Recommended Minimum Facilities for Safe Anaesthetic Practice in Anaesthetising Locations Outside Operating Suites

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1. INTRODUCTION

There are increasing numbers of diagnostic and therapeutic procedures performed outside the Operating Suite environment, in both elective and emergency situations. These procedures may require anaesthetic involvement through haemodynamic monitoring during the procedure, sedation, regional anaesthesia or general anaesthesia. The challenge for anaesthesia is to develop a framework that supports and regulates the safe delivery of care. In addition, the development of deep sedation techniques and general anaesthesia with total intravenous anaesthesia (TIVA)/target-controlled infusion techniques may remove the requirement for complex gas delivery systems and anaesthetic machines. The safe delivery of anaesthesia through preoperative assessment, case selection, anaesthesia delivery, recovery and postoperative care should not be compromised because of cost pressures. This document specifies the minimum staffing, equipment, emergency medications and service processes in locations where anaesthesia is provided outside Operating Suites. It is also intended to include standalone facilities and facilities undertaking 'deep sedation', where medications are administered that result in loss of verbal contact with the patient.

This document should be read in conjunction with the Hong Kong College of Anaesthesiologists (HKCA) document:

"*Recommended Minimum Facilities for Safe Anaesthetic Practice in Operating Suites*" [T2].

Reference should also be made to the following documents of the HKCA:

"*Recommendations on checking Anaesthesia Delivery Systems*" [T1]

"*Guidelines on minimum requirements for an anaesthetic record*" [T6]

"*Guidelines on Minimum Assistance Required for the Safe Conduct of Anaesthesia.*" [T7]

"*Guidelines on Monitoring in Anaesthesia*" [P1]

"*Guidelines for Safe Sedation for diagnostic and therapeutic procedures*" [P2]

This document is intended to supersede the following Hong Kong College of Anaesthesiologists documents:

"Recommended Minimum Facilities for Safe Anaesthetic Practice for in Organ Imaging Unit" [T3]

"Recommended Minimum Facilities for Safe Anaesthetic Practice for Electroconvulsive Therapy (ECT)" [T5]

2. PRINCIPLES OF ANAESTHETIC CARE

2.1. The physical environment can be challenging for the safe provision of anaesthesia when compared with the main theatre environment. The anaesthesia providers should develop safe practice guidelines that consider the pre-anaesthetic assessment, induction, recovery and discharge of patients. In addition, procedure-specific risks such as radiation exposure and infection control should be considered.

2.2. The same standard of anaesthetic care should be followed as care provided in main operating suite, such as pre-anaesthetic consultation, consent, surgical safety check, proper documentation, post-anaesthetic care, emergency management and quality assurance activities.

2.3. A specialist anaesthesiologist should be appointed in the non-theatre environment to lead the anaesthesia service. Adequate time should be provided within the job plan to develop the service, train staff and ensure that safety standards are upheld. Local consensus guidelines for the non-theatre environment should be created for the staffing of each non-theatre area where anaesthesia is delivered.

2.4. Anaesthesia should be administered only by registered medical practitioners[1] who should observe the relevant law, rules and regulations governing them, in particular the Dangerous Drugs Ordinance.

2.5. Anaesthesia includes general anaesthesia, neuraxial or major regional anaesthesia, and sedation as defined in HKCA document *"Guideline for safe sedation for diagnostic and therapeutic procedures"* [P2].

2.6. There should be sufficient space to accommodate necessary equipment and

personnel and to allow expeditious access to the patient, anaesthesia machine and monitoring equipment.

2.7. Ideally, anaesthetic equipment should be standardised throughout the hospital or facility. Putting old equipment not in use elsewhere in remote area such as the imaging suite must be avoided.

2.8. The risk associated with anaesthesia in the non-theatre environment should be minimised by careful planning and anaesthetic service provision. There needs to have an explicit agreed plan for getting help when required, recognising the risk of, and preparing adequately for, massive blood loss, life-threatening loss of airway or respiratory function.

2.9. It is a requirement that all facilities comply with regulatory and licensing standards as well as occupational health and safety regulations including:

- Lighting and emergency lighting
- Electric power supply with backup
- Patient transfer devices to assist with safe transfer of patients from the procedural table to the recovery trolley, and then safe transport to the recovery area (refer HKCA document "*Guidelines on Postanaesthetic Recovery Care" [P3]*).

3. STAFFING

In addition to the medical and nursing staff required for the procedure, there must be:

3.1. A trained assistant available exclusively for the anaesthetic procedure. Please refer to HKCA document "*Guidelines on Minimum Assistance Required for the Safe Conduct of Anaesthesia.*" [T7]

3.2. Adequate assistance in handling and positioning the patient.

3.3. Adequate technical/nursing assistance as required.

4. EQUIPMENT

4.1. Essential anaesthetic equipment

4.1.1. Each anaesthesia location should designate at least one specialist

anaesthesiologist to advise on the choice and maintenance of anaesthesia equipment and at least one of its nursing or technical staff to be responsible for organising, maintaining, and servicing anaesthesia equipment.

4.1.2. Equipment, which complies with section 4.4 to 4.8 of the HKCA document "*Recommended Minimum Facilities for Safe Anaesthetic Practice in Operating Suites*" [T2], must be provided when inhalational volatile anaesthesia is used on a regular basis.

4.1.3. There must be adequate oxygen for the whole anaesthetic and recovery period in addition to, as a minimum, a full size-E oxygen cylinder of oxygen for emergency use. If inhalational volatile anaesthesia is provided frequently in a location, piped oxygen should be installed, or the continued use of such a location should be reviewed.

4.1.4. There should be an adequate and reliable source of suction.

4.1.5. Where inhalational volatile anaesthesia is delivered on a regular basis, or non-depolarising muscle relaxants used the following are essential:

- An anaesthesia delivery system or anaesthesia machine with a gas scavenging system that complies with HKCA document *"Recommended Minimum Facilities for Safe Anaesthesia Practice in Operating Suite"* [T2].
- Breathing systems including paediatric breathing systems if paediatric patients are to be anaesthetised.
- Equipment for automatic ventilation of the lungs, incorporating alarms as specified in HKCA document *"Guideline on monitoring in anaesthesia"* [P1].

4.1.6. Where anaesthesia is delivered by intravenous infusion the followings are strongly recommended:

- Equipment for programmable delivery of medication by infusion, preferably loaded with applicable pharmacokinetic models.
- Depth of anaesthesia monitoring such as a processed electroencephalogram monitor if muscle relaxation is also employed.

4.2. Basic airway equipment related to the types of patients and procedure included:

4.2.1. Facemasks

4.2.2. Airway adjuncts (oropharyngeal and nasopharyngeal airways)

4.2.3. At least two laryngoscopes

4.2.4. Supraglottic airways

4.2.5. Connectors, bougies/introducers and associated equipment suitable for the size and age of patients to be anaesthetized.

4.2.6. Magill's forceps

4.2.7. Throat packs

4.2.8. Syringes for inflation of tracheal tube and supraglottic airways and sterile lubricant for airway devices

4.2.9. A manual self-inflating resuscitator bag capable of delivering at least 90% oxygen (e.g., Laerdal, Ambu bags) must also be available.

4.2.10. High flow airway equipment provide support during shared airway and deep sedation procedures for patients with anticipated difficult airway is recommended.

4.3. Monitoring equipment

4.3.1. Monitoring of physiological and other variables should comply with HKCA document *"Guideline on monitoring in anaesthesia"* [P1].

4.3.2. The availability of equipment for invasive monitoring will be determined by patient complexity in addition to surgical or procedural complexity and may even be required for straightforward procedures

4.4. Other equipment

4.4.1. Availability of telecommunications permitting communication with persons outside the anaesthetising location. Ideally, there should also be mobile phone reception and internet access.

4.4.2. Equipment to ensure safe positioning of patients during procedures.

4.4.3. Secure but accessible storage for restricted medications according to jurisdictional requirements.

4.4.4. Personal protective equipment and theatre clothing appropriate for both the designated procedure and for the patient population undergoing care, must be provided for all personnel. This includes protection from biological hazards such as contaminated body fluids, equipment to reduce the risk of healthcare related infections (see HKCA documents *"Guideline on infection control in anaesthesia"* [P12]) as well as equipment to reduce exposure to physical hazards such as radiation and laser eye protection and ear protection where needed.

4.4.5. A stethoscope.

4.4.6. A tilting trolley or bed.

4.4.7. A cardiac defibrillator with capacity for synchronised cardioversion should be accessible.

4.4.8. Equipment for cardiopulmonary resuscitation, including drugs for resuscitation and a range of intravenous equipment and fluids (appendix 1).

4.4.9. Sufficient electrical outlets to satisfy anesthetic machine (when present), any present or needed anaesthesia equipment (syringe pumps, videolaryngoscopes, etc), and monitoring equipment requirements, including clearly labelled outlets connected to an emergency power supply. In any anesthetizing location determined by the health care facility to be a "wet location" (e.g., cystoscopy, arthroscopy, or a birthing room in labor and delivery), either isolated electric power or electric circuits with ground fault circuit interrupters should be provided.

4.4.10. It is highly recommended that laminated copies of cognitive aids and flowcharts be available and accessible in each location. These should include management of can't intubate can't oxygenate (CICO), anaphylaxis, cardiac arrest, systemic local anaesthetic toxicity and malignant hyperthermia emergencies.

4.5. Special equipment

4.5.1. Special problems are encountered with magnetic resonance imaging due to the MRI effects on ferromagnetic objects (which include most

conventional monitoring and anaesthetic equipment). Alternative arrangements by the individual department/ hospital will be required for anaesthesia and monitoring in these areas. A specialist anaesthesiologist should be responsible for supervising these arrangements.

4.5.2. In anaesthesia location where depolarizing muscle relaxant is intended to be used (other than for airway emergencies), such as electro-convulsive therapy (ECT), equipment and drugs for the management of malignant hyperthermia, including the initial dose of Dantrolene, should be accessible.

4.5.3. In anaesthesia location where non-depolarized muscle relaxant and controlled ventilation is practiced on a regular basis, additional advanced airway equipment should also be provided in a separate difficult airway trolley for equipment to manage difficult airways including a pre-prepared kit for performance of an emergency front of neck airway procedure in case of a can't intubate, can't oxygenate crisis.

4.5.4. Where complex surgery/procedure is undertaken such as cardiac, thoracic, major vascular neurosurgery or obstetrics the following are essential:

- Equipment for the direct measurement of arterial and venous pressures.
- Equipment for the rapid infusion of fluids such as manual pump giving sets and devices to heat and pressurise fluid.
- Interpleural drainage sets including underwater seal drainage equipment or one way valves in facilities where thoracic trauma or surgery is undertaken, or where there may be a risk of pneumothorax.
- Equipment for the active warming (and where appropriate, cooling) of patients such as insulating sheets, forced air warming devices, mattress warmers and intravenous fluid warmers

5. DRUGS

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

- Adrenal dysfunction,
- Anaphylaxis,
- Bronchospasm,
- Cardiac arrest,
- Cardiac arrhythmias,
- Hyperglycaemia,
- Hypoglycemia,
- Hypertension,
- Hypotension,
- Increased intracranial pressure,
- Opioid and benzodiazepine overdose,
- Pulmonary oedema,
- Status epilepticus

5.2. The hospital or institution should seek the advice of the specialist anaesthesiologist designated in 4.1.1 on the selection of drugs for the above purpose.

5.3. An appropriate protocol for the regular checking and replacement of all drugs should be available. Drugs stored for emergency and rare events should have the expiry dates checked regularly.

6. CHECKING, CLEANSING AND SERVICING

All anaesthetic equipment must be checked and maintained in accordance with section 6 of the HKCA document "*Recommended Minimum Facilities for Safe Anaesthetic Practice in Operating Suites*" [T2]

7. RECOVERY

7.1. The patient should be monitored for an appropriate duration after the procedure in an area, which is adequately equipped and staffed for recovery care.

7.2. If the recovery area is not where the procedure occurred, then there must be adequate and safe patient transfer facilities available.

7.3. After adequate assessment, patient discharge should be authorized by the anaesthesiologist providing the anaesthesia/sedation; or by another registered medical practitioner[1] with proper delegation and handover.

7.4. Adequate staffing and facilities must be available in the recovery area for managing patients who have become unconscious or who have suffered complications during the procedure.

7.5. A system should be in place to enable safe transfer of the patient to appropriate medical care facilities should the need arise.

8. OTHER CONSIDERATIONS

If complications from procedure or anaesthesia care arise, the foregoing recommendations only allow patients to be resuscitated and/or supported while awaiting transfer to a more suitable environment. There should be agreed contingency plans to enable smooth, effective transfer of patients to be accomplished with minimal delay, and under adequate medical supervision to a critical care facility.

9. APPENDIX 1

Emergency drugs should include the following:

Adrenaline

Amiodarone

Atropine

Dextrose 50%

Flumazenil

Lipid Emulsion*

Naloxone

Portable emergency O2 supply

*Lipid emulsion should be available where local anaesthetics are used, unless lignocaine is the only local anaesthetics available

10. REFERENCE

- The Royal College of Anaesthetists. *"Guidance for the provision of anaesthesia services in the non-theatre environment 2024"* [Chapter 7]
- American Society of Anesthesiologists. *"Statement on non-operating room anesthesia services 2023"*.
- Australian and New Zealand College of Anaesthetists. *"Position Statement on minimum facilities for safe administration of anaesthesia in operating suites and other anaesthetising locations 2021"* [PS55(A)]

[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.