

International standards for a safe practice of anesthesia: A step toward total quality assurance of anesthesia practice

EDITORIAL BOARD OF THE JOURNAL OF ANESTHESIA

Key words: International standards—Anesthesia—Quality assurance

Introduction

The International Task Force on Anaesthesia Safety* issued the *International Standards for a Safe Practice of Anaesthesia*, which was adopted by the World Federation of Societies of Anaesthesiologists on 13 June 1992. The original Task Force included ten anesthesiologists from nine countries and was supported by a nonprofit foundation called Communicore. The foundation was originally supported through unrestricted grants from Datex, Hewlett-Packard, Nellcor, Ohmeda, and Sentinel Monitoring. Prof. Kazuyuki Ikeda of Hamamatsu University School of Medicine was one of the original members, but since June 1993, Prof. Yasuhiro Shimada of Nagoya University School of Medicine has taken over his position. Now the Task Force meets twice a year and is developing a second document on the quality assurance of anesthesia practice. The International Standards have been accepted worldwide and printed in many international journals in different languages, in-

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Received for publication on July 13, 1994; accepted on July 29, 1994

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cluding the European Journal of Anaesthesiology [1], and the Editorial Board considers it appropriate to publish these standards in our journal.

International standards for a safe practice of anesthesia

Preamble

These Standards are recommended to anesthetists throughout the world. Their purpose is to provide guidance and assistance to anesthetists, professional societies, hospital administrators, and governments in improving the quality and safety of anesthesia.

For some anesthetists, these Standards will represent a future goal, while for others they may already have been implemented and be regarded as mandatory. The most important standards relate to the individual anesthetist. Monitoring devices play an important part in safe anesthesia as *extensions* to clinical skills rather than their replacement.

Minimum standards, indicated in **bold**, are applicable to any preplanned anesthetic, from patient evaluation to recovery; it is recognized, however, that immediate lifesaving measures always take precedence in an emergency. Further recommendations should be implemented as resources and training permit: Highly recommended standards should be implemented first, followed by those which are recommended, and then those that are encouraged. (A glossary of terms used in this document is given in Appendix 1). It is anticipated that these standards will need revision as practice and technology evolve.

General standards

Professional status **The provision of anesthesia is a vital component of basic healthcare and merits an ap-**

appropriate share of the available resources. It is highly recommended that anesthetists should be appropriately trained and accredited medical specialists with clinical and administrative autonomy. When anesthesia is provided by other personnel, it is highly recommended that the anesthetist should be appropriately trained and accredited, and directed and supervised by a medically qualified specialist anesthetist.

Professional organizations **Anesthetists should form appropriate organizations at local, regional, and national levels for the setting of standards of practice, supervision of training, continuing education with appropriate certification and accreditation, and general promotion of anesthesia as an independent professional specialty.** These organizations should form links with appropriate groups within the region or country and internationally.

Training, certification and accreditation **Adequate time and facilities should be available for professional training, both initial and continuing, to ensure that an adequate standard of knowledge, expertise, and practice is attained and maintained.** Formal certification of training and accreditation to practice is recommended.

Records and statistics **A record of the details and course of each anesthetic should be made and preserved with the patient's records.** This should include details of the preoperative assessment and the postoperative course. It is recommended that individuals, departments, and regional and national groups collect data to facilitate the progressive enhancement of the safety, efficiency, effectiveness, and appropriateness of anesthesia.

Peer review **Institutional, regional and/or national mechanisms to provide a continuing review of anesthetic practice should be instituted. Regular confidential discussion of appropriate topics and cases with professional colleagues should take place. Mechanisms and protocols should be developed to ensure that deficiencies in individual and collective practice are identified and rectified.** Anonymous incident reporting is encouraged as a useful mechanism in this respect. Legal safeguards of the confidentiality of the review material may be appropriate and should be sought where they do not already exist.

Workload **A sufficient number of trained anesthetists should be available so that individuals may practice to high standard.** Time should be allocated for professional development, administration, research and teaching.

Personnel **An anesthetist must be dedicated to each patient and be present throughout each anesthetic (general, regional, or monitored sedation), and should be responsible for the transport of the patient to the postanesthesia recovery facility and the transfer of care to appropriately trained personnel. The anesthetist should retain overall responsibility for the patient during the recovery period and should be readily available for consultation until the patient has made an adequate recovery. The anesthetist should ensure, if aspects of direct care are delegated before, during, or after an anesthetic, that the person to whom responsibility is delegated is both suitably qualified and conversant with relevant information regarding the anesthetic and the patient.**

Where it is impossible for the above standard to be attained and the surgeon or another individual assumes responsibility for the anesthetic, it is highly recommended that the practice and cases be reviewed and audited from time to time by an appropriately trained anesthetist.

Facilities and equipment **Appropriate equipment and facilities, adequate both in quantity and quality, should be present wherever anesthesia and its recovery is undertaken.** A list of recommended equipment and suggestions as to the order in which additions should be made as resources permit is given in Appendix 2.

It is highly recommended that anesthesia equipment conforms to relevant national and international standards.

Formal certification of an individual's ability to use a specific piece of equipment correctly and safely is encouraged.

Perianesthetic care and monitoring

The first and most important component of perianesthetic care, including monitoring of the anesthesia delivery system and the patient, is the continuous presence of a vigilant anesthetist throughout the operative period.

Preanesthetic care

The patient must be evaluated by an anesthetist prior to induction of anesthesia. The anesthetist must ensure that all necessary equipment is in working order prior to the induction of anesthesia. The development of protocols to facilitate such verification is encouraged. **The anesthetist should ensure that assistance is available and that the assistant(s) have been instructed in, and are competent at, the necessary tasks.**

*Monitoring during anesthesia**Oxygenation*

Oxygen supply. Supplemental oxygen is highly recommended for all patients undergoing general anesthesia. **The anesthetist should ensure the integrity of the oxygen supply. When nitrous oxide or other supplemental gases are used, the concentration of oxygen in the inspired gas should be verified, at least at the commencement of each anesthetic session.** It is highly recommended that the inspired oxygen concentration be monitored throughout each anesthetic with an instrument fitted with a low oxygen concentration alarm. An oxygen supply failure alarm and a device protecting against the delivery of a hypoxic gas mixture are highly recommended. **A system should be used to prevent misconnection of gas sources.**

Oxygenation of the patient. **Tissue oxygenation should be monitored whenever practicable by visual examination. Adequate illumination and exposure of the patient should be ensured whenever practicable unless an appropriate monitor is used.** The continuous use of a quantitative monitor of oxygenation such as pulse oximetry is highly recommended.

Airway and ventilation **The adequacy of the airway and ventilation should be continuously monitored by observation and auscultation whenever practicable.** Where a breathing circuit is used, movements of the reservoir bag should be observed. Continuous monitoring with a precordial, pretracheal, or esophageal stethoscope is highly recommended. Confirmation of the correct placement of the endotracheal tube and the adequacy of ventilation by continuous measurement and display of the carbon dioxide waveform and concentration is highly recommended. **When mechanical ventilation is employed, a disconnect alarm should be used throughout the period of mechanical ventilation.** Continuous measurement of the inspiratory and/or expired gas volumes is recommended.

Circulation

Cardiac rate and rhythm. **The circulation should be monitored continuously. Palpation or registration of the pulse and/or auscultation of the heart sounds should be continuous.** Continuous monitoring and display of the heart rate with a plethysmograph (stand-alone or pulse oximeter) or electrocardiograph are highly recommended. The provision of a defibrillator is highly recommended.

Tissue perfusion. **The adequacy of tissue perfusion should be monitored continually by clinical examination.** Continuous monitoring with a plethysmograph or capnograph is highly recommended.

Blood pressure. **Arterial blood pressure should be determined at appropriate intervals (usually at least every 5 min, and more frequently if indicated by clinical circumstances).** Continuous registration of arterial pressure is encouraged in appropriate cases.

Temperature **A means of measuring the temperature should be available and should be used at frequent intervals where clinically indicated (e.g., prolonged or complex anesthetics, young children).** The continual measurement of temperature in patients in whom a change is anticipated, intended, or suspected is highly recommended. The provision and use of continuous electronic temperature measurement is recommended.

Depth of anesthesia **The depth of anesthesia should be regularly assessed by clinical means.** The continuous measurement of inspired and expired concentrations of nitrous oxide and volatile agents is encouraged.

Neuromuscular function When neuromuscular blocking drugs are given, the use of a peripheral nerve stimulator is recommended.

Postanesthesia care

Facilities and personnel **All patients who have had an anesthetic affecting central nervous system function and/or loss of protective reflexes should remain where anesthetized or be transported to a location specifically designated for postanesthesia recovery. See General Standards (Personnel) above for delegation of responsibilities of the anesthetist. All patients should be observed and monitored in a manner appropriate to the state of their nervous system function, vital signs, and medical condition with emphasis on oxygenation, ventilation, and circulation.** Supplementation of clinical monitoring with quantitative methods described above for intraanesthetic patient care is recommended. Pulse oximetry is highly recommended.

Appendix 1*Glossary*

Anonymous incident reporting—mechanism for reporting anesthesia incidents without identifying the individual administering the anesthetic.

Continual—repeated regularly and frequently.
 Continuous—without interruption.

Appendix 2

Basic equipment requirements

For anesthesia administration as available, including:

- Intravenous anesthesia
- Regional anesthesia
- Inhalational anesthesia (open techniques or suitable flow-over vaporizer)

For patient monitoring:

- Stethoscope
- Sphygmomanometer
- Light source
- Thermometer

For patient support:

1. Airway management
 - Airways, masks
 - Suction apparatus
 - Laryngoscope, endotracheal tube
2. Ventilatory support
 - Self-inflating bag
 - Oxygen supply
3. Circulatory support
 - Needles, syringes, cannulae, infusion fluid
4. Drug therapy
 - As appropriate for common emergencies and cardiopulmonary resuscitation

Intermediate equipment requirements—as above, PLUS:

For anesthesia administration:

- Compressed gas supply—O₂, N₂O
- Calibrated vaporizer
- Anesthetic circuits

For patient monitoring:

- Oxygen supply failure alarm
- Oxygen analyzer
- Oximeter
- Capnometer
- Electrocardiogram

For patient support:

- Defibrillator

Optimal equipment requirements—as above, PLUS:

For anesthesia administration:

- Anesthesia machine with integrated function monitoring
- Neuromuscular blockers.

For patient monitoring:

1. Airway/ventilation
 - Capnograph
 - Respiratory volume monitor
 - Airway pressure alarm
2. Circulation
 - Automated blood pressure (oscillometry)
 - Invasive hemodynamic pressure monitor
3. Administered anesthetic
 - Peripheral nerve stimulator
 - Respired drug monitoring
 - For patient support:
 - Mechanical ventilator
 - Disconnect alarm is mandatory if a mechanical ventilator is used (e.g., low pressure, capnograph, expired volume)

References

1. The International Task Force on Anaesthesia Safety (1993) International standards for a safe practice of anaesthesia. *Eur J Anaesthesiol* 10 (Suppl 7):12–15