concerned Anesthesiologist shall be familiar with the setup, proper use and trouble shooting of the equipments.

4.3 The Anesthesiologist should check all the anesthetic equipments and monitors before connecting them to the patient. Before commencing anesthesia delivery, he should appropriately set the alarm parameters.

4.4 In children and other uncooperative patients who are not accepting the monitors in a conscious state, anesthesia could be induced with clinical monitoring of Pulse, BP and auscultation. Monitors could be connected as soon as possible.

Section V: Monitoring during Transportation to Post-operative Recovery Ward

5.1 All patients shall be monitored continuously till he recovers from anesthesia and has intact reflexes.

5.2 Patients are to be transported to the post-operative recovery area by the Anesthesiologist/Assistant and the patient is handed over to the ward in charge. The summary of the anesthesia record and necessary postoperative instructions are to be handed over.

5.3 Patient should be under continuous observation with ECG, Pulse Oximeter and BP monitoring as needed.

Section VI: Monitoring in the Post-operative Recovery Ward

6.1 The patient shall be monitored in the Post-operative recovery area with continuous monitoring of ECG, Pulse Oximeter and BP.

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6.2. A post-operative recovery chart shall be maintained by recovery ward staff detailing level of consciousness, hemodynamic status, and respiration. They shall be charted every 15 minutes and earlier if the patient deteriorates.
6.3. Patient shall be transferred out of recovery or post-operative ward, only when he has completely recovered from the effect of all anesthetic drugs and clinical condition is stable.
6.4. If the clinical condition of the patient is not stable, he should be transferred to appropriate Intensive Care Unit for further management.