Monitoring during anaesthesia: beyond minimal standards

Shahridan Mohd Fathil

Department of Anaesthesia, Gleneagles Hospital Medini Johor, Malaysia

One of the fundamental tenets of anaesthesia is patient monitoring. In 1985, a modest initiative that started as a straightforward attempt to lower malpractice indemnity costs in hospitals linked with Harvard University made pulse oximetry and capnography mandatory during anaesthesia. A year later, the formulated standards were later published in the Journal of the American Medical Association to promote patient safety at the national level. In the same year, after much publicity, the American Society of Anesthesiologists ratified the national monitoring standards by an almost unanimous vote.

The International Taskforce on Anaesthesia Safety was established in 1989 and comprises leaders who were involved in developing anaesthesia safety policies in their home nations with the goal of “improving anaesthesia safety by advocating international standards for anaesthesia practice.” The task force aimed to increase current regulations and offer a framework for anaesthesia practitioners in other countries to create their national safe practices. These efforts led to the World Federation of Societies of Anesthesiologists developing International Standards for a Safe Practice of Anaesthesia at the World Congress of Anesthesiologists in 1992.

In embracing the efforts above, the Malaysian Society of Anaesthesiologists (MSA) published the Recommendations for Safety Standards and Monitoring during Anaesthesia and Recovery in 1993, and the second updated edition in 1997. After over a decade, the College of Anesthesiologists (CoA), Academy of Medicine of Malaysia in collaboration with MSA produced the Recommendations for Safety Standards and Monitoring During

Correspondence: Dr. Shahridan Mohd Fathil, Department of Anaesthesia, Gleneagles Hospital Medini Johor, Malaysia.
E-mail: cooldoc1971@yahoo.co.uk
Anaesthesia and Recovery Revised 2008. Five years later, the fourth edition with a slightly different title of Recommendations for Patient Safety and Minimal Monitoring Standards during Anaesthesia and Recovery (4th Edition) 2013 was published by CoA and MSA. More recently, the Recommendations for Patient Safety and Minimal Monitoring Standards during Anaesthesia and Recovery (5th Edition) 2022 was produced.

In the latest edition of the recommendations, the following statements were indicated:

- “A peripheral nerve stimulator should be available when muscle relaxants are used to monitor neuromuscular function” under the section of Intraoperative Monitoring of the Patient, under the subsection of Neuromuscular function.
- “Depth of anaesthesia monitoring (e.g., BiSpectral Index, Auditory Evoked Potential, and Entropy) is indicated: In patients who are at high risk of developing awareness” and “When total intravenous anaesthesia technique is administered especially if it is used together with neuromuscular blockade” under the subsection of Depth of Anaesthesia Monitoring.

Near similar statements for neuromuscular function can be traced back to the second edition, and for depth of anaesthesia monitoring to the third edition.

Residual neuromuscular blockade defined as a quantitative train-of-four (TOF) ratio of lower than 0.9 at the end of surgery has been linked to unpleasant clinical symptoms of weakness, extended stay in the Post-Anaesthesia Care Unit (PACU), reduced hypoxic ventilatory response, increased upper airway obstruction risk, and decreased ability to protect the airway. Residual neuromuscular blockade is a contributing factor for postoperative pulmonary complication.

Deep neuromuscular blockade defined as no TOF response and 2 or fewer responses to post-tetanic count enhanced surgical space conditions and reduced postoperative pain in the PACU for laparoscopic surgery.

Bispectral index (BIS), a processed electroencephalography (pEEG) depth of anaesthesia monitor, has not been proven to reduce the incidence of accidental awareness under general anaesthesia (AAGA) for inhalational anaesthesia but exhibited a notable superiority for intravenous anaesthesia but BIS usage has been associated with lower volatile and propofol anaesthesia doses, quicker recovery from anaesthesia, and a shorter PACU stay.
A low BIS score defined as less than 40–45 has been linked to increased long-term mortality.\textsuperscript{15,16} Anaesthesia guided by pEEG was associated with a reduction in postoperative delirium.\textsuperscript{17} Light anaesthesia defined as BIS of 50 compared to deep anaesthesia defined as BIS of 35 among patients following major surgery decreased the incidence of postoperative delirium and postoperative cognitive impairment.\textsuperscript{18}

Deep neuromuscular blockade guided by a peripheral nerve stimulator will improve the laparoscopic surgical condition and postoperative pain; its adequate reversal will reduce post-extubation complications. Adequate delivery of anaesthetics guided by pEEG will reduce the incidence of AAGA; avoidance of excessive doses will reduce mortality and cognitive morbidity. These balancing acts will require going beyond the minimal standards.

References

9. Recommendations for Safety Standards and Minimal Monitoring Standards during Anaesthesia and Recovery (5th Edition) 2022: College of Anaesthesiologists, Academy of Medicine Malaysia and Ma-


