



Recommended Minimum Facilities for Safe Anaesthetic Practice in Operating Suites

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1. INTRODUCTION

1.1 These recommendations state the minimum facilities required for the safe conduct of general and regional anaesthesia in operating theatre suites.

1.2 The document does not preclude the need for additional facilities relevant to special or local situations.

2. PRINCIPLES OF ANAESTHETIC CARE

2.1 Anaesthesia should be administered only by registered medical practitioners¹ with appropriate training in anaesthesia or by trainees supervised according to HKCA document [E1] *Guidelines on Trainee Supervision*.

2.2 Every patient presenting for anaesthesia should have a pre-anaesthetic assessment by an anaesthesiologist who should preferably be the one who will administer the anaesthetic. See HKCA document [P13] *Guidelines on the Pre-anaesthetic Consultation*.

2.3 Modern practice demands basic staffing, equipment and drugs, and protocols for the safe administration of anaesthesia.

2.4 Appropriate monitoring of physiological and other variables must be established during anaesthesia. Please refer to HKCA document [P1] *Guidelines on Monitoring in Anaesthesia*.

2.5 There are certain minimum requirements in the construction and building of standard operating suites in hospital and outpatient surgical facilities² that have embedded essential safety features that are sometimes taken for granted by our HKCA members, such as adequate dimension in rooms, doors, corridors and lifts for the safe and expedite passage of patient transport trolley in critical conditions, the adequate and safe supply of medical gases by pipelines, the safety design in areas such as fire, electricity, water supplies and drainage, ventilation and environmental control. When anaesthetic care is provided outside these standard operating suites, our members need to satisfy themselves besides the above safety issues, the appropriate provision of drugs, consumables and equipment, adequacy of trained staff and the existence of policies on infection control, quality assurance and emergency management.



3. STAFFING

3.1 In addition to the nursing staff required by the practitioner carrying out the procedure, there must be:

3.1.1 An assistant designated to the anaesthesiologist. Please refer to HKCA document [T7] *Guidelines on Minimum Assistance Required for the Safe Conduct of Anaesthesia*.

3.1.2 Adequate number of assistant with necessary experience for specialised procedures and monitoring.

3.1.3 Adequate assistance in handling the patient.

4. EQUIPMENTS

4.1 Essential requirements are listed below. While there is a range of equipment recommended, the facility is expected to provide the most suitable type of equipment according to its needs.

4.2 Each hospital must designate:

4.2.1 One or more specialist anaesthesiologists to advise on the choice and maintenance of anaesthetic equipment.

4.2.2 One or more staff to organise and supervise the cleaning, servicing and maintenance of anaesthetic equipment.

4.3 Each operating theatre must have oxygen supply through oxygen pipe (with at least 2 outlets) and backup supply from oxygen cylinders.

4.4 Anaesthetic Delivery System

4.4.1 Each operating theatre must have an anaesthetic machine capable of delivering an accurately measured flow of oxygen, medical air and the commonly used inhalational anaesthetic agents.

4.4.2 Each anaesthetic machine must have the following safety features:

4.4.2.1 An indexed gas connection system.

4.4.2.2 A reserve cylinder supply of oxygen and, where appropriate,



nitrous oxide.

4.4.2.3 An oxygen supply pressure warning device.

4.4.2.4 An oxygen analyser/monitor with a low oxygen alarm.

4.4.2.5 An anti-hypoxic mechanism where nitrous oxide is used.

4.4.2.6 Oxygen would be the last gas to enter the common gas manifold in anaesthetic machines that incorporate a gas flow-meter bank.

4.4.2.7 For machines utilising mechanical means to control the anaesthetic gas flow, each gas should be controlled only by one knob and the knob for Oxygen should allow a distinct tactile identification.

4.4.2.8 A vaporiser inter-lock system.

4.4.2.9 Standardised size in the fresh gas outlet (22 mm outer diameter and 15 mm inner diameter)

4.4.2.10 A high pressure relief valve or other means of automatically preventing dangerously high and/or prolonged pressure- this can be either an integral part of the anaesthetic machine or as part of the breathing circuit.

4.4.2.11 A difference in size of the connection of the scavenging system to that of the patient breathing circuit.

4.4.3 Each anaesthetic machine should include:

4.4.3.1 Calibrated vaporisers for accurate delivery of inhalational anaesthetics.

4.4.3.2 Breathing systems suitable for paediatric anaesthesia when necessary.

4.4.3.3 Commonly required accessories.

4.4.4 A range of suitable breathing systems with appropriate measures to prevent respiratory tract infection should be readily available to each anaesthetic machine. Please refer to HKCA document [P15] *Guidelines on Infection Control in Anaesthesia*.

4.4.5 An automatic mechanical ventilator, with a disconnection alarm, must be available for each anaesthetised patient.



4.4.6 Infusion devices designed for controlled delivery of intravenous anaesthetic agents must be available when required.

4.5 A separate means of inflating the lungs with oxygen must be provided in each anaesthetizing location.

4.5.1 The size of the device and its attachments must be appropriate for patients being anaesthetised at that location.

4.5.2 Its oxygen supply must be independent of the anaesthesia delivery system.

4.6 Suction apparatus

4.6.1 Suction apparatus must be available for the exclusive use of the anaesthesiologist at all time together with appropriate hand pieces (e.g. Yankauer) and range of endotracheal suction catheters. This apparatus should comply with the current relevant international standards.

4.6.2 Provision must be made for an alternative suction system in the case of primary suction machine failure.

4.7 Each operating theatre must have monitoring equipment according to the HKCA document [P1] *Guidelines on Monitoring in Anaesthesia*.

4.8 Each operating theatre must also have:

4.8.1 Appropriate protection for the anaesthesia team against biological contaminants. This must include gowns, disposable gloves, masks and eye shields.

4.8.2 A stethoscope.

4.8.3 Non-invasive blood pressure measuring devices with appropriate sized cuffs.

4.8.4 Monitoring equipment complying with HKCA document [P1] *Guidelines on Monitoring in Anaesthesia*.

4.8.5 A range of appropriate face masks.

4.8.6 A range of appropriate oropharyngeal, nasopharyngeal, laryngeal mask and other artificial airways.

4.8.7 Two laryngoscopes and a range of interchangeable blades.



- 4.8.8 A range of appropriate endotracheal tubes and connectors.
 - 4.8.9 A range of endotracheal tube introducers and bougies.
 - 4.8.10 Endotracheal cuff inflating syringe and clamps.
 - 4.8.11 Magill's forceps and throat packs.
 - 4.8.12 A suitable range of adhesive and other tapes appropriate for the securing of apparatus.
 - 4.8.13 Scissors.
 - 4.8.14 Sterile lubricant suitable for use with airway devices.
 - 4.8.15 Tourniquets for use during intravenous catheter insertion.
 - 4.8.16 Intravenous infusion equipment with a range of cannulas, catheters and solutions.
 - 4.8.17 Facilities for safe disposal of sharp objects, waste glass and items contaminated with biological fluids.
 - 4.8.18 Access to hand washing facilities.
 - 4.8.19 Equipment for scavenging of anaesthetic gases and vapours where these are in use with interface equipment which prevents over-pressurization of the anaesthesia breathing circuit.
 - 4.8.20 Operating table / trolley that can be tilted head down rapidly.
- 4.9 Each operating suite complex must have:
- 4.9.1 Equipment for difficult intubations including a range of appropriate fiberoptic bronchoscope. A specialist anaesthesiologist should be responsible for organising the equipment, preferably in a trolley designated for such purpose. This trolley should be easily accessible and its position well known by all theatre staff.
 - 4.9.2 A 12-lead electrocardiograph.
 - 4.9.3 Equipment for invasive monitoring of arterial blood pressure.
 - 4.9.4 A cardiac defibrillator with capacity for synchronized cardioversion.
 - 4.9.5 A manual, self-inflating resuscitator bag capable of delivering at least 90% oxygen (e.g. Laerdal, Ambu bags).



- 4.9.6 Central venous pressure sets and equipment for central venous lines insertion according to current standard.
- 4.9.7 Means of infusing intravenous fluids rapidly under pressure.
- 4.9.8 Means of maintaining normothermia including insulating sheets, forced air warming devices, mattress warmers and intravenous fluid warmers.
- 4.9.9 Equipment to cool patients in case of inappropriate increase in body temperature.
- 4.9.10 When appropriate, means of warming of respiratory gases during anaesthesia, and conserving airway humidification.
- 4.9.11 Intrapleural drainage sets including appropriate underwater seal drainage equipment or one way valves.
- 4.9.12 Equipment required for spinal, epidural and regional nerve blocks, wherever these procedures are used.
- 4.9.13 Refrigerator for the storage of drugs required to be stored in the cold.
- 4.9.14 Means to ensure safe positioning for patients during procedures.
- 4.9.15 Adequate equipment for radiation protection of staff.
- 4.10 Other essential requirements for safe anaesthesia are:
 - 4.10.1 Warning devices in medical gas pipeline systems, to alarm when bulk gas supplies are low.
 - 4.10.2 Electrical supply and equipment designed to eliminate risk of microshock.
 - 4.10.3 Appropriate lighting for the clinical observation of patients.
 - 4.10.4 Emergency lighting and power supply.
 - 4.10.5 Means of controlling the room temperature within the range of 18 - 28°C.
 - 4.10.6 A wall clock with clear illustration of hours, minutes and seconds.
 - 4.10.7 A timer.
 - 4.10.8 Means of 2-way communicating with people outside the theatre including an 'emergency' call system.



4.10.9 Ready access within the hospital to separate refrigerators for the correct storage of blood and biological products.

4.10.10 Patient transfer trolleys as specified in HKCA document [P3] *Guidelines on Postanaesthetic Recovery Care*.

4.10.11 Devices such as rollers or patient slides to assist with transfer of patients in a manner safe for patients and staff.

4.10.12 A minimum of three people to assist with transfer of the patient when required, with the anaesthesiologist having prime responsibility for the patient's airway, head and neck.

4.10.13 Support services must be available for haematology, blood transfusion, chemical pathology including blood gas analysis and radiology with time-responsiveness appropriate to the complexity of procedures performed. Point of care devices should be considered if major or emergency operations are performed in the location.

5. DRUGS

5.1 In addition to the drugs commonly used in anaesthesia, drugs and agents necessary for the management of the following conditions which may complicate or co-exist with anaesthesia, must also be available:

- Adrenal dysfunction
- Anaphylaxis
- Bronchospasm
- Cardiac arrest
- Cardiac arrhythmias
- Coagulopathy
- Hyperglycaemia
- Hypertension
- Hypoglycaemia
- Hypotension



- Local anaesthetic systemic toxicity
- Malignant hyperpyrexia
- Opioid and benzodiazepine overdose
- Pulmonary oedema
- Raised intracranial pressure
- Respiratory depression
- Status epilepticus
- Uterine atony (where relevant)

5.2 The hospital or institution should seek the advice of specialist anaesthesiologists working in the institution in the selection of drugs for the above purposes.

5.3 An appropriate protocol should exist for the regular checking and replacement of all drugs.

5.4 An initial supply of dantrolene sufficient for commencing the treatment of a suspected case of malignant hyperpyrexia should be readily accessible to all anaesthetising locations within the institution. Additional doses must be readily available on request.

6. CHECKING, CLEANING AND SERVICING EQUIPMENT

6.1 Regular sterilising, cleaning and maintenance routines for anaesthetic equipment must be established.

6.2 Each anaesthetic machine must be clearly identified by a serial number to facilitate maintenance and servicing. Readily removable components, such as canisters and vaporisers must also be clearly identified.

6.3 Each anaesthetic machine must be serviced by an appropriate organisation on a regular basis, and at least twice a year. A record of service or test procedures for each machine, provided by the service organisation to the appropriate hospital personnel must be available.

6.4 Each anaesthetic machine, if new or after having been in storage for a



considerable time, should undergo gas analysis checks of its outlets, to verify the supply of correct gases. In addition, the accuracy of flowmeters on such a machine should be tested by flow measurement techniques.

6.5 All wall gas outlets must undergo gas analysis checks, following a major structural alteration of the operating suite. A signed record must be provided by the service organisation after the gas analyses.

6.6 A copy of the HKCA document [T1] *Recommendations on Checking Anaesthesia Delivery Systems* or similar document should be available with each anaesthetic machine.

7. RECOVERY AREA

7.1 Recovery from anaesthesia should take place under appropriate supervision in an area designated for the purpose and conforming to HKCA document [P3] *Guidelines for Postanaesthetic Recovery Care*.

7.2 Contingency plans should exist for the safe emergency evacuation of patients from the operating theatre and/or recovery areas under adequate medical supervision.

8. REFERENCE

- Recommendations on Minimum Facilities for Safe Administration of Anaesthesia in Operating Suites and Other Anaesthetising Locations. Australian and New Zealand College of Anaesthetists. PS55 (2012)

¹ Medical Registration Ordinance (Cap 161): “registered medical practitioner” means a person who is registered, or is deemed to be so registered under the provisions of section 29.

² With reference to the Health Building Note of UK Department of Health or Guidelines for Design and Construction of Hospitals and Outpatient Facilities by the American Hospital Association, Facilities Guidelines Institute.