2008 International Standards for a Safe Practice of Anaesthesia

An update of the Standards developed by the International Task Force on Anaesthesia Safety that were adopted by the World Federation of Societies of Anaesthesiologists 13 June 1992

These standards are recommended for anaesthesia professionals throughout the world. They incorporate and elaborate upon the core components of the Safe Anaesthesia part of the 2008 World Health Organization's World Alliance for Patient Safety "Safe Surgery Saves Lives" global initiative. These WFSA standards are intended to provide guidance and assistance to anaesthesia professionals, their professional societies, hospital and facility administrators, and governments for improving and maintaining the quality and safety of anaesthesia care.

For some anaesthesia services, groups, and departments these standards will represent a future goal, while for others they may already have been implemented and be regarded as mandatory. It is recognized that in some settings facing challenges in resources and organization, not even those standards regarded as mandatory are met at present. The provision of anaesthesia under such circumstances should be restricted to procedures which are absolutely essential for the urgent or emergency saving of life or limb, and every effort should be made by those responsible for the provision of healthcare in these areas and settings to ensure that the standards are met. Provision of anaesthesia care at standards lower than those outlined as mandatory for anaesthesia for elective surgical procedures simply cannot be construed as safe acceptable practice. The most important standards relate to individual anaesthesia professionals. Monitoring devices play an important part in safe anaesthesia as extensions of human senses and clinical skills rather than their replacement.

Adopting the standardized language of the World Health Organization, minimum standards that would be expected in all anaesthesia care for elective surgical procedures are termed "HIGHLY RECOMMENDED" and these are the functional equivalent of "mandatory" standards. These HIGHLY RECOMMENDED standards are indicated in bold type, are applicable throughout any elective procedure, from patient evaluation until recovery [it is recognized, however, that immediate life-saving measures always take precedence in an emergency]. In the judgement of the WFSA, these are the minimum standards for anaesthesia for a "necessary" procedure (rather than essential and/or emergency) in settings where resources are extremely limited. This does not imply that these standards on their own are ideal or even acceptable in more adequately resourced settings. These HIGHLY RECOMMENDED (functional equivalent of mandatory) standards and (regarding facilities, equipment, and medications) the parallel prescription for "Level 1" or "basic" infrastructure are relevant to any healthcare environment anywhere in which general or regional anaesthetics are administered, but not to a setting where superficial procedures involving local anaesthetics only are performed. Additional elements of the anaesthesia standards should be implemented as resources, organization, and training permit, yielding this paradigm:

Anaesthesia standards  (in order of adoption)
Setting

Infrastructure

HIGHLY RECOMMENDED

Level 1

Basic

HIGHLY RECOMMENDED + RECOMMENDED

Level 2

Intermediate
HIGHLY RECOMMENDED + RECOMMENDED

+ Suggested

Level 3

Optimal

See the Table for a detailed outline of the integration of the practice standards with the levels of facilities/infrastructure. The goal always in any setting is to practice to the highest possible standards, specifically exceeding those prescribed if that can be accomplished. In spite of some facilities' limitations, it may be possible to implement elements of the RECOMMENDED standards even in a "basic" setting and, likewise, to implement elements of the Suggested standards even in an "intermediate" setting. The goal is always the best care possible and ongoing improvement by meeting and exceeding the standards for safe practice of anaesthesia, starting with all providers meeting the HIGHLY RECOMMENDED standards and striving to meet as many of the RECOMMENDED and Suggested standards as well.

It is anticipated that these standards and the setting/infrastructure specifications will be revised as practice and technology evolve.

General standards

1. Professional status

Anaesthesia services are a vital component of basic healthcare requiring appropriate resources. The WFSA views anaesthesia as a medical practice. Medically trained anaesthesia specialists should be trained and accredited with clinical and administrative autonomy. When anaesthesia is provided by non-medical personnel, these providers should be appropriately trained and accredited as well as directed and supervised by medically qualified specialist anaesthesia professionals.

2. Professional organizations
standards of practice, supervision of training and continuing education/continuing professional development with appropriate certification and accreditation, and general promotion of anaesthesia as an independent professional specialty. These organizations should form links with appropriate groups within the region and/or country and internationally.

3. Training, certification, and accreditation

Adequate time, facilities, and financial support 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.

4. Records and statistics

A record of the details of each anaesthetic should be made and preserved with the patient’s medical record. This should include details of the pre-operative assessment and the post-operative course. It is RECOMMENDED that individuals, departments, and regional and national groups collect cumulative data to facilitate the progressive enhancement of the safety, efficiency, effectiveness, and appropriateness of anaesthesia care.

5. Peer review and incident reporting

Institutional, regional, and/or national mechanisms to provide a continuing review of anaesthetic practice should be instituted. Regular confidential discussion of appropriate topics and cases with multidisciplinary professional colleagues should take place. Protocols should be developed to ensure that deficiencies in individual and collective practice are identified and rectified. An anonymous incident reporting system with case analysis and resulting suggested remedies is RECOMMENDED.

6. Workload

A sufficient number of trained anaesthesia professionals should be available so that individuals may practice to a high standard without undue fatigue or physical demands. Time should be allocated for education, professional development, administration, research, and teaching.

7. Personnel

An anaesthesia professional should be dedicated to each patient and be immediately present throughout each
anaesthetic (general, regional, or monitored sedation), and should be responsible for the transport of the patient to the post-anaesthesia recovery facility and the transfer of care to appropriately trained personnel. An anaesthesia professional 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. If responsibility for care is transferred from one anaesthesia professional to another, a "handover protocol" should be followed, during which all relevant information about the patient's history, medical condition, anesthetic status, and plan should be communicated. An anaesthesia professional should ensure, if aspects of direct care are delegated before, during, or after an anaesthetic, that the person to whom responsibility is delegated is both suitably qualified and conversant with relevant information regarding the anaesthetic and the patient. Where it is impossible for this standard to be attained and the surgeon or other individual assumes responsibility for the anaesthetic, these arrangements should be reviewed and audited by an appropriately trained anaesthesia professional.

8. Facilities, equipment, and medications

Appropriate equipment and facilities, adequate both in quantity and quality, should be present wherever anaesthesia and recovery from it is undertaken, including outside traditional hospital operating room suites, such as procedure or imaging suites and outpatient facilities or offices. In-service training and verification of an individual's ability to use a specific piece of equipment correctly and safely is required. Formal certification as documentation of this process is suggested. A list of facilities, infrastructure elements and supplies at the three levels and suggestions as to the order in which additions should be made when possible as resources permit is presented in the Table. Anaesthesia equipment should conform to relevant national and international standards. Appropriate anesthetic, resuscitative, and adjuvant medications are required at each level.

Peri-anaesthetic care and monitoring standards

The first and most important component of peri-anaesthetic care, including monitoring of the anaesthesia delivery system and the patient, is the continuous presence of a vigilant anaesthesia professional during anaesthesia. In addition to use of monitoring technology, careful continuous clinical observation is required because equipment may not detect clinical deterioration as rapidly as the skilled professional. If an emergency requires the brief temporary absence of the primary anaesthesia professional, judgment must be exercised comparing the emergency with the anaesthetized patient's condition and in the selection of the person left responsible for the anaesthetic during the temporary absence.

1. Pre-anaesthetic care

The patient must be evaluated by an anaesthesia professional prior to administration of anaesthesia and an appropriate anaesthetic plan formulated. The anaesthesia professional must ensure that all necessary equipment is present and functions correctly prior to initiation of anaesthesia care. The anaesthesia professional should ensure that assistance is available as needed and that the assistant is competent at, or has been instructed in, the necessary tasks. The development of protocols and check-lists to facilitate such verification is RECOMMENDED.

2. Pre-anaesthesia checks
A. An appropriate "pre-list check," which has been established in each health care institution providing anaesthesia services, of the anaesthesia system, facilities, equipment, and supplies should be performed prior to the start of each operating list.

B. The relevant components of the World Health Organization Safe Surgery Checklist should be performed.

C. An appropriate "pre-patient check" (such as presented in the attached Pre-anaesthetic check list) which has been established in each health care institution providing anaesthesia services, of the anaesthesia system and anaesthetizing location should be executed prior to each anesthetic.

3. Monitoring during anaesthesia

A. Oxygenation

(ii) Oxygen supply

Supplemental oxygen is HIGHLY RECOMMENDED for all patients undergoing general anaesthesia. The anaesthesia professional should verify the integrity of the oxygen supply. It is RECOMMENDED that the inspired oxygen concentration be monitored throughout each anaesthetic with an instrument fitted with a low oxygen concentration alarm. An oxygen supply failure alarm and a device protecting against the delivery of an hypoxic gas mixture are RECOMMENDED. Systems with interlocks (tank yokes, hose connections, etc.) should be used to prevent misconnection of gas sources.

(ii) Oxygenation of the patient

Tissue oxygenation should be monitored continuously. For visual examination, adequate illumination and exposure of the patient should be ensured whenever practicable. Continuous use of a quantitative monitor of oxygenation such as pulse oximetry is HIGHLY RECOMMENDED.

B. Airway and ventilation

The adequacy of the airway and ventilation should be continuously monitored at least by observation and auscultation whenever practicable. Where a breathing circuit is used, the reservoir bag should be observed. Continuous monitoring with a precordial, pretracheal, or oesophageal stethoscope is RECOMMENDED. Confirmation of the correct placement of an endotracheal tube and also the adequacy of ventilation by continuous measurement and display of the expired carbon dioxide waveform and concentration (capnography) is 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, and of the concentration of volatile agents, is Suggested.
C. Circulation

(i) Cardiac rate and rhythm

The circulation should be monitored continuously. Palpation or display of the pulse and/or auscultation of the heart sounds should be continuous. Continuous monitoring and display of the heart rate with a pulse oximeter is HIGHLY RECOMMENDED; an electrocardiograph is RECOMMENDED. The availability of a defibrillator is RECOMMENDED.

(ii) Tissue perfusion

The adequacy of tissue perfusion should be monitored continually by clinical examination. Continuous monitoring with a pulse oximeter is HIGHLY RECOMMENDED; continuous monitoring with a capnograph is RECOMMENDED.

(iii) Blood pressure

Arterial blood pressure should be determined at appropriate intervals (usually at least every 5 minutes and more frequently if indicated by clinical circumstances). Automated non-invasive blood pressure measurements have many advantages in anaesthesia; continuous measurement and display of arterial pressure is Suggested in appropriate cases.

D. 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 anaesthetics, young children). The continual measurement of temperature in patients in whom a change is anticipated, intended, or suspected is RECOMMENDED. The availability and use of continuous electronic temperature measurement is Recommended.

E. Neuromuscular function

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

F. Depth of anaesthesia

The depth of anaesthesia (degree of unconsciousness) should be regularly assessed by clinical observation. The continuous measurement of inspired and expired concentrations of anesthetic gases and volatile agents is Suggested. The application of an electronic device intended to measure brain function (consciousness), while controversial and not universally recommended, should be considered, particularly in cases with high risk of awareness under general
anaesthesia.

G. Audible signals and alarms

Available audible signals (such as the variable pitch pulse tone of the pulse oximeter) and audible alarms (with appropriately set limit values) should be activated at all times and loud enough to be heard throughout the operating room.

4. Post-anaesthesia care

A. Facilities and personnel

All patients who have had an anaesthetic affecting central nervous system function and/or a loss of protective reflexes should remain where anaesthetized until recovered or be transported safely (with care and monitoring as indicated) to a specifically designated recovery location for post-anaesthesia recovery. See General Standards, Section 7, for delegation of responsibilities to dedicated qualified recovery personnel.

B. Monitoring

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 the adequacy of oxygenation, ventilation, circulation, and temperature. Supplementation of clinical monitoring with quantitative methods analogous to intra-anaesthetic patient care described above is RECOMMENDED. Specifically, pulse oximetry is HIGHLY RECOMMENDED until consciousness has recovered (i.e. the patient is no longer anaesthetized).

C. Pain relief

All patients are entitled to appropriate efforts to prevent and alleviate postoperative pain employing available appropriate medications and modalities; these efforts are therefore highly recommended. Usually, the involved anaesthesia professional assumes initial responsibility for this.

Table  Guide to Infrastructure, Supplies and Anaesthesia Standards at Three Levels of Health Care Facility Infrastructure and Supplies
Level 1

(Should meet at least HIGHLY RECOMMENDED anaesthesia standards)

Small hospital / health centre

Level 2

(Should meet at least HIGHLY RECOMMENDED and RECOMMENDED anaesthesia standards)

District/provincial hospital

Level 3

(Should meet at least HIGHLY RECOMMENDED, RECOMMENDED and SUGGESTED anaesthesia standards)

Referral hospital
Rural hospital or health centre with a small number of beds (or urban location in an extremely disadvantaged area); sparsely equipped operating room (OR) for "minor" procedures

Provides emergency measures in the treatment of 90-95% of trauma and obstetrics cases (excluding caesarean section)

Referral of other patients (for example, obstructed labour, bowel obstruction) for further management at a higher level

District or provincial hospital (e.g. with 100-300 beds) and adequately equipped major and minor operating rooms

Short term treatment of 95-99% of the major life threatening conditions

A referral hospital of 300-1000 or more beds with basic intensive care facilities. Treatment aims are the same as for Level 2, with the addition of:

Ventilation in OR and ICU

Prolonged endotracheal intubation

Thoracic trauma care

Haemodynamic and inotropic treatment
Basic ICU patient management and monitoring for up to 1 week: all types of cases, but possibly with limited provision for:

- Multi-organ system failure
- Haemodialysis
- Complex neurological and cardiac surgery
- Prolonged respiratory failure
- Metabolic care or monitoring

Essential Procedures

Uterine evacuation
Circumcision

Hydrocele reduction, incision and drainage

Wound suturing

Control of haemorrhage with pressure dressings

Debridement and dressing of wounds

Temporary reduction of fractures

Cleaning or stabilization of open and closed fractures

Chest drainage (possibly)

Abscess drainage

Same as Level 1 with the following additions:

Caesarean section

Laparotomy (usually not for bowel obstruction)
Amputation

Hernia repair

Tubal ligation

Closed fracture treatment and application of plaster of Paris

Acute open orthopaedic surgery: e.g. internal fixation of fractures

Eye operations, including cataract extraction

Removal of foreign bodies: e.g. in the airway

Emergency ventilation and airway management for referred patients such as those with chest and head injuries

Same as Level 2 with the following additions:

Facial and intracranial surgery

Bowel surgery

Paediatric and neonatal surgery

Thoracic surgery
Major eye surgery

Major gynaecological surgery, e.g. vesico-vaginal repair

Personnel

Paramedical staff/anaesthetic officer (including on-the-job training) who may have other duties as well

Nurse-midwife

One or more trained anaesthesia professionals

District medical officers, senior clinical officers, nurses, midwives

Visiting specialists or resident surgeon and/or obstetrician/ gynaecologist
Clinical officers and specialists in anaesthesia and surgery

Drugs

Ketamine 50 mg/ml injection

Lidocaine 1% or 2%

Diazepam 5 mg/ml injection, 2 ml or midazolam 1mg/ml injection, 5 ml

Pethidine 50 mg/ml injection, 2 ml

Morphine 10mg/ml, 1 ml

Epinephrine (Adrenaline) 1 mg
Atropine 0.6 mg/ml

Appropriate inhalation anaesthetic if vaporizer available

Same as Level 1, but also:

Thiopental 500 mg/1g powder or propofol.

Suxamethonium bromide 500 mg powder

Pancuronium

Neostigmine 2.5 mg injection

Ether, halothane or other inhalation anaesthetics

Lidocaine 5% heavy spinal solution, 2 ml

Bupivacaine 0.5% heavy or plain, 4 ml

Hydralazine 20 mg injection

Frusemide 20 mg injection

Dextrose 50% 20 ml injection
Aminophylline 250 mg injection

Ephedrine 30/50 mg ampoules

Hydrocortisone

(?) Nitrous oxide

Same as Level 2 with these additions:

Propofol

Nitrous oxide

Various modern neuromuscular blocking agents

Various modern inhalation anaesthetics

Various inotropic agents

Various intravenous antiarrhythmic agents

Nitroglycerine for infusion
Calcium chloride 10% 10 im injection

Potassium chloride 20% 10 ml injection for infusion

Equipment: capital outlay

Equipment: capital outlay

Equipment: capital outlay

Adult and paediatric self-inflating breathing bags with masks

Foot-powered suction

Stethoscope, sphygmomanometer, thermometer

Pulse oximeter

Oxygen concentrator or tank oxygen and a draw-over vaporizer with hoses

Laryngoscopes, bougies
Complete anaesthesia, resuscitation and airway management systems including:

Reliable oxygen sources

Vaporizer(s)

Hoses and valves

Bellows or bag to inflate lungs

Face masks (sizes 00-5)

Work surface and storage

Paediatric anaesthesia system

Oxygen supply failure alarm; oxygen analyzer

Adult and paediatric resuscitator sets

Pulse oximeter, spare probes, adult and paediatric*

Capnograph*

Defibrillator (one per O.R. suite / ICU)*
ECG (electrocardiograph) monitor*

Laryngoscope, Macintosh blades 1-3(4)

Oxygen concentrator[s] [cylinder]

Foot or electric suction

IV pressure infusor bag

Adult and paediatric resuscitator sets

Magill forceps (adult and child), intubation stylet and/or bougie

Spinal needles 25G

Nerve stimulator

Automatic non-invasive blood pressure monitor

Same as Level 2 with these additions (per each per OR room or per ICU bed, except where stated):

ECG (electrocardiograph) monitor*
Anaesthesia ventilator, reliable electric power source with manual override

Infusion pumps (2 per bed)

Pressure bag for IV infusion

Electric or pneumatic suction

Oxygen analyzer*

Thermometer [temperature probe*]

Electric warming blanket

Electric overhead heater

Infant incubator

Laryngeal mask airways sizes 2, 3, 4 (3 sets per O.R)

Intubating bougies, adult and child (1 set per O.R)

Anaesthetic agent (gas and vapour) analyser

Depth of anaesthesia monitor are being increasingly recommended for cases at high risk of awareness but are not standard monitoring in many countries.
Equipment: disposable

Examination gloves

IV infusion/drug injection equipment

Suction catheters size 16 FG

Airway support equipment, including airways and tracheal tubes

Oral and nasal airways

ECG electrodes

IV equipment (minimum fluids: normal saline, Ringer's lactate and dextrose 5%)
Paediatric giving sets

Suction catheters size 16 FG

Sterile gloves sizes 6-8

Nasogastric tubes sizes 10-16 FG

Oral airways sizes 000-4

Tracheal tubes sizes 3-8.5 mm

Spinal needles sizes 22 G and 25G

Batteries size C

Same as Level 2 with these additions:

Ventilator circuits

Yankauer suckers

Giving sets for IV infusion pumps

Disposables for suction machines
Disposables for capnography, oxygen analyzer, in accordance with manufacturers’ specifications:

Sampling lines

Water traps

Connectors

Filters - Fuel cells

* It is preferable to combine these modalities all in one unit

Note: drug concentrations and quantities are indicative only. All equipment should be appropriate for patients’ age and size.

PRE ANAESTHETIC CHECK LIST

Patient name ________________ Number ___________ Date of Birth -__/__/__

Procedure____________________________________ Site_______
Check patient risk factors

(if yes - circle and annotate)

Check resources

Present and Functioning

ASA  1  2  3  4  5  E

Airway

Mallampati  (pictures)

Aspiration risk?
Allergies?

Abnormal investigations?

Medications?

Co-morbidities?

N

N

N

N

Airway
Masks

Airways

Laryngoscopes (working)

Tubes

Bougies

Breathing

Leaks (a FGF of 300 ml/minute maintains a pressure of > 30 cm H2O)

Soda lime (colour - if present)

Circle system (2-bag test if present*)

Suction

Drugs and Devices

Oxygen cylinder (full and off)

Vaporisers (full and seated)
Drips (IV secure)

Drugs (lebeled - TIVA connected)

Blood / fluids available

Monitors - alarms on

Humidifiers, warmers and thermometers

Emergency

Assistant

Adrenaline

Suxamethonium

Self inflating bag

Tilting table
The integrity of a circle system and its valves should be checked by placing one breathing bag in the correct place for ventilating a patient and another breathing bag on the patient limb of the Y-piece (i.e. in place of the patient) and ventilating the system manually using an appropriate fresh gas flow and squeezing the primary and secondary bags alternatively, so that gas passes around the circle from one to the other. Inflation and deflation of the breathing bag, movement of any visible unidirectional valves, and the resistance and compliance of the system should all be assessed as "normal". The function of the adjustable pressure limiting valve should also be checked by spilling some of the gas when both bags are compressed. This "two bag check" is a reliable way of detecting expiratory limb obstruction which is readily missed by less systematic checks of the integrity of the circuit are carried out.