



SOUTH AFRICAN SOCIETY OF ANAESTHESIOLOGISTS

PRACTICE GUIDELINES

2012 Revision

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South African Society of Anaesthesiologists

SASA Practice Guidelines 2013

2012 Revision

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A. INTRODUCTION

Since the publication of the first *SASA Practice Guidelines* by the South African Society of Anaesthesiologists (SASA) in 1987, the Society has continued to expand its involvement in the practice of anaesthesia locally, and in the southern African, African and international arenas. The *SASA Practice Guidelines* were revised in 1990, 1999 and 2006, and the current fifth revision aims to build further on the principles laid down then, while aligning the content with international standards for anaesthetic practice.

The vision of SASA is to lead the science and practice of safe anaesthesia to the highest standard and to ensure the sustainability of anaesthesiological services.

The structure of the *SASA Practice Guidelines 2012 Revision* has been adapted to reflect the topics discussed in the International Standards for a Safe Practice of Anaesthesia 2010, and endorsed by the World Federation of Societies of Anaesthesiologists (WFSA).

In certain instances, where further elaboration has been deemed unnecessary, the WFSA Standards are simply quoted and should be considered as adequate guidance.

With these *SASA Practice Guidelines*, the Society attempts to address the relevant standards listed below (as referred to in the abovementioned publication) within the context of the South African healthcare system:

General standards

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C. DISCLAIMER

This document is not intended as a legal binding document. It is merely a guide to good practice.

This document has been prepared by SASA as a guide only. It should not be interpreted as a rigid code of practice.

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PART One

THE SCOPE OF PRACTICE AND REQUIRED TRAINING FOR ADMINISTERING ANAESTHESIA

SECTION I: PROFESSIONAL STATUS

A. Preamble

The practice of anaesthesiology differs from other medical and surgical specialties, in that:

- Anaesthesiologists are often not based at one facility and have to commute between different facilities.
- Anaesthesiologists are true service providers and have little control over their daily bookings.
- Anaesthesiologists, as a group, are faced with more emergency situations than other clinicians.
- As most surgical cases are now only admitted on the day of surgery, this allows anaesthesiologists less time to establish rapport with the patient.
- Anaesthesia is procedure-associated.
- Primary diagnoses are usually made only when the anaesthesiologist is the primary doctor in the intensive care unit (ICU) or in chronic pain treatment.

B. Scope of practice for administering anaesthesia in South Africa

1. Introduction

- 1.1 The need to draw up recommendations on the scope of practice of anaesthesia in South Africa arose at the time of initial publication of the *SASA Practice Guidelines* (November 2002), because of growing recognition of the role of hospital licensing and credentialing. Part of the process of consideration for accreditation of hospitals was to include the level of qualifications and expertise that a hospital expects of the medical practitioners to whom that hospital grants clinical privileges.
- 1.2 It is important to note that, at the time of publication of these revised recommendations, the National Department of Health of South Africa had published the *Green paper on National Health Insurance*, in which proposals were made, among others, on levels of hospital care. The finalisation of these proposals will greatly influence future recommendations from SASA.
- 1.3 In addition, at the time of original publication, the Health Professions Council of South Africa (HPCSA) requested the College of Anaesthetists of South Africa (CASA) to define the “scope of practice” in the speciality of anaesthesia. CASA has recently submitted a revised recommendation to the HPCSA in collaboration with the Society. Certain statements from the submission have been reproduced in Part One of the *SASA Practice Guidelines 2012 revision*.

2. Recommendations

The two main groups of relevance are independent practice and supervised practice. It is recommended that practitioners are accredited to practice anaesthesia in either capacity.

2.1 Interns

An intern is a doctor in training. He or she should receive a minimum of supervised anaesthesia training of two months. Interns should only administer anaesthesia under on-site supervision.

2.2 Community service doctors

Community service doctors are often required to administer anaesthesia because no other trained medical practitioner is available. The recommendation is that these doctors receive two months of supervised training, and thereafter, should only administer anaesthesia under supervision, which may be remote. It is advised that they should keep a log book of completed cases.



2.3 General practitioners

The level of training given at undergraduate level cannot be seen as sufficient to allow for the independent practice of anaesthesia. General practitioners who have had no additional training in anaesthesia fall into this group.

In a dire emergency, such a practitioner may be expected to provide anaesthesia care to the best of his or her ability [i.e. American Society of Anesthesiologists (ASA) class V]. Every effort should be made to transfer the patient to a centre where better care is available. At the very least, the case should be discussed with a specialist anaesthesiologist. The general practitioner should always inform a patient that he or she is not a specialist anaesthesiologist.

2.4 Diplomat anaesthetists

The diplomate anaesthetist is eligible for the independent practice of both general and regional anaesthesia in fit and healthy patients (ASA class I) and patients with controlled systemic disease (ASA class II). Patients with poorly controlled systemic disease or functional limitation should only be anaesthetised in consultation with a specialist anaesthesiologist (ASA class III), i.e. with a supervisor.

It is reasonable to expect the diplomate to provide safe anaesthesia for fit and healthy paediatric patients over the age of two years, providing the practitioner has maintained the necessary skills and the nature of the intended surgery is minor and elective.

The scope of practice of the diplomate with regard to obstetric anaesthesia is broader, in that the diplomate should be capable of providing safe and appropriate anaesthesia to all obstetric patients, except those with severe systemic disease (ASA class III).

In an emergency, or where no alternative exists, the diplomate may, in consultation with a specialist anaesthesiologist, administer anaesthesia to patients with severe systemic disease (ASA class IV and V). This constitutes supervised practice.

2.5 Specialists in training (registrars)

The anaesthetic registrar is permitted to administer anaesthesia under specialist supervision. This supervision must take place at a ratio of 2:1, i.e. two registrars to each specialist. In circumstances in which the anaesthesia is classified as "low risk", this ratio may be extended to 4:1, and if "high risk", 1:1.

2.6 Specialist anaesthetists (anaesthesiologists)

The specialist anaesthesiologist can be expected to provide anaesthesia services independently to all patients, irrespective of the state of health or co-existing disease (ASA classes I, II, III, IV and V). It behoves the individual practitioner to confine his or her practice to those areas in which he or she has maintained the necessary skills. This applies particularly to the subspecialties of cardiac, thoracic, neuro- and paediatric anaesthesia.

The Society thinks it prudent to comment on the scope of practice and training requirements of two further categories of practitioners that relate to anaesthesia:

2.7 Clinical associates

The Society advises that the training curriculum for clinical associates should not include training in the administration of anaesthesia, either general or regional. However, they should be trained to recognise the complications that may arise from the administration of regional anaesthesia, and how to monitor the patient for recognition of the onset of these complications.

2.8 Anaesthetic assistants

Anaesthetic assistants should obtain technical university training, which is currently being developed. Suggestions regarding the scope of practice for anaesthetic assistants include:

- 2.8.1 To assist the anaesthetist in the preparation of the operating room and patients for anaesthesia, and operative or diagnostic procedures.
- 2.8.2 To assist the anaesthetist with intraoperative monitoring and care of patients.
- 2.8.3 To assist with the postoperative care and monitoring of patients.
- 2.8.4 To function as part of the multidisciplinary team in the operating department.

3. Summary

In view of the risks involved, and the possibility of simple errors that result in severe negative outcomes, such as hypoxic brain damage and death, the scope of practice for the various classes of medical practitioner should be confined as follows:



3.1 Interns

- Supervised training.

3.2 Community service doctors

- Two months' training under direct supervision.
- Subsequent anaesthetic practice under supervision, which may be remote.

3.3 General practitioners

- Independent practice of anaesthesia not recommended.

3.4 Diplomate anaesthetists

- Independent practice for ASA class I and II patients.
- Supervision for all other ASA categories.

3.5 Specialists in training (registrars)

- Supervision at all times.

3.6 Specialist anaesthetists (anaesthesiologists)

- Independent practice for all categories of patient.
- It is suggested that elective neonatal anaesthesia should only be conducted in specialist units.

3.7 Clinical associates

- No anaesthesia procedures are allowed.

3.8 Anaesthetic assistants

- Only allowed to provide assistance.

C. Duties of an anaesthesiologist

1. Preamble

These guidelines attempt to define the general duties and responsibilities of anaesthesiologists (specialist anaesthetists) and anaesthetists (non-specialists).

2. Duties

2.1 The duties of an anaesthesiologist or anaesthetist include:

- 2.1.1 Maintaining personal knowledge and skills.
- 2.1.2 Providing anaesthetic services or supervising trainees who provide anaesthetic services:
 - 2.1.2.1 Anaesthesiologists or anaesthetists may be directly responsible for only one anaesthetic procedure at any specific time, unless acting in a supervisory capacity.
 - 2.1.2.2 When a local anaesthetic technique is used for pain relief without concomitant surgery, e.g. labour epidural, the responsibility for patient supervision may be delegated to a suitably trained paramedical or nursing officer.
- 2.1.3 Carrying out preoperative risk assessment and risk management for all types of patient and surgery.
- 2.1.4 Supervising the recovery room activities.
- 2.1.5 Participating in postoperative management where appropriate.
- 2.1.6 Managing and/or supervising the management of patients in the ICU.
- 2.1.7 Providing services related to the management of acute and chronic pain and consulting in pain clinics.
- 2.1.8 Providing services related to resuscitation and advanced airway management in adults and children.
- 2.1.9 Taking responsibility for supervising the maintenance of anaesthetic, monitoring and other life-support equipment relevant to anaesthesiology and critical care. This must take place in conjunction with a suitable technical or biomedical engineering service.
- 2.1.10 Taking responsibility for the safe use of anaesthesia-associated drugs.
- 2.1.11 Providing anaesthetic services that relate to obstetrics, including pain relief in labour.
- 2.1.12 Providing procedural sedation services in and out of hospital.



2.2 Further duties of the anaesthesiologist or anaesthetist may include:

- 2.2.1 Providing consultative anaesthetic and ancillary services.
- 2.2.2 Carrying out administrative, educational and managerial duties, locally and/or regionally.
- 2.2.3 Providing information and training on methods of handling mass casualties, trauma and basic life support techniques to:
 - 2.2.3.1 Paramedical staff
 - 2.2.3.2 Interested community groups (particularly basic life support).
- 2.2.4 Contributing to the activities of professional associations.
- 2.2.5 Auditing and reviewing quality of care and participating in hospital-based, regional and/or national efforts to improve patient safety.
- 2.2.6 Participating in theatre complex management.
- 2.2.7 Carrying out reviews and investigations on drugs, equipment, methods of clinical management and physiological and pharmacological matters that are relevant to anaesthesiology and intensive care.
- 2.2.8 Providing and/or taking part in advisory services to hospital committees, health commissions and other organisations.

SECTION II: PROFESSIONAL ORGANISATIONS

The South African Society of Anaesthesiologists (SASA) has been functioning independently as a professional body, “leading the science and practice of safe anaesthesia at the highest standard and ensuring the sustainability of anaesthesiology services”, as described in its Constitution. The objectives are the efficient functioning of the key business units, namely Education, Private Practice, Public Sector, Regulation, and Special Interest Groups. More information on the SASA Constitution is available at www.sasaweb.com.

SASA previously functioned as a group within the South African Medical Association (SAMA) and maintains strong ties with SAMA. More information on SAMA is available at www.samedical.co.za.

SASA has full membership status of the World Federation of Societies of Anaesthesiologists (WFSA) and is a member of the African Regional Section within the WFSA. More information is available at www.anaesthesiologists.org

SECTION III: TRAINING, CERTIFICATION AND ACCREDITATION

A. Preamble

The following has been taken from the College of Anaesthetists of South Africa (CASA) submission to the HPCSA, as referred to in the introduction of Section I, Part B of this document (for a review on the categories of anaesthetic practitioners, see Section I: Professional status):

“The Australian Medical Council’s August 2010 *Competence-based medical education consultation* paper has particular relevance as the situation in Australia can be likened to that in South Africa in several ways.

This similarity is highlighted in the following extract from that document:

*‘In Australia, significant reports and reviews on the health sector over the last five years...have described **pressures for reform of the healthcare system stemming from factors such as consumer expectations for safe and high quality health care...changes in the models of care, pressures for health care to be cost-effective, increased rates of chronic disease, pressures on hospitals to reduce both the number of admissions and the time spent in hospitals, greater equity of access to primary health care, renewed focus on prevention, changes which technological advances impose on how care is delivered, the distribution of healthcare practitioners, i.e. urban and rural, and closing the gap between the health of indigenous Australians and nonindigenous Australians**’.*

South Africa shares the problems of reduced access to medical care in rural areas, as opposed to urban populations, and the difference between the previously disadvantaged (read “indigenous”) and advantaged groups remain a major source of discontent for the majority of South African citizens. For this reason, it is felt that much of the document has a bearing on the South African scenario and should be carefully considered.

An additional factor to be taken into consideration is patients receiving multidisciplinary care. The level of care for each discipline involved in the treatment may differ for the same patient. An example would be a patient with a tight mitral stenosis and pulmonary hypertension, requiring a dilatation and curettage, where the anaesthetic and surgical level of care may differ widely:



Adequacy of education and training

To qualify as adequately trained, two points need to be satisfied:

- The training entity/institution/hospital needs to be accredited for training in that particular discipline and for that particular competency.
- The trainee needs to be evaluated and certified as having met the requirements of the training programme.

The adequacy of the training, i.e. were the goals of the training programme achieved? is seen to be of greater importance than the actual period of the training, although a minimum period should be stipulated. To some extent, these latter requirements have already been addressed by the HPCSA and for specialists and by the Colleges of Medicine of South Africa (CMSA) for diplomats.

Following successful completion of training, the practitioner will be considered to be 'credentialed' to perform the prescribed activities in line with the respective professional society's guidelines and subject to regular 'revalidation' of competencies in keeping with the UK Good Medical Practice document of the General Medical Council (GMC). CPD activities are essential to maintain current knowledge.

In terms of anaesthetic practice, respondents were in favour of the addition of a clause (c) to read: '*for all anaesthetic procedures and related intensive care practice, scope of practice should be in accordance with the CASA (see B below) and Critical Care Society of South Africa (CCSSA) guidelines*', to the existing rule: '*It is permissible for a practitioner to perform, except in an emergency, only a professional act (a) for which he or she is adequately educated, trained and sufficiently experienced, and (b) under proper conditions and in appropriate surroundings*'.

This clause (c) could be broadened to read 'in accordance with the relevant discipline's official established guidelines for standards and norms'.

However, for all categories of practitioner, if the emergency warrants urgent action to prevent morbidity or mortality and there is no access to an appropriately trained healthcare worker, then without question, a healthcare worker should intervene to the best of his or her ability and as long as her or she does no further harm: the principle of *Primum non nocere*.

However, concern is expressed that in the private sector, general practitioners continue to provide complex anaesthesia for elective surgery beyond their scope of practice as outlined by CASA and SASA, without supervision in an environment in which anaesthesiologists are readily available. This situation should be viewed differently from that of the public sector where supervision is present.

Where should the focus of training lie?

The Australian Medical Council recommendation is as follows:

'Part of the rationale for this progressive shift in training orientation has been the realisation that the focus should be directly on the student's own learning: specifically what they know and are able to perform on completion of training, rather than on length of time served under a master in a master-apprentice relationship. Comprehensive identification of skills and knowledge elements is intended to provide a strong direction for training, explicitly assessable element and ultimately a greater confidence in the resulting certification or qualification...'

In practice, the breakdown of overall "proficiency" is to detailed competencies in many areas of the vocational education and training sector, where the focus is on the development of discrete skills or elements of knowledge. Each skill or knowledge element is known as a "competency", with performance at a nominated approved level in all the competencies constituting proficiency, virtually by definition, as a qualified tradesperson, artisan, or specialist worker...

Underlying this development is the belief that the greater the specificity, the fuller the training and assessment regime, and the more the standing of the qualification is assured. This in turn has sometimes meant that students are coached in each of the discrete elements separately, until the student complies with the requirement: that is, performs satisfactorily.

Disinterested observers have noted that this tendency towards finely grained training can leave a student technically satisfying all the requirements for a qualification, but not able to "get all the pieces coordinated".'

Sufficiently experienced

Experience should also be viewed from two perspectives:

- Initial supervised training experience as previously discussed.
- Ongoing experience.



With highly specialised procedures, a minimum number of procedures need to be performed annually on a regular basis to remain proficient. Cardiac anaesthesia, for example, should not be performed two or three times a year, as the practitioner needs to perform regularly in order to remain sufficiently skilled. This issue is addressed by credentialing and revalidation processes that involve ongoing appraisal as implemented in the UK [see also Good Practice document 2006 Royal College of Anaesthetists (RCA) and The Association of Anaesthetists of Great Britain and Ireland (AAGB & I)]. It is difficult to pin down specific numbers per procedure, but they should at least be reasonably regularly performed.

Under proper conditions

For anaesthesia, these have been prescribed in detail in the SASA guidelines and the RCA key points on the provision of anaesthetic services document. In addition, conditions are subject to National Health and Safety regulations.

In appropriate surroundings

The *SASA Practice Guidelines* provide an adequate and detailed description of what is required and legislation is already in place governing registration of healthcare facilities. Health and safety regulations apply.

B. South African Training Institutions

The training institutions accredited for the education of anaesthesia practitioners are:

- CASA, part of the CMSA. More information is available at www.collegemedsa.ac.za
- Other training institutions include the University of Pretoria, University of Cape Town, University of Limpopo (Medunsa Campus), Walter Sisulu University, University of the Free State, Stellenbosch University, University of the Witwatersrand and University of KwaZulu-Natal.

C. Certification and accreditation in South Africa

Certification and accreditation of medical practitioners are managed by the HPCSA. More information is available at www.hpcsa.co.za.

D. Essential training for general practitioners proposing to administer anaesthesia

1. Introduction

1.1 The Society, at the outset, acknowledges the inadequate number of specialist anaesthesiologists to meet the needs of South Africa. Standards vary with location. The urban population benefits largely from First World standards of anaesthetic practice, while a significant percentage of the rural population lacks access to even rudimentary primary health facilities. The position of general practitioners, in a community where no specialist anaesthetic service is available, and where it is necessary for surgical procedures to be undertaken, is acknowledged. In this respect, South Africa is not unique, as certain First World countries, including Australia and Canada, share a similar problem in meeting the needs of their respective rural communities.

1.2 It should be clearly understood that what follows is not intended in any way to endorse, reflect on or pre-judge the issue of surgery being undertaken in these circumstances. Nevertheless, any practitioner undertaking such an anaesthetic service should have achieved a certain minimum standard of training and experience, which is hereinafter defined. Some cognisance has to be taken of the international models developed for rural anaesthetic practice in the countries referred to above.

Furthermore, the availability of an anaesthesiologist, the question of hospital facilities and infrastructure are critical to this matter, and anaesthesia is only one of a number of considerations which must influence decisions to be made on what is in the best interests of the patient.

1.3 A minimum period of experience in anaesthesia under instruction is required. This experience should be gained in a department of anaesthesia with a significant case load, where a graded programme can be arranged under the instruction of persons who are competent to teach the trainee, i.e. are themselves qualified in anaesthesia, and it should be of at least six months' duration, three months of which should be in a continuous, full-time capacity.

1.4 At the conclusion of this training period, the practitioner must be able to:

- 1.4.1 Cannulate both the peripheral and central venous systems.
- 1.4.2 Perform basic life support and advanced life support and resuscitation.



- 1.4.3 Test the safety and efficient working of anaesthetic and other life-support equipment used in anaesthesia.
 - 1.4.4 Manage an airway, including intubation and insertion of a laryngeal mask airway and similar alternate airway devices, in patients ranging from neonates to the elderly.
 - 1.4.5 Maintain intermittent positive-pressure ventilation safely in the intubated and nonintubated patient.
 - 1.4.6 Perform local, topical and regional anaesthesia techniques.
- 1.5 In addition, the practitioner must have acquired sufficient clinical knowledge to:
- 1.5.1 Understand the pharmacological and physiological effects of commonly used anaesthetic agents.
 - 1.5.2 Understand the physiological responses to subarachnoid and epidural blockade.
 - 1.5.3 Be aware of the range, function, clinical use and hazards of anaesthetic equipment, and safety issues pertaining to the use and maintenance of equipment.
 - 1.5.4 Appreciate the additional risks of anaesthesia in the presence of pre-existing, co-morbid disease or injury.
 - 1.5.5 Choose the anaesthetic method that is most suitable for a particular patient and procedure.
 - 1.5.6 Manage local, topical and regional anaesthesia techniques, including techniques of subarachnoid anaesthesia and commonly used nerve blocks and intravenous (Biers) blocks, as well as the management of their immediate and delayed complications.
 - 1.5.7 Adequately monitor patients undergoing regional anaesthesia.
 - 1.5.8 Use sedative drugs according to published SASA guidelines.
 - 1.5.9 Use general anaesthesia in conjunction with regional anaesthesia.
 - 1.5.10 Manage acute pain that relates to surgery and trauma.
 - 1.5.11 Resuscitate patients who are suffering from fluid and electrolyte depletion, acid-base disturbances and other metabolic disturbances, and hypoxia with or without hypercarbia, and manage acute trauma and haemorrhagic or septic shock.
- 1.6 It is to be expected that this clinical knowledge will equip a prudent and responsible practitioner to recognise those situations which are beyond his capabilities. However, it should also be appreciated that maintaining and updating the necessary skills and knowledge is essential. This implies both continuing education and continuity and adequacy of clinical experience.
- 1.7 It is highly recommended that all doctors providing anaesthesia in any form maintain a record, i.e. a log book, of anaesthetic procedures, containing as much detail as is practical, including patient particulars and details of the surgical and anaesthetic techniques employed.

2. Categories of anaesthetic practice among non-specialist anaesthetists

Two categories of anaesthetic practice are recognised for the non-specialist anaesthetist:

- 2.1 Diplomates of the College of Anaesthetists of South Africa [(DA(SA))] are required to undergo supervised training for a minimum period of six months in an approved institution, as well as a formal assessment and examination. The diplomate is eligible for independent practice of both general and regional anaesthesia in fit and healthy patients (ASA class I) and patients with controlled systemic disease (ASA class II) undergoing non-major surgery. Patients with poorly controlled systemic disease, or who have functional limitation (ASA class III), should only be anaesthetised in consultation with a specialist anaesthesiologist or supervisor. In the case of paediatric anaesthesia, it is reasonable to expect the diplomate to provide safe anaesthesia for fit and healthy children over the age of two years, providing the practitioner has maintained the necessary skills and that the nature of the intended surgery is minor and elective. The diplomate should be capable of providing safe and appropriate anaesthesia to all obstetric patients, except those with severe systemic disease (ASA class III or IV). In an emergency, or where no alternative exists, the diplomate may, in consultation with a specialist anaesthesiologist, administer anaesthesia to patients suffering from more severe disease (ASA class IV and V); this then constituting supervised practice.
- 2.2 The training that is given at undergraduate, intern and community service levels is not sufficient to allow for the independent practice of anaesthesia. Therefore, it would be inappropriate for the medical practitioner who has not received formal anaesthetic training to independently administer general or major regional anaesthesia without supervision. It is recommended that all intern service-level doctors, in addition to the required period spent in the anaesthesia department at the hospital, undergo training through the Essential Steps in Managing Obstetric Emergencies (ESMOE) Anaesthetic Module to safely administer anaesthesia for Caesarean section.



SECTION IV: RECORDS AND STATISTICS

It is imperative that all practitioners provide and maintain documentation to support the execution of any tasks as set out in these *Practice guidelines* in as much detail as is practical and useful. The practitioner may be required to submit this information to named authorities willingly, provided that patient confidentiality is maintained.

The ultimate goals are to protect patients and improve quality of care:

“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 preoperative assessment and the postoperative 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”.¹

SECTION V: PEER REVIEW AND INCIDENT REPORTING

Peer review is a function of the Society’s Regulation Business Unit, and peer review-related enquiries are facilitated through the SASA website.

The Society is in the process of developing a national incident reporting system according to the following recommendations:

“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”.¹

SECTION VI: WORKLOAD

At the time of publication of this guideline, it was decided that a document pertaining to workload would be published as a discussion document on the SASA website as a “statement”, and that this part of the *Practice guidelines* will be revised when consensus is reached, based on discussion around this preliminary statement:

“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”.¹

SECTION VII: 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, anaesthetic 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 the relevant information regarding the anaesthetic and the patient. Where it is impossible for this standard to be attained and the surgeon or another individual assumes responsibility for the anaesthetic, these arrangements should be reviewed and audited by an appropriately trained anaesthesia professional.”¹

References

1. Merry AF, Cooper JB, Soyannwo O, et al. International standards for a safe practice of anesthesia. *Can J Anaesth*. 2010;57(11):1027-1034.
2. World Federation of Societies of Anaesthesiologists (WFSA) [homepage on the Internet]. Available from: <http://www.anaesthesiologists.org>



PART Two

GUIDELINES TO THE PREOPERATIVE ANAESTHETIC WORK-UP AND INFORMATION REQUIRED FOR THE AVERAGE ELECTIVE SURGICAL PATIENT PRESENTING FOR ANAESTHESIA

1. General

- 1.1 These standards apply to all patients who receive general or regional anaesthesia, sedation or monitored anaesthesia care. Under unusual circumstances, e.g., extreme emergencies, these standards may be modified. When this is the case, the circumstances shall be documented in the patient's record. At a minimum, a focused preoperative evaluation of airway, lungs and heart must be carried out and vital signs documented.
- 1.2 An anaesthesiologist shall be responsible for determining the medical status of the patient, developing a plan of anaesthesia care and acquainting the patient or the responsible adult with the proposed plan and all aspects relating thereto, including financial implications and scheduling. Appropriate informed consent for anaesthesia should be obtained.
- 1.3 Information is obtained by reviewing the medical record, interviewing the patient in terms of the medical history, previous anaesthesia experience, drug therapy, current disease and aspects that may influence perioperative decisions, physical examination and results from special investigations, medical tests or consultations.
- 1.4 Further consultation or investigations may be ordered at this stage, and specific preparation may be implemented. Any evaluations, tests and consultation should only be performed if there is reasonable expectation that the benefit will outweigh the risk. Potential benefits may include a change in timing and content of anaesthetic management which would improve safety or better utilisation of resources.
- 1.5 The responsible anaesthesiologist shall verify that the above has been properly performed and documented in the patient's record.
- 1.6 Preoperative assessment should take place early in the patient's journey so that all requirements for essential resources and obstacles can be anticipated before the day of the operation. Patients with high severity of disease and/or high invasiveness of surgery should be evaluated before the day of surgery. Patients with low severity of disease and medium or low invasiveness of surgery could be evaluated on or before the day of surgery.¹
- 1.7 Ideally, the anaesthetist who will actually give the anaesthetic should visit the patient before the operation.
- 1.8 Sufficient time must be made available in the patient care pathway for the anaesthetist to cover the essential points of preoperative assessment. Job plans should incorporate adequate programmed activities for preoperative anaesthetic visiting and assessment. Whenever possible, a preoperative consultation should be performed in a formal setting. Nevertheless, this might not always be practical or possible. Therefore, there can be no geographical or time limitation as to when or where this preoperative consultation should take place.
- 1.9 At the time of the preoperative consultation, premedicant drugs should be prescribed in writing and signed for on the appropriate document by the anaesthesiologist or the individual taking the anaesthesiologist's orders. Such premedicant drugs may include those for night sedation, pain management and therapy of underlying disease.

1.10 **Telephonic premedication**

While it is generally accepted that the ideal is to visit all patients in the ward before prescribing premedicants, it may be in the patient's best interests to prescribe these telephonically. For example, patients may only be admitted on the day of surgery while a busy surgical list is already in progress. This makes it difficult, if not impossible, for the anaesthesiologist to visit the patient prior to the patient's transfer to the operating suite. In such circumstances, it may be desirable or even essential to prescribe some form of anxiolytic or other premedication. Premedicant drugs may be ordered telephonically if the patient's detailed history, as well as other admission criteria, such as age, weight and gender, are made available to the anaesthesiologist and if the patient is being attended to by registered nurses who will have the patient under observation. In these circumstances, overall responsibility will remain that of the anaesthesiologist, and he should refrain from telephonic prescriptions if it is not appropriate.



2. Medical history

The following information should be obtained and recorded by the anaesthesiologist by taking a formal history, which may be supplemented with a questionnaire.

2.1 *Previous or present illnesses*

Do you have, or have you had:

- 2.1.1 Heart disease, e.g. coronary thrombosis, chest pain, high blood pressure, rheumatic fever or congenital defects or any abnormal cardiovascular symptoms?
- 2.1.2 Asthma, bronchitis, emphysema or any other lung disease?
- 2.1.3 A cough or recent cold?
- 2.1.4 A smoking history? If smoking presently, how much?
- 2.1.5 Jaundice, hepatitis or any liver disease?
- 2.1.6 Kidney disease?
- 2.1.7 Diabetes, and if so, what treatment are you receiving?
- 2.1.8 Epilepsy, and if so, what treatment are you receiving?
- 2.1.9 Arthritis?
- 2.1.10 Muscular disease?
- 2.1.11 Porphyria? (This extends to a member of your family too).
- 2.1.12 A bleeding tendency? (This extends to a member of your family too).
- 2.1.13 Blackouts, dizzy spells or previous strokes?
- 2.1.14 Are you pregnant?
- 2.1.15 Allergies or abnormal reactions to any medication or any other substance?
- 2.1.16 Are you taking any medication not mentioned above, including aspirin and other anti-inflammatory drugs?
- 2.1.17 What is your average weekly alcohol consumption?
- 2.1.18 Do you engage in any recreational drug use?
- 2.1.19 Do you have heartburn or reflux?
- 2.1.20 Do you snore or suffer from sleep apnoea?

2.2 *Previous anaesthetics or surgery?*

- 2.2.1 What previous anaesthetics or operations have you had?
- 2.2.2 Have you or any members of your family had any complications or unusual reactions to local or general anaesthetics?

2.3 *Medication*

Are you taking or have you taken:

- 2.3.1 Any heart drugs?
- 2.3.2 Any blood pressure drugs?
- 2.3.3 Cortisone or other steroids?
- 2.3.4 Anticoagulants?
- 2.3.5 Tranquillisers, sleeping pills, sedatives or antidepressant drugs?
- 2.3.6 Any treatment for asthma or hypertension?
- 2.3.7 Other drugs?

2.4 *Other aspects*

- 2.4.1 Do you have false teeth, crowns, capping or any loose teeth?
- 2.4.2 Do you wear contact lenses?
- 2.4.3 When did you last eat or drink?
- 2.4.4 Who will accompany you home? (day-case patients only).

2.5 *Further history*

The above questionnaire should be supplemented at the time of the preoperative visit by the anaesthetist to include information deemed necessary for his assessment of the individual patient.



3. Physical examination

The above history should be supplemented by a full physical examination at the time of the preoperative consultation. This includes evaluation of the airway and appropriate systems.

Extra information that might be necessary should be included, e.g.:

- 3.1 The patient's weight should be provided.
- 3.2 Haemoglobin estimation should be ascertained where appropriate.
- 3.3 Clinical assessment of cardiovascular and respiratory status should be carried out as considered appropriate by the anaesthesiologist.
- 3.4 Blood pressure reading should be taken.
- 3.5 Further systemic examination should be conducted, as is relevant.
- 3.6 Side-room urine examination should be undertaken, if indicated.

4. Special investigations

Preoperative tests should not be carried out routinely. They should be ordered selectively (balancing risk and costs against benefits, taking the invasiveness of surgery into account) to guide optimising of perioperative management. Indications should be documented and based on information from medical records, history and physical examination. Unless the patient's condition changes significantly, results of tests carried out up to six months before the procedure should be acceptable.

4.1 ***A 12-lead electrocardiograph is not routinely indicated, but in the case of a history that is suggestive of cardiac or pulmonary disease may be indicated in the following circumstances or when symptomatic:***

- 4.1.1 Recent myocardial infarction or angina.
- 4.1.2 Congenital heart disease
- 4.1.3 Arrhythmia, particularly if symptomatic.
- 4.1.4 Any previous heart disease or condition predisposing to cardiovascular disease.
- 4.1.5 Longstanding hypertension.
- 4.1.6 History of dyspnea, blackouts and palpitations.
- 4.1.7 Older age.
- 4.1.8 Chronic respiratory disease.
- 4.1.9 Other risk factors.

4.2 ***A chest X-ray should be available where:***

- 4.2.1 Clinical examination indicates lung pathology with remaining functional impairment.
- 4.2.2 There is a history of haemoptysis.
- 4.2.3 There is a recent history of thoracic injury.
- 4.2.4 Other indications.

4.3 ***Preoperative haemoglobin should not be carried out routinely, but may be indicated by:***

- 4.3.1 Type and invasiveness of surgery.
- 4.3.2 Liver disease or renal disease.
- 4.3.3 Clinical anaemia.
- 4.3.4 Extremes of age.
- 4.3.5 Bleeding.
- 4.3.6 Other haematological diseases.

4.4 ***Other special investigations***

Other special investigations, such as electrolytes, blood sugar, blood urea and creatinine, coagulation studies, pulmonary function tests, functional tests of cardiac function and an echocardiography should be considered in the light of the findings of the preoperative assessment.



5. Consent and explanation

- 5.1 Informed consent must be obtained.
- 5.2 The patient or guardian need to be fully informed regarding all aspects of the planned anaesthetic procedure, including the financial implications. A written quotation may be required to facilitate this communication.
- 5.3 The anaesthesiologist may need to confirm that appropriate arrangements have been made regarding scheduling of the procedure.
- 5.4 The patient's fears need to be allayed and information and reassurance given. The anaesthetic technique must be discussed with the patient or caretaker.
- 5.5 Only the more common and relevant risks of the anaesthetic procedure need to be explained to the patient and/or his or her family, as is appropriate. Explanation of risks should not necessarily include rare and uncommon outcomes that will incur undue anxiety. However, catastrophic outcomes, e.g. death or paralysis, should be mentioned, even if extremely rare.
- 5.6 Explanations and answers to questions posed by the patient should be frank, but must be tailored according to:
 - 5.6.1 The ability of the patient to grasp the implications fully.
 - 5.6.2 The patient's existing medical knowledge and medical background.
- 5.7 It is preferable that a written information sheet with simple information on fasting, anaesthesia, and pain relief is provided to elective patients before hospital admission.
- 5.8 The patient is entitled to enquire as to whether the anaesthetist is an anaesthesiologist or not.

6. Further information

- 6.1 South African Society of Anaesthesiologists' webpage. Available from: www.sasaweb.com
- 6.2 On the American Society of Anesthesiologists' webpage. Available from: www.asahq.org/:
 - 6.2.1 Basic standards for preanaesthesia care.
 - 6.2.2 Statement on routine preoperative laboratory and diagnostic screening.
 - 6.2.3 Practice advisory for preanaesthetic evaluation.
- 6.3 On the Royal College of Anaesthetists' webpage. Available from: <http://www.rcoa.ac.uk/>:
 - 6.3.1 Guidelines for the provision of anaesthetic services (July 2004), Chapter 3.
- 6.4 Regarding airway assessment:
 - 6.4.1 <http://www.asahq.org/~media/For%20Members/Practice%20Management/PracticeParameters/DifficultAirway.ashx>
 - 6.4.2 <http://tinyurl.com/cgbow6w>
 - 6.4.3 www.das.uk.com/guidelines/downloads.html

References

1. American Society of Anesthesiologists task force practice for preanesthesia evaluation. *Anesthesiology*. 2012;116(3):552-538.



PART Three

RECOMMENDED FACILITIES FOR SAFE ANAESTHETIC PRACTICE IN HOSPITALS, DAY CARE AND OFFICE-BASED FACILITIES

1. Principles of anaesthetic care.
2. Operating theatre staff.
3. Anaesthetic equipment.
4. Drugs.
5. Routines for checking, cleaning and servicing equipment.
6. Theatre environment.
7. Recovery area.

Please note: Recommendations have been adopted to accommodate the proposal for the designation of hospitals as contained in the *Green paper policy* for National Health Insurance in South Africa, published by the Department of Health, August 2011:

- A. District hospital.
- B. Regional hospital.
- C. Tertiary hospital.
- D. Central hospital.
- E. Specialised hospital.

Detailed information regarding the Essential Equipment List according to hospital designations, as recommended by SASA, has been provided to the National Department of Health (Appendix A).

Some of the items listed under “Desirable” in the following document may only be indicated as part of a central or specialised hospital’s requirements.

Day-care and office-based facilities should adhere to all the “Essential” requirements.

1. Principles of anaesthetic care

- 1.1 Anaesthesia should be administered only by medical practitioners with appropriate training in anaesthesia (see Part One).
- 1.2 The *sine qua non* of the safe conduct of anaesthesia is the physical presence of such a practitioner constantly in attendance during anaesthesia. Furthermore, the anaesthesiologist should be readily available during the period of recovery from anaesthesia until such time as the patient is deemed fit for transfer from the recovery area. Only in exceptional circumstances should the anaesthesiologist physically leave the operating room, and then only if continued supervision has been handed over to another suitably qualified medical person. In addition, the operating team should be informed that the anaesthesiologist will temporarily be out of the room and that continued monitoring will be performed by a substitute.
- 1.3 Every patient who presents for anaesthesia should undergo a general medical assessment by a medical practitioner, preferably by the doctor scheduled to give the anaesthetic (see Part Two).
- 1.4 A full contemporaneous record of the anaesthetic technique, patient responses to anaesthesia and other pertinent medical information relating to the anaesthetic should be made by the practitioner delivering an anaesthetic. Any anaesthesia-related complications should be documented in the patient file.
- 1.5 It is the responsibility of the anaesthesia practitioner to engage other members of the surgical team in care of the patient in such a way that the improved communication results in every effort being made to improve the quality of care and to prevent the patient from being harmed. An example of a tool to be used to enhance this communication process is the World Health Organization Safe Surgery Checklist (<http://www.who.int/patientsafety/safesurgery/>).
- 1.6 Modern practice demands certain basic facilities and equipment for the safe administration of anaesthesia (see below).



2. Operating and theatre staff

- 2.1 In addition to the nursing staff required by the surgeon, it is considered essential for the safe and efficient conduct of anaesthesia that a suitably trained and competent registered or enrolled nurse or anaesthetic technician is available to assist the anaesthesiologist.
- 2.2 Such an assistant must be present during the preparation for and induction of anaesthesia, and must remain in the operating room until the anaesthesiologist indicates that the assistant's presence is no longer required. The presence of the assistant is similarly required at the conclusion of anaesthesia. The assistant should have no other obligations or duties during these periods.
- 2.3 During the maintenance of anaesthesia, the assistant must be available immediately should he or she be required in the operating room.
- 2.4 Operating theatre rosters must ensure the allocation of such an assistant.
- 2.5 There should be at least one trained anaesthetic sister per operating room complex.

3. Anaesthetic equipment

Standards must be influenced by the nature of the surgery undertaken, and to some extent by the quality of the service offered by the institution, and the availability of maintenance and service facilities. Referral hospitals are usually in large centres and must meet higher standards.

3.1 Anaesthetic mixture components

The anaesthetic machine must not be capable of delivering a hypoxic mixture of gases under any circumstances.

ESSENTIAL: Items considered to be a minimum requirement for the safe conduct of anaesthesia include:

- 3.1.1 *Gas sources exclusively from cylinders must have:*
 - 3.1.1.1 Pin-index yokes with pressure-reducing valves for both oxygen and nitrous oxide. These should be marked with the name or the chemical symbol of the gas and colour coded in accordance with international standards.
 - 3.1.1.2 Pressure indicators for oxygen must be available.
 - 3.1.1.3 One nitrous oxide cylinder and one full spare per machine.
 - 3.1.1.4 Two oxygen cylinders and two full spares per machine.
 - 3.1.1.5 A suitable spanner or key must be available for opening and closing gas cylinders, even where the cylinders have finger-control knobs. The spanner should be attached to the anaesthesia machine.
- 3.1.2 *Gas sources from pipelines with back-up cylinders must have:*
 - 3.1.2.1 Noninterchangeable wall points and connectors for nitrous oxide and oxygen and any other gases, conforming to national standards.
 - 3.1.2.2 Colour-coded pipeline hoses capable of withstanding pressures of up to 1 000 kPa affixed to anaesthetic machines by noninterchangeable fittings. Colour coding according to international standards: oxygen (white), nitrous oxide (blue) and medical air (black).
 - 3.1.2.3 Pressure indicators for each line.
 - 3.1.2.4 Non-return valves fitted at the machine connection point of the pipeline.
 - 3.1.2.5 One back-up cylinder with pin-index yoke for oxygen.
 - 3.1.2.6 One spare oxygen cylinder.
 - 3.1.2.7 A suitable spanner or key must be available for opening and closing gas cylinders, even where the cylinders have finger-control knobs. This should be attached to the anaesthesia machine.
 - 3.1.2.8 Medical air pipelines should be fitted with a water trap.
- 3.1.3 An oxygen failure device with an audible alarm, preferably continuous, must be fitted to the anaesthetic machine.
- 3.1.4 *Appropriate flow controllers for all available gases:*
 - 3.1.4.1 The flow meter for oxygen must be accurate to 100 ml/minute for flows up to 1 l/minute and accurate to 500 ml/minute for higher oxygen flows.
 - 3.1.4.2 Where there is a sequence of gas control knobs, oxygen must be positioned on the right, as seen from a position facing the machine.
 - 3.1.4.3 Oxygen must always be the final gas delivered to the common gas pathway.



- 3.1.4.4 Machines with electronic flow controllers must have a manual device for oxygen delivery, independent of electrical supply.
- 3.1.5 One vaporiser that is capable of delivering accurate, controllable partial pressures of volatile anaesthetic agents at varying fresh gas flows, and under the full range of normal clinical conditions. The graduations of the control should not exceed 0.5 minimum alveolar concentration (MAC) and should provide at least three times the MAC of the selected agent.
- 3.1.6 The breathing system pressure relief valve should be set to 6 kPa oxygen flush system, delivering at least 35 l/minute of oxygen at the machine outflow and controlled by an obvious, recessed, nonlockable button.
- 3.1.7 Outflow point connector of 22 mm International Organization for Standardization (ISO) standard male taper.
- 3.1.8 These components are to be mounted on a rigid frame that maintains the flow meters in a vertical position and the vaporiser level.
 - 3.1.8.1 The mounting frame for a mobile anaesthetic machine must be sufficiently stable to prevent it from being accidentally tipped over. All ancillary monitoring equipment should be mounted on a suitable horizontal surface, or securely attached to the machine.
- 3.1.9 Oxygen analyser with audible low-concentration warning device which should be adjustable, but with a minimum of 18%.
- 3.1.10 Where a potentially hypoxic gas mixture could be delivered, a hypoxic guard must be fitted to ensure a minimum oxygen concentration of 25%.
- 3.1.11 High-pressure gas supply master/slave switches, whereby low pipeline or cylinder pressure of oxygen cuts off hypoxic gas sources (fail-safe device).
- 3.1.12 Pipeline supply for compressed air in all major theatres.
- 3.1.13 Appropriate delivery system for the supply of accurate flows of compressed air.
- 3.1.14 Gas delivery systems capable of delivering accurately proportioned fresh gas mixtures at flow rates down to 250 ml/minute.

3.2 Breathing circuits

ESSENTIAL: Items considered to be a minimum requirement for the safe conduct of anaesthesia include:

- 3.2.1 A suitable breathing system for adult patients fitted at all junctions with ISO-standard tapered fittings.
- 3.2.2 Paediatric anaesthetic breathing systems must be available in institutions where children might be anaesthetised.
- 3.2.3 One set of face masks per machine in a suitable range of sizes that are appropriate for the patient population.
- 3.2.4 One set of Guedel® oral airways per machine.
- 3.2.5 An appropriate range of different endotracheal tube sizes with standard connectors which are immediately available.
- 3.2.6 Breathing circuit-pressure gauge.
- 3.2.7 A self-inflating resuscitation bag (Ambu® or similar).

DESIRABLE: Items considered not absolutely essential on a basic machine, but normally considered desirable for the safe conduct of anaesthesia

- 3.2.8 Anaesthesia workstation with central processing unit controlling electronic flow meters, electronic vaporisers and integrated multi-mode anaesthesia ventilator, e.g. rising bellow or piston driven, with integrated patient monitoring and a circle breathing circuit with a carbon dioxide absorber.
- 3.2.9 Venturi® injector for airway inflation within the theatre complex.

Regional, tertiary, central and specialised hospital requirements must include all items set out under “Desirable”.

3.3 Ancillary equipment per theatre

ESSENTIAL: Items considered to be a minimum requirement for the safe conduct of anaesthesia include:

- 3.3.1 Laryngoscopes (preferably with fibre-optic light carrier and light-emitting diode light source)



- 3.3.1.1 Two adult, preferably Macintosh® pattern with all size blades.
- 3.3.1.2 Appropriate range of paediatric laryngoscope blades when anaesthesia might be provided for children.
- 3.3.2 Magill® adult endotracheal tube-introducing forceps.
- 3.3.3 Nonmetallic or plastic coated, malleable endotracheal tube-introducing stylettes.
- 3.3.4 Anaesthesiologist's chair on wheels with backrest.
- 3.3.5 Full set of laryngeal mask airways per theatre complex.
- 3.3.6 Designated difficult airway management trolley with appropriate equipment should be in every theatre complex (Appendix B).
- 3.3.7 A wall clock with a sweep second hand or digital equivalent should be present in each theatre.
- 3.3.8 Suction unit for exclusive use by the anaesthesiologist, generating a minimum negative pressure of 50 kPa at a minimum airflow of 25 l/minute into a reservoir bottle of at least 1-litre capacity. Adequate length of suction tubing and an appropriate range of cannulae/catheters for oral and endotracheal suction.
- 3.3.9 Two kidney dishes as receivers for clean and dirty oral and endotracheal instruments.
- 3.3.10 Inflating device for endotracheal tube cuffs.
- 3.3.11 A monitor-defibrillator with adult and infant electrodes per theatre suite must be available. A pacing facility is desirable.
- 3.3.12 Operating table with Trendelenburg-position controls at the head of table.
- 3.3.13 Two lateral padded straight arm supports.
- 3.3.14 Appropriate padding and equipment for the positioning of patients to prevent injury.
- 3.3.15 Drug trolley for exclusive use by the anaesthesiologist.
- 3.3.16 Topical anaesthetic spray.
- 3.3.17 Two intravenous (IV) infusion poles.
- 3.3.18 A pair of strong scissors.
- 3.3.19 A method of securing the anaesthetic breathing system to the operating table.
- 3.3.20 Anaesthetic and surgical suction bottles should be graduated for volume.
- 3.3.21 An appropriate selection of intravenous fluids and IV cannulas must be available.
- 3.3.22 Warming blankets/convection warmers for use in theatre. This is an absolute requirement for neonates and infants.
- 3.3.23 Where infants and small children are to be anaesthetised, a full range of the necessary paediatric equipment (as outlined above) must be available.
- 3.3.24 Infusion devices: volumetric pumps and/or syringe drivers.
- 3.3.25 In-line warmer for blood and IV fluids.
- 3.3.26 Pressure infusor for 500 ml (blood) or 1 000 ml IV bags.
- 3.3.27 Forced air warmer.
- 3.3.28 Electrical generator back up for hospital and/or theatre complex.
- 3.3.29 Uninterruptable power supply (UPS) or battery back up for life-support equipment.

In the case of a power outage (failure of main Eskom power supply) the following guideline should be followed:

- 3.3.29.1 If the theatre complex only has one electrical back-up system (generator /UPS), current elective cases should be completed as soon as possible and all other cases postponed until the main power is restored. Urgent emergency cases may continue.
- 3.3.29.2 If a theatre complex has a second back-up power supply, e.g. second generator or UPS unit, elective cases can continue as long as it is verified that the second back-up supply has adequate capability for the duration of the power outage.
- 3.3.29.3 Equipment battery backup is not deemed to be a second back-up power supply as the duration of the battery supply is not dependable enough to continue with an elective list.

DESIRABLE: Items considered not absolutely essential on a basic machine, but normally considered desirable for the safe conduct of anaesthesia

- 3.3.30 A rigid bronchoscope (this need not be for exclusive use by the anaesthesiologist), with attachments for ventilating apnoeic patients, must available in the theatre suite.
- 3.3.31 Video-assisted or normal light source fibre-optic bronchoscope.



- 3.3.32 Video-assisted laryngoscope.
- 3.3.33 Individual illumination of the anaesthesiologist's area, including emergency back-up, battery-powered illumination source.
- 3.3.34 Peripheral nerve stimulator to assist with regional anaesthetic techniques per theatre suite.
- 3.3.35 Syringe drivers programmed to administer target-controlled intravenous anaesthesia.
- 3.3.36 Blood salvage system.
- 3.3.37 High-flow blood/fluid warmer.
- 3.3.38 Transportable ventilator and monitor.
- 3.3.39 Equipment for patient-controlled analgesia.
- 3.3.40 All electrical equipment should be able to operate from batteries, particularly when a reliable emergency electrical supply is not available.
- 3.3.41 A telephone in each theatre for communication.

Regional, tertiary, central and specialised hospital requirements must include all of those set out under "Desirable" for the safe conduct of anaesthesia.

3.4 Monitors

ESSENTIAL: Items considered to be a minimum requirement for the safe conduct of anaesthesia include:

- 3.4.1 A stethoscope.
- 3.4.2 A multi-parameter vital signs monitor, incorporating and displaying:
 - 3.4.2.1 An electrocardiogram (ECG) channel with 3- and/or 5-lead ECG monitoring. The unit must incorporate a diathermy filter.
 - 3.4.2.2 *Heart rate*: Derived from ECG or noninvasive blood pressure or invasive pressure readings.
 - 3.4.2.3 An automated electronic noninvasive blood pressure module displaying systolic, mean and diastolic blood pressure, with an appropriate range of cuffs.
 - 3.4.2.4 Pulse oximetry, displaying oxygen saturation and a plethysmogram.
 - 3.4.2.5 Capnograph, displaying end-tidal CO₂ in mmHg or Kpa, or a percentage and a capnogram.
 - 3.4.2.6 Temperature for oesophageal, rectal, bladder or tympanic use, reading 22-42°C minimum range.
 - 3.4.2.7 Alarms: Adjustable alarm limits for all parameters.
- 3.4.3 Oxygen monitor of the gases (inspired and expired), with a low-limit alarm at least (may be incorporated in the device outlined in 3.4.2).
- 3.4.4 Whenever an automatic ventilator is used, a breathing circuit pressure monitor with high- and low-limit alarms must be incorporated.
- 3.4.5 A peripheral nerve stimulator to monitor neuromuscular function (may be incorporated in the device outlined in 3.4.2) with double-burst stimulation, train-of-four and post-tetanic count facilities.
- 3.4.6 A point-of-care device to estimate blood glucose.
- 3.4.7 A point-of-care device to measure haemoglobin and/or haematocrit.
- 3.4.8 A thermometer that permanently displays the operating theatre temperature.

DESIRABLE: Items considered not absolutely essential on a basic machine, but normally considered desirable for the safe conduct of anaesthesia

- 3.4.9 Invasive pressure module for intra-arterial/IV pressure monitoring incorporated in multi-parameter vital signs monitor.
- 3.4.10 Anaesthetic gas analyser.
- 3.4.11 Oesophageal stethoscope.
- 3.4.12 Coagulation monitoring device.
- 3.4.13 Cerebral function monitor.
- 3.4.14 Noninvasive cardiac output monitor.
- 3.4.15 Portable ultrasound device for guided nerve blocks and vascular access.
- 3.4.16 Transoesophageal echocardiography equipment.



- 3.4.17 Blood gas analyser.
- 3.4.18 Transportable vital signs monitor.
- 3.4.19 Scale for weighing swabs.

Regional, tertiary, central and specialised hospital requirements must include all or some of those set out under “Desirable” for the safe conduct of anaesthesia, depending on the hospital designation.

3.5 Recovery room equipment

An area within the theatre suite, preferably with easy access from each theatre, must be provided for the recovery of patients from anaesthesia before discharge to the wards. For further details consult Part Four.

4. Drugs

In addition to the drugs commonly used to provide anaesthesia, the following basic drugs or their equivalents must be available:

4.1 Drugs used in the treatment of cardiac arrest

- 4.1.1 Adrenaline.
- 4.1.2 Other inotropic agents, e.g. dopamine and dobutamine.

4.2 Bronchodilators

- 4.2.1 Salbutamol or hexoprenaline .
- 4.2.2 Aminophylline.

4.3 Corticosteroids

- 4.3.1 Hydrocortisone.
- 4.3.2 Dexamethasone or methylprednisone or equivalent.

4.4 A vasopressor

Ephedrine, phenylephrine or etilefrine.

4.5 A vasodilator

Trinitroglycerine or labetalol.

4.6 Other drugs

- 4.6.1 Lignocaine hydrochloride and other local anaesthetic agents, e.g. bupivacaine and ropivacaine L-bupivacaine.
- 4.6.2 Sodium bicarbonate.
- 4.6.3 Calcium chloride/gluconate.
- 4.6.4 Beta-adrenergic blocker, e.g. propranolol, esmolol.
- 4.6.5 Digoxin.
- 4.6.6 Atropine/glycopyrrolate.
- 4.6.7 Neostigmine.
- 4.6.8 Furosemide.
- 4.6.9 Mannitol.
- 4.6.10 Dextrose 50%.
- 4.6.11 Normal saline.
- 4.6.12 Oxytocin.
- 4.6.13 Midazolam or other benzodiazepines.
- 4.6.14 Flumazenil
- 4.6.15 Verapamil or other calcium-channel blocker.
- 4.6.16 Naloxone.
- 4.6.17 *Dantrolene*: At least 36 vials per hospital/day care centre.¹
- 4.6.18 Adenosine.
- 4.6.19 Amiodarone.
- 4.6.20 IV antibiotics for prophylaxis.



4.7 Essential Medicine List: Anaesthesiology drugs (Appendix C)

The drugs listed in Appendix C should be available in all facilities. In addition, the following drugs are desirable in regional, tertiary, central and specialised hospitals.

4.7.1 Inhalants

- Sevoflurane
- Desflurane

4.7.2 Analgesics

- Alfentanil
- Sufentanil
- Remifentanil

4.7.3 Muscle relaxants and related drugs

- Rocuronium
- Atracurium

4.7.4 Other drugs

- Dexetomidine

5. Routines for checking, cleaning, servicing and storage of equipment

- 5.1 Any institution at which anaesthetics are given must provide an efficient and reliable maintenance and repair service for all anaesthetic equipment. A suitable mechanism must exist whereby faulty essential equipment can be replaced immediately.
- 5.2 Regular sterilising, cleaning and housekeeping routines for the care of anaesthetic equipment should be established.
- 5.3 Servicing by an appropriately certified organisation or persons should be carried out on a regular and appropriate basis. Life-support equipment should be serviced by a manufacturer-approved, licence-holder company.
- 5.4 To promote maximum safety in relation to service procedures, the following points are important prerequisites:
 - 5.4.1 Individual anaesthetic machines should be clearly identified, either by the maker's serial number, or preferably by a hospital marking. This identification must extend to all the readily removable components, such as canisters and vaporisers, so that the performance and checking of these can be followed without confusion.
 - 5.4.2 A record of service procedures that are performed on each machine, signed by the person responsible for the service, must be provided to the appropriate hospital personnel, e.g. Department of Anaesthesia, anaesthetic technical staff or theatre nursing staff, depending on local circumstances.
 - 5.4.3 In newly built operating theatres, where operating suites have undergone major structural alterations, or where anaesthetic machines are either new or returning to use after storage for a period that exceeds the normal service interval, an instrument check using appropriate gas analysis and flow measurement should be undertaken to ensure that correct gases are emerging from line and machine outlets, and that flow meters are accurate. If this cannot be performed by hospital personnel, it should be carried out by company service personnel and duly signed on the service document. These tests should be carried out in the presence of a responsible anaesthesiologist who will be working in the operating suites and appropriate certification obtained prior to use.
 - 5.4.4 Adequate time must be made available for service personnel to perform both regular and emergency servicing without safety being compromised.
- 5.5 Storage facilities should be available for nitrous oxide and oxygen in the sterile area. This storage area should fulfil the criteria described in the appropriate South African Bureau of Standards Code of Practice.

6. Theatre environment

For a full description of the requirements for theatre design, and for access to environmental guidelines, the reader is referred to the American Society of Anesthesiologists' manual on operating room design (www.asahq.org/For-Members/Practice-Management/ASA-Practice-Management-Resources/Operating-Room-Design-Manual.aspx).

6.1 Theatre temperature

Theatre temperature should be controlled between 20-23°C, as keeping the patient warm during the perioperative period has been shown to be highly beneficial. It should be possible to change individual theatre temperature rapidly up or down, depending on the individual case requirement.



6.2 Theatre ventilation

Theatre ventilation systems should function, and be maintained in good working order at all times. Air that is filtered through high-efficiency particulate air (HEPA) filters should be delivered to each theatre from the ceiling downwards, and returned via several exhaust outlets near the floor. It is recommended that there should be at least 20-25 air changes per hour. Normally, a positive pressure is used inside the theatre with a pressure differential of 19 mm Hg (2.5 Kpa) between the theatre and the passage. Theatre ventilation plays an important role in infection control.

6.3 Humidity

Humidity control is important and relative humidity should be maintained between 30-60%.

7. Recovery area

Recommendations as laid out in Part Four, *Guidelines for the care of patients recovering from anaesthesia*, should be applied.



Appendix A: Essential Equipment List (Anaesthesia)

Equipment description	District hospital	Regional hospital	Tertiary hospital	Central hospital
Anaesthetic machine (basic)	X	X	X	X
Anaesthesia machine, with O ₂ , air and N ₂ O flow meters, with vaporisers, anaesthesia rising bellow ventilator, absorber and closed circuit, masks, suction unit, aneroid blood pressure apparatus (with obese, adult and child cuffs) and oxygen monitor	X	X	X	X
Anaesthetic work station		X	X	X
Anaesthesia workstation: CPU controlled with electronic flow meters, electronic controlled vaporisers, integrated multi-mode anaesthesia ventilator (rising bellow or piston driven), with integrated patient monitor with ECG, ST-segment analysis, NIBP, invasive pressures, SPO ₂ , multi-gas analyser, spirometry, NMT, BIS or entropy			X	X
Anaesthesia trolley, mobile	X	X	X	X
BIS monitor (if not part of patient monitor)		X	X	X
Blood/fluid warmer	X	X	X	X
Blood salvage system			X	X
Cerebral oximeter (NIRS)			X	X
Diagnostic set, complete	X	X	X	X
Defibrillator, complete, mounted on mobile trolley (adult/paediatric paddles)	X	X	X	X
Defibrillator and external pacing		X	X	X
Difficult airway management equipment	X	X	X	X
Forced air warmer	X	X	X	X
Fibre-optic flexible laryngoscope		X	X	X
Glucometer	X	X	X	X
Haemoglobinometer/centrifuge (Hct)	X	X	X	X
High-flow blood/fluid warmer		X	X	X
Lactate meter	X	X	X	X
Laryngoscope set, complete	X	X	X	X
Jet ventilator		X	X	X
Non-invasive cardiac output monitor		X	X	X
PCA, PCA pump		X	X	X
Peripheral nerve stimulators	X	X	X	X
Platelet function monitor			X	X
Point-of-care diagnostics (blood gas, electrolytes, glucose and lactate)		X	X	X
Portable ultrasound for nerve blocks and vascular access		X	X	X
Pulse oximeter with HB			X	X
Resuscitator, pulmonary, manual, adult, complete	X	X	X	X
Resuscitator, pulmonary, manual, child/infant, complete	X	X	X	X
Scale for swab weighing		X	X	X
Syringe drivers	X	X	X	X
Suction unit, mobile, 1 x 2-litre bottle/disposable bag, wall outlet	X	X	X	X
Suction unit, mobile, 1 x 2-litre bottle/disposable bag, electrical	X	X	X	X
TCI syringe drivers (target-controlled intravenous anaesthesia)		X	X	X
TEE			X	X
Transport ventilator		X	X	X
Transport vital signs monitor		X	X	X
Thromboelastograph			X	X
Video bronchoscope			X	X
Video laryngoscope		X	X	X
Vital signs monitor with ECG, SpO ₂ , NIBP, temperature, capnography	X	X	X	X
Vital signs monitor with ECG, SpO ₂ , NIBP, invasive pressures, temperature, multi-gas analyser		X	X	X
Vital signs monitor: capnograph	X	X	X	X
Vital signs monitor with SpO ₂ and NIBP	X	X	X	X
Volumetric infusion pump	X	X	X	X

BIS: Bispectral Index, CPU: central processing unit, ECG: electrocardiogram, HB: haemoglobin, Hct: haematocrit centrifuge, NIBP: noninvasive blood pressure, NIRS: near-infrared spectroscopy, NMT: neuromuscular transmission, N₂O: nitrous oxide, PCA: patient-controlled anaesthesia, SPO₂: blood oxygen saturation, TCI: target-controlled infusion, TEE: transoesophageal echocardiography



Appendix B: Difficult airway management trolley

The reader is referred to the SASA official guideline: *Hodgson R, Milner A, Barrett D et al. Airway management resources in operating theatres: recommendations for South African hospitals and clinics.*²

For ease of use, the following tables are extracted from the guideline.

Table I lists the necessary implements needed for the airway resource trolley.

Table I: Airway resource trolley

<ol style="list-style-type: none"> 1. American Society of Anesthesiologists algorithm and difficult airway prediction chart. 2. Tracheal tube guides: Gum elastic bougies <p>Alternatives:</p> <ul style="list-style-type: none"> • Frova® intubating introducer with adaptor for ventilation. • Lightwand/trachlight. <ol style="list-style-type: none"> 3. Nasopharyngeal airways: Portex® size 6, 7 and 8. 4. Alternate laryngoscope blades to Macintosh® 3 and 4: <ul style="list-style-type: none"> • McCoy® size 3 and 4. • Straight blades: Miller® or McGill® size 3 and 4. 5. Specialised laryngeal mask airways of assorted sizes: <ul style="list-style-type: none"> • Intubating LMAs™ (Fastrach™) size 3, 4 and 5 (complete set of LMA™, • correct tube and exchanger, facilitated by use of disposable) • Proseal™ or Supreme™ LMAs™. 6. Airway exchange catheter. 7. Retrograde intubation set. 8. Needle cricothyrotomy size 12 and 14 intravenous cannulae with 15-mm connector (size 5 endotracheal tube). 9. Single-stab cricothyrotomy kit. 10. Seldinger® cricothyrotomy kit. 11. Dilatational tracheostomy set. 12. Fibre-optic bronchoscope with a light source. 13. Jet ventilation set (Sanders® injector, preferably with a pressure gauge). 14. Access to a rigid bronchoscope with a light source. 15. Access to a surgical tracheostomy set and tubes. 16. <i>Drugs:</i> <ul style="list-style-type: none"> • Vasoconstrictor drops, e.g. Drixine® 0.05% or Otrivin®. • Nasal gel with local anaesthetic, e.g. Cathgell® with lignocaine. • Lignocaine spray 10%, e.g. Xylotox® 10%. • Access to ribbon gauze and cocaine. • Nebulisation kit for local anaesthetic. • Mucosal atomiser devices.

Contents to be checked daily and after use.

Table II: Emergency airway kit

<ol style="list-style-type: none"> 1. LMA™ or alternatives: <ul style="list-style-type: none"> • Variety of other supraglottic airway devices • Specific clinical scenarios: <ul style="list-style-type: none"> - Obstetrics /obesity LMA Supreme™ - Definitive airway required LMA Fastrach Disposable™ - Disposable devices recommended to facilitate replacement 2. EasyTube® or alternatives: <ul style="list-style-type: none"> • Laryngeal tube suction • Combitube 3. Single-stab cricothyrotomy: <ul style="list-style-type: none"> • Scalpel handle and blades • Alternative: Single-stab cricothyrotomy kit. 4. Seldinger cricothyrotomy kit. 5. Access to rigid bronchoscope and light source (ear, nose and throat/cardiothoracic). 6. Highly recommended: <p>Alternatives to place an endotracheal tube:</p> <ul style="list-style-type: none"> • Airtraq • Lightwand
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Contents to be checked daily and after use.

**Appendix C: National Essential Medicine List (2012)****Medicines used for anaesthesiology³*****Anaesthesiology for adults***

The list is provided to give an indication of agents that should be available to provide safe anaesthesia at a regional hospital. It is assumed that medicines such as adrenaline are also available.

For induction

- Etomidate
- Ketamine
- Midazolam
- Propofol
- Thiopental sodium.

Inhalants

- Halothane
- Isoflurane.

Analgesics

- Fentanyl
- Morphine
- Diclofenac, intramuscular.

Muscle relaxants and related drugs

- Cisatracurium
- Suxamethonium chloride
- Vecuronium bromide
- Neostigmine
- Atropine or glycopyrronium bromide.

Local anaesthetics

- Bupivacaine 0.5%
- Bupivacaine 5 mg/ml plus dextrose
- Lidocaine 1%
- Lidocaine 2%
- Lidocaine 2% plus adrenaline
- Lidocaine jelly
- Lidocaine topical spray.

Other drugs

- Dantrolene
- Ephedrine
- Ondansetron (postoperative nausea and vomiting)
- Phenylephrine.

References

1. Krause T, Gerbershagen MU, Fiege M, et al. Dantrolene: a review of its pharmacology, therapeutic use and new developments. *Anaesthesia*. 2004;59(4):364-373.
2. SASA Guidelines: Airway management resources in operating theatres. *S Afr J Anaesth Analg*. 2008;14(4).
3. Standard treatment guidelines and essential medicines list for South Africa hospitals – level adults. Pretoria: The National Department of Health, 2012.



PART Four

CARE OF PATIENTS RECOVERING FROM ANAESTHESIA

General principles

1. Recovery from anaesthesia must take place under appropriate supervision in an area designed for this purpose.
2. This area should either be in the theatre itself, or close to where the anaesthetic was administered.
3. The staff members who work in this area must be appropriately trained. When the need arises, staff must be able to contact the anaesthesiologist or his or her designate promptly.
4. It is desirable for patients to have regained consciousness and to be in a stable state before they are transported any distance.
5. If patients have to be transported within and from the operating suite when not fully recovered, they must be moved on a suitably designed trolley or bed capable of a head-down tilt. The bed or trolley should be provided with oxygen, a means of inflating the patient's lungs, equipment for suctioning and an appropriate monitor. The patient must be accompanied by staff to be able to deal with problems which may occur during transport.

Operating suite recovery rooms

1. Design features

The area should be part of the operating suite.

- 1.2 The number of bed or trolley spaces must be sufficient for expected peak loads. There should be not less than 1.5 spaces per operating room.
- 1.3 The space that is allocated per bed or trolley should be 9-12m². There must be easy access to the head of the patient.
- 1.4 Space must also be provided for a nursing station, the storage of clean linen, equipment and drugs, and a utility room.
- 1.5 Each bed must be provided with:
 - 1.5.1 An oxygen outlet.
 - 1.5.2 Two general power outlets.
 - 1.5.3 Adequate lighting of the correct colour balance.
 - 1.5.4 Appropriate facilities for mounting and/or storing the necessary equipment, and for the patient's chart.
 - 1.5.5 Medical suction that complies with the relevant national standards (refer to Part 3, paragraph 3.3.8 page S18).
- 1.6 There must be appropriate facilities for scrubbing-up procedures.
- 1.7 There should be a wall clock with a sweep second hand or digital equivalent that is clearly visible from each bed space.
- 1.8 Communication facilities should include:
 - 1.8.1 An emergency call system.
 - 1.8.2 A telephone.
- 1.9 Climate control to operating room standards is desirable.
- 1.10 There should be easy access for portable X-ray equipment. Appropriate power outlets should be provided in the area.

2. Equipment and drugs

- 2.1 Each bed space should be provided with:
 - 2.1.1 An oxygen flow meter and nipple.
 - 2.1.2 Suction equipment, including a receiver, tubing, a rigid hand piece and a range of suction catheters, including Yankauer®.
 - 2.1.3 An automated noninvasive blood pressure monitor with appropriately sized cuffs.
 - 2.1.4 A stethoscope.
 - 2.1.5 A pulse oximeter.
 - 2.1.6 Means of measuring body temperature.



- 2.2 Within the recovery room there must be:
 - 2.2.1 A range of devices for the administration of oxygen to spontaneously breathing patients.
 - 2.2.2 A self-inflating manual resuscitator, e.g. Ambu® bag, in order to deliver an oxygen-enriched mixture to inflate the lungs. A minimum of two per recovery room complex is required.
 - 2.2.3 Equipment and drugs for airway management and endotracheal intubation.
 - 2.2.4 Emergency drugs (see Section IV, paragraph 4).
 - 2.2.5 A range of intravenous equipment and fluids.
 - 2.2.6 Drugs and equipment for acute pain management.
 - 2.2.7 A range of syringes and needles.
 - 2.2.8 An electrocardiogram monitor.
 - 2.2.9 Patient-warming devices.
- 2.3 There should be immediate access to:
 - 2.3.1 A monitoring defibrillator, preferably with pacing facility.
 - 2.3.2 A blood warmer.
 - 2.3.3 A thermostatically controlled warming cupboard for intravenous solutions.
 - 2.3.4 A refrigerator for drugs and blood.
 - 2.3.5 A procedure light.
 - 2.3.6 A range of appropriate drugs.
 - 2.3.7 A surgical tray for procedures, including tracheostomy and chest drains.
 - 2.3.8 Point-of-care access to diagnostic services, e.g. blood glucose, blood gases and radiology.
 - 2.3.9 A peripheral nerve stimulator.
 - 2.3.10 Other equipment that is as appropriate to the patient's condition, e.g. wire cutters.
 - 2.3.11 A ventilator.
- 2.4 The recovery trolley or bed must:
 - 2.4.1 Have a firm base and mattress.
 - 2.4.2 Tilt from either end, both head up and head down, to at least 15 degrees.
 - 2.4.3 Be easy to manoeuvre.
 - 2.4.4 Contain functional and accessible brakes.
 - 2.4.5 Have provision for the patient to be able to sit up.
 - 2.4.6 Have straps or side rails capable of being dropped below the base, or of being easily removed.
 - 2.4.7 Include provision for a pole from which intravenous solutions may be suspended.
 - 2.4.8 Include provision for monitoring, mounting portable oxygen cylinders, underwater seal drains and suction apparatus for use during transport.

3. Staffing

It is the responsibility of the institution to ensure that staff members who are appointed to the recovery room are trained and competent. Recovery staff must be available at all times.

- 3.1 A registered or enrolled nurse, who is trained and competent in recovery room care, must be present at all times.
- 3.2 An appropriately trained registered nurse who is experienced and competent in recovery room work should be in charge.
- 3.3 The ratio of nursing staff who are trained in recovery room care to patients needs to be flexible to provide no less than one nurse to two patients, and one to each patient who has not recovered protective reflexes.

4. Management and supervision

- 4.1 Written protocols for safe management should be established.
- 4.2 A written routine for checking the equipment and drugs must be established.
- 4.3 Observations should be recorded at appropriate intervals and at the very least should include state of consciousness, colour, respiration, oxygen saturation, pulse and blood pressure and level of pain. The record should form part of the patient's clinical notes.



- 4.4 All patients should remain until the anaesthesiologist considers it safe to discharge them from the recovery room according to validated criteria, which include return of protective airway reflexes, stable cardiovascular and respiratory function, full reversal of neuromuscular blockade, absence of nausea and vomiting, and absence of pain.
- 4.5 The anaesthesiologist is responsible for:
- 4.5.1 Supervising the recovery period and authorising the patient's discharge.
 - 4.5.2 Accompanying the patient to the recovery room and adequately handing him or her over to the nursing staff who will document the patient's condition on arrival and subsequent course in recovery.
 - 4.5.3 Providing appropriate written and verbal instructions and information to the recovery room staff for each case.
 - 4.5.4 Specifying the type of apparatus and the flow rate to be used in oxygen therapy.
 - 4.5.5 Remaining in the facility until the patient meets the criteria detailed in 4.4, or delegating this responsibility to another anaesthesiologist or intensivist.
- 4.6 Guidelines for the handover of postoperative patients to the staff of the theatre recovery area.

The responsibility of the anaesthetist does not end with the handover to the recovery staff and he or she or an appointed designate should be available in the theatre complex until it can be reasonably assumed that the anaesthetic has worn off.

- 4.6.1 The anaesthetist must formally hand over care of a patient to a recovery room nurse or other appropriately trained member of staff.
- 4.6.2 The patient should be breathing spontaneously and oxygen saturation should be appropriate.
- 4.6.3 The patient should have recovered from the neuromuscular blocker, as determined by the return of the train-of-four or by appropriate clinical signs of recovery, vis-à-vis head lift or hand squeeze.
- 4.6.4 The patient should be haemodynamically stable. If excessive blood loss has occurred, the anaesthetist should remain with the patient until adequate volume resuscitation has occurred and appropriate measures to test haemoglobin level and order homologous blood have been carried out.
- 4.6.5 The patient should have adequate control of pain and postoperative nausea and vomiting.
- 4.6.6 Airway patency remains the responsibility of the anaesthetist until the patient is able to maintain his or her own airway. Patients should not be left unattended with Guedel® oral airways in situ. If airway maintenance is delegated, it remains the responsibility of the anaesthetist. It is also his or her responsibility to ensure that any person to whom airway care is delegated is capable of safe airway management.

The anaesthetist should authorise discharge from the recovery area to the ward. The patient should not be discharged until he or she has regained control of his or her airway, is haemodynamically stable and is able to communicate adequately. If the modified Aldrete score is used to assess the patient prior to discharge, it is reasonable to expect that the patient will score 2/2 for each of the five categories, unless there is good reason for failure to meet these criteria. If the patient requires admission to an intensive or high care unit, the anaesthetist should remain in attendance until the transfer has taken place, and handover to the appropriate personnel has occurred.

The time when the responsibility of the anaesthetist for a particular patient ends is unclear, and is not possible to determine precisely. However, it is reasonable to expect an anaesthetist to be in attendance, or at least available, until the patient has fully recovered from the anaesthetic and until the anaesthetist is satisfied that there are no sequelae from delivery of the anaesthetic. In addition, if the patient is to be handed over to other medical personnel, it is the responsibility of the anaesthetist to ensure that the patient is stable, that the medical personnel are competent to take over the management of the patient, and that the handover is carried out clearly and concisely to ensure continuity of information.

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1. Immediate postanaesthetic recovery. The Association of Anaesthetists of Great Britain and Ireland; 2002.
2. Guidance on the provision of anaesthetic services for postoperative care. The Royal College of Anaesthetists; 2009.
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5. Scribante J, Perrie HC. A pilot study to determine the profile of recovery room nurses in Johannesburg hospitals. South Afr J Anaesth Analg. 2011;17(5):323-327.
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Guidelines for the handover of postoperative **adult** patients to the staff of the theatre recovery area

S

Stable

Patients in all respects

T

Tell

the recovery staff about preoperative and intraoperative condition/problems

A

Airway

secured

M

Muscle

relaxants adequately reversed

P

Pain

and nausea under control

E

Ensure

that fluids and haemoglobin are adequately replaced

D

Discharge

the patient from recovery room

The responsibility of the anaesthetist does not end with the handover to the recovery staff. The anaesthetist, or an appropriate, designated person, should be available in the theatre complex until it can be reasonably assumed that the anaesthetic has worn off.

1. The anaesthetist must formally hand over care of a patient to a recovery room nurse or other appropriately trained member of staff.
2. The patient should be breathing spontaneously and oxygen saturation should be appropriate.
3. The patient should have recovered from the neuromuscular blocker as determined by the return of the train-of-four or by appropriate clinical signs of recovery (for example head lift or hand squeeze).
4. The patient should be haemodynamically stable. If excessive blood loss has occurred, the anaesthetist should remain with the patient until adequate volume resuscitation, the haemoglobin level has been checked, and blood products have been ordered if necessary.
5. The patient should have adequate control of pain and postoperative nausea and vomiting.
6. Airway patency remains the responsibility of the anaesthetist until the patient is able to maintain his/her own airway. Patients should not be left unattended with Guedel® oral airways in situ. If airway maintenance is delegated, it remains the responsibility of the anaesthetist. It also is his or her responsibility to ensure that any person to whom airway care is delegated is capable of safe airway management.

The anaesthetist should authorise discharge from the recovery area to the ward. The patient should not be discharged until he or she has regained control of his or her airway, is haemodynamically stable and is able to communicate adequately. If the modified Aldrete score is used to assess the patient prior to discharge, the patient must score $\geq 9/10$ before discharge, unless there is a good reason for failure to meet these criteria. If the patient requires admission to an intensive or high care unit, the anaesthetist should remain in attendance until the transfer has taken place and handover to the appropriate personnel has occurred.

The time at which the responsibility of the anaesthetist for a particular patient ends is not possible to determine precisely. It is reasonable to expect an anaesthetist to be in attendance, or at least available, until the patient has fully recovered from the anaesthetic and until the anaesthetist is satisfied that there is no sequelae from the delivery of the anaesthetic. In addition, if the patient is to be handed over to other medical personnel, it is the responsibility of the anaesthetist to ensure that the patient is stable, that the medical personnel are competent to take over the management of the patient, and that the handover is done clearly and concisely to ensure continuity of information.

ALDRETE SCORE	
Should be 2/2 for each parameter depending on circumstances and at least 9/10 prior to discharge from the recovery area.	
Able to move 4 extremities voluntarily or on command	= 2
Able to move 2 extremities voluntarily or on command	= 1
Able to move 0 extremities voluntarily or on command	= 0
	ACTIVITY
Able to deep breathe and cough freely	= 2
Dyspnoea or limited breathing	= 1
Apnoeic	= 0
	RESPIRATION
BP ⁿ 20% of preanaesthetic level	= 2
BP ⁿ 20-50% of preanaesthetic level	= 1
BP ⁿ 50% of preanaesthetic level	= 0
	CIRCULATION
Fully awake	= 2
Arousable on calling	= 1
Not responding	= 0
	CONSCIOUSNESS
Pink (SaO ₂ > 92% on room air)	= 2
Pale, dusky blotchy, (O ₂ required for SaO ₂ > 90%)	= 1
Cyanotic (SaO ₂ < 90% despite supplementary oxygen)	= 0
	COLOUR
Total	

References:

1. Immediate Postanaesthetic Recovery. The Association of Anaesthetists of Great Britain and Ireland. September 2002.
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PART Five

MAJOR REGIONAL ANAESTHESIA

1. Introduction

- 1.1 Major regional anaesthesia should only be administered by medical practitioners with appropriate training and resuscitation skills.
- 1.2 A single operator may not assume the dual role of anaesthesiologist/anaesthetist and surgeon/obstetrician.
- 1.3 An exception may occur in that, in an emergency situation, a single practitioner may assume the dual responsibility of the operator and the anaesthesiologist/anaesthetist in the context of neuraxial blockade or major plexus anaesthesia.

2. Principles

- 2.1 The practitioner must be adequately trained and sufficiently experienced in the regional anaesthesia technique that is performed before it is independently carried out.
- 2.2 The practitioner is expected to have the skill and ability to promptly recognise and adequately treat any complication that may arise from the anaesthetic technique.
- 2.3 Management of major regional anaesthesia should include appropriate monitoring of the patient during and after completion of the block, until such time as the block has resolved and normal neurological function has been restored.
- 2.4 The practitioner must be present until the block is fully established. All the patient's vital signs and physiological parameters must be within normal limits, and his or her condition must be stable before the practitioner leaves the facility where the procedure has been performed.
- 2.5 Staffing and equipment in the area in which the patient is being managed should conform with the recommendations that are contained in this guideline.

3. Neuraxial anaesthesia and analgesia

These procedures refer to the injection of pharmaceutical preparations into the vicinity of the spinal cord or nerve tissue. The chosen method of administration of these agents and the agents that are used may vary, but the underlying principles for the management of the patient remain the same. The agents that are given are local anaesthetics, opiates, and other analgesics or adjuvants. The method of administration includes bolus or intermittent bolus with or without indwelling catheter placement, and continuous infusion via an indwelling catheter.

3.1 *Responsibility of the practitioner*

- 3.1.1 The responsibility for the application, maintenance and sequelae of neuraxial techniques, regardless of the anaesthetic technique or the agent used, is that of the attending practitioner.
- 3.1.2 When the blockade has been fully established and all haemodynamic changes have been normalised, a practitioner may delegate such responsibility to another suitably trained medical practitioner or competent nursing personnel, who will then assume subsequent responsibility.
- 3.1.3 The responsible practitioner must:
 - 3.1.3.1 Ascertain that there is no absolute contraindication to the procedure.
 - 3.1.3.2 Ensure that the patient understands and gives his or her informed consent to the procedure.
 - 3.1.3.3 Ensure that all equipment and drugs that are necessary for the management and prevention of complications relating to the procedure are immediately available.
 - 3.1.3.4 Establish intravenous access prior to the procedure.
 - 3.1.3.5 Check the agents to be injected and administer the initial dose.
 - 3.1.3.6 Ensure that adequate monitoring is performed and that accurate records are kept.
 - 3.1.3.7 Adequately manage any haemodynamic changes which may occur as a result of administration of the anaesthetic agents used for the blockade.



3.2 *Monitoring and clinical observations*

- 3.2.1 The practitioner or a qualified nursing sister or trained observer must be in constant attendance in order to perform regular and appropriate monitoring of the patient's physiological status and the effects of the block.
- 3.2.2 Such an observer shall:
 - 3.2.2.1 Have been trained in the proper use and have an understanding of monitoring equipment.
 - 3.2.2.2 Have the necessary clinical skills to perform, interpret and react appropriately to basic clinical observations made regarding the neurological, respiratory and cardiovascular status of the patient.
 - 3.2.2.3 Have an understanding of possible complications associated with neuraxial block and the correct management thereof.
- 3.2.3 Such an observer shall be trained in measures related to basic life support.
- 3.2.4 All orders and routines to be followed by the observer should be conveyed in writing by the responsible practitioner. All parameters and action lines should be defined when alarms should be raised.
- 3.2.5 The practitioner who performed the block, or the designated practitioner, must be available to the observer for consultation and recall at all times.
- 3.2.6 Availability should be interpreted according to the stage of involvement of the blockade, the likelihood of complications pertinent to that stage, the concomitant use of other drugs, including those used for sedation, the presence of other co-morbid disease and the physical status of the patient.
- 3.2.7 It is not incumbent on the practitioner to be physically present until complete regression of blockade has occurred, provided that the other conditions of these guidelines are fulfilled.
- 3.2.8 The responsible practitioner is free to embark on other procedures, provided that they do not conflict with the other conditions outlined in these guidelines.

3.3 *"Topping up" and management of continuous infusions*

- 3.3.1 There is no objection to a qualified nursing sister or junior doctor undertaking the "topping up" or adjustment of continuous infusion rates. The responsible practitioner must be satisfied that the experience and capabilities of such a person are appropriate and each top up or change in dosage should be verbally confirmed. This must be recorded in writing as soon as possible.
- 3.3.2 The responsibility for the effects of the top up or dosage alteration remains that of the practitioner who is responsible for the procedure.
- 3.3.3 Written instructions as to the dose or infusion rate must be issued by the responsible practitioner.
- 3.3.4 The dose, or change in infusion rate, should be checked and verified by a second competent person prior to any action being taken.
- 3.3.5 Instructions as to patient posture at the time of injection, clinical observations and measures to be taken in the event of untoward effects must be issued by the responsible practitioner.
- 3.3.6 There is no objection to a qualified nursing sister or junior doctor removing an epidural catheter on the instructions of the responsible practitioner, providing that timing and monitoring protocols have been adequately outlined, especially when concomitant anticoagulants have been administered.

4. Major plexus anaesthesia

These procedures involve injecting pharmaceutical agents into the close proximity of major nerves or nerve plexuses. The agents that are employed for these purposes include local anaesthetics and opioids, or other recognised adjuvants. The method of drug administration includes single-bolus injections or continuous infusions via indwelling catheters.

4.1 *Responsibility of the practitioner*

- 4.1.1 The responsibility for the application, maintenance and sequelae of the block, regardless of the anaesthetic technique or the agent used, is that of the attending practitioner.
- 4.1.2 The responsible practitioner must:
 - 4.1.2.1 Ascertain that there is no absolute contraindication to the procedure.
 - 4.1.2.2 Ensure that the patient understands and gives his or her informed consent to the procedure.
 - 4.1.2.3 Ensure that all equipment and drugs that are necessary for the management and prevention of complications that relate to the procedure are immediately available.
 - 4.1.2.4 Ensure that appropriate measures are taken to minimise the risk of inadvertent nerve damage during the procedure (See 4.4).



4.1.2.5 Check the agent to be used and administer the first dose.

4.1.2.6 Ensure that adequate monitoring is performed and that accurate records are kept.

4.2 Monitoring and clinical observations

This responsibility remains with the practitioner who performs the procedure. The same principles that apply to plexus anaesthesia are relevant to neuraxial blockade (see paragraph 3.2).

4.3 “Topping up” and management of continuous infusions

The same principles that apply to plexus anaesthesia are relevant to neuraxial anaesthesia (see paragraph 3.3).

4.4 Prevention of inadvertent nerve damage

The attending practitioner should be familiar with the current methods of performing nerve blocks. It is recommended that:

4.4.1 Only blunt needles should be used.

4.4.2 Nerve stimulators and appropriate needles should be used to determine the correct positioning of the block needle.

4.4.3 Where possible, and if the practitioner has been adequately trained, ultrasound-guided block techniques, where appropriate, should be used when performing nerve blocks.

4.4.4 All agents that are to be used must be checked to ensure that an appropriate solution is injected.



PART Six

GUIDELINES FOR INTENSIVE CARE IN SOUTH AFRICA

Introduction

The recommendations in this document should be used as a guideline for the provision of ideal conditions for the care of critically ill patients. It is accepted that some of these are only feasible in certain training institutions. Nevertheless, other centres should aspire to the guidelines set out herein. They should not be viewed as a binding code of practice.

These guidelines for intensive care have been formulated to assist in the practice and provision of intensive care for physicians, hospital administrators and developers. Intensive care, or intensive therapy or critical care, describes the highest level of continuing patient monitoring and treatment. The intensive care unit (ICU) is a specially designated area where facilities for the critically ill are concentrated, and where the level of care and supervision is considerably more sophisticated than that in the ordinary ward. These units may be multidisciplinary, dealing with all types of critically ill patients; or specialised, dealing with specific entities, e.g. general surgical patients, neuro- or cardiac surgical patients and coronary care or paediatric patients. The level of care and facilities that are required vary depending on the type of patient who is admitted. This helps to determine the staffing, equipment, services and other facilities that are required in specific ICUs.

1. Categories of intensive care units

1.1 Category 3 (tertiary intensive care unit facility)

This category of ICU has the potential to offer the highest degree of patient care and the type of patient who is admitted to this unit may include, but is not limited to, those:

1. 1.1 With multiple-organ failure.
1. 1.2 Requiring multidisciplinary intervention.
1. 1.3 Requiring ventilation with second organ failure.
1. 1.4 Requiring haemodialysis with second organ failure.
1. 1.5 Haemodynamically unstable patients, e.g. unstable myocardial infarction and immediate post-bypass surgery.

1.2 Category 2 (specialised organ support unit)

Patients who are admitted to this category of ICU require slightly less care than category 3 patients and may include, but are not limited to, those who:

- 1.2.1 Require active system support, e.g. intermittent positive-pressure ventilation.
- 1.2.2 Have single-organ failure, e.g. stable myocardial infarction, diabetic coma, head injury, flail chest, severe asthma, acute pancreatitis, status epilepticus and eclampsia.
- 1.2.3 Airway problems.
- 1.2.4 Conditions that require potent drug infusions, e.g. sodium nitroprusside and dopamine.

1.3 Category 1 (high care)

Patients who are admitted to this category of ICU require intensive monitoring only, and include those who have:

- 1.3.1 Fluid, electrolyte or metabolic disturbances, e.g. diabetic pre-coma and postoperative monitoring.
- 1.3.2 Drug overdose that does not require intermittent positive pressure ventilation (IPPV).
- 1.3.3 Neuromuscular weakness that does not require intermittent positive pressure ventilation (IPPV).
- 1.3.4 Single-organ dysfunction that does not require active support, e.g. asthma, congestive cardiac failure and pneumonia.

Most ICUs will not only admit one or other category of patient, but the majority of patients should fall into the category which is designated for the ICU, and as such, should provide the facilities that are recommended for the highest category of patient admitted to the ICU. If these facilities and staff are not available, patients who require a higher category of intensive care should be transferred to an institution where this can be provided once the patient is haemodynamically stable. Transport should be supervised by the senior transferring doctor or by the admission unit.



Isolation facilities must be available in all categories of ICU for patients who have multi-resistant organisms or highly contagious diseases, i.e. single-bed cubicles with separate ablution facilities if possible. Isolation facilities should also be available for the care of immunosuppressed patients.

2. Staffing of intensive care units

Levels of staffing by qualified medical, nursing, and ancillary and support personnel should be appropriate to the patient mix, severity of illness, and level of intervention. Facilities must be available for rapid effective communication between staff members within the unit, and those providing backup services.

2.1 Medical staff

2.1.1 Category 3 intensive care unit

2.1.1.1 Requires a full-time medical director who should be an intensivist. The director's responsibility includes control of staff, admission and discharge policies, individual patient care, overall management of protocols and staff, quality control and audit function (issues of maintenance of accreditation), a supervisory role, liaison with hospital management, selection of admissions to the unit, arranging of training and research programmes, maintaining of records and equipment, and general supervision of the daily running and forward planning of the ICU. The admitting physician should not abrogate total responsibility for patient care.

2.1.1.2 A 24-hour consultant availability is essential. Consultants should have clinical and teaching responsibilities and should have a minimum training of two years in an acceptable ICU unit. These consultants should have an acceptable higher qualification in anaesthesia, surgery, internal medicine or paediatrics. The consultant should be physically present within 30 minutes if necessary.

2.1.1.3 A 24-hour registrar (surgical, medical, anaesthetic or paediatric) or equivalent medical graduate must be available on the premises 24 hours a day. This person must be available immediately and should not be committed to other duties.

2.1.2 Category 2 intensive care unit

2.1.2.1 Consultant cover 24-hourly. Consultants should have accepted higher training as in 2.1.1.2.

2.1.2.2 A registrar in training or an equivalent doctor or consultant must be available in hospital within minutes if necessary.

2.1.3 Category 1 intensive care unit

2.1.3.1 Consultant cover 24-hourly. Specialists in anaesthesia, internal medicine, paediatrics or surgeons with a minimum of three months' intensive care experience in an acceptable ICU (pre- or post-higher training) are preferable.

2.2 Nursing staff

Appropriate levels of nurse staffing should be determined on a shift-by-shift basis by consultation between the senior nurse and the critical care physician in charge, either directly, or through the use of unit-based policies. Staffing arrangements should be flexible to allow matching of supply with variable demand.

2.2.1 Category 3 intensive care unit

2.2.1.1 ICU nurse to patient ratio between 1.5:1 and 2:1, depending on the number of category 3 patients. (This means that there is one registered nurse with each patient at all times.)

2.2.1.2 Not less than 50% of nurses with intensive care nurse training.

2.2.2 Category 2 intensive care unit

2.2.2.1 Nurse to patient ratio 1:1.

2.2.2.2 At least 25% of the nurses should be trained in intensive care.

2.2.3 Category 1 intensive care unit

2.2.3.1 Nurse to patient ratio 1:2.

2.2.3.2 Control nurse should be trained in intensive care.

2.2.4 Nursing assistants

The above ratio of nurses to patients may be slightly decreased if nursing assistants are employed to wash patients, as runners and to assist nursing staff in other ways. However, they should not take over patient care responsibilities or monitoring responsibilities. Nurses should not work more than 12 hours in any period of 24 hours.



2.3 Technologists

Technologists who have been trained in any of the recognised branches of medical technology or intensive care technologists who have a minimum of a year's ICU experience should be available 24 hours a day to provide equipment and therapeutic support. This includes:

- 2.3.1 Care, maintenance and decontamination of ICU equipment.
 - 2.3.2 Operation of ICU equipment.
 - 2.3.3 Setting up and calibration of monitoring equipment, e.g. pressure transducers, oximetry and gas analysers.
 - 2.3.4 Blood gas analysis, oximetry and electrolyte estimations.
 - 2.3.5 Education of nursing and paramedical staff in user care and the operation of equipment.
- A technologist should be available on call in all three categories of ICUs on a 24-hour basis.

2.4 Physiotherapists

A physiotherapist who is experienced in ICU work (a minimum of six months' experience in an acceptable ICU) should be available on a 24-hour basis.

2.5 Radiographer

An experienced radiographer who can provide mobile X-ray facilities should be available at all times in all categories of ICUs.

2.6 Secretaries, clerks and cleaners

- 2.6.1 Secretarial assistance should be available for patient summaries and records.
- 2.6.2 A ward clerk should be available for filing, taking calls, handling visitors and handling requests for investigations.
- 2.6.3 A cleaning staff team should be available to provide a 24-hour cleaning service.

2.7 Social worker

A social worker should be available to help to solve patients' and their dependants' social and financial problems.

3. Design of intensive care units

3.1 Facilities

3.1.1 Siting

The ICU should be sited close to the departments from which patients are admitted, such as emergency and accident units and recovery rooms and theatres. It should be easily accessible to support areas, such as chemistry laboratories, bacteriological laboratories, sterilising units, radiographic facilities and other diagnostic and treatment areas. It should be positioned where optimal use can be made of outside windows, lighting and views for both patients and staff.

3.1.2 Size

Of the total number of acute beds in a hospital, 2-8% should be intensive care beds. These should be grouped into units of 8-12 beds for convenient management. There should be at least 20 m² of floor area for each bed in open-plan areas, with at least 2 m of corridor space beyond the working area. In many instances, separate cubicles are preferable. A minimum of one isolation cubicle should be available for every five ICU beds.

3.1.3 Lighting

Maximum use should be made of outside windows. Artificial lighting should be of the correct colour and temperature and should have a facility to provide regional dimming and lighting over single beds only.

3.1.4 Hand basin

One per bed to one per two beds.

3.1.5 Management base

A central station should be provided where the following facilities are available:

3.1.5.1 Communication:

3.1.5.1.1 Two telephones per 3-4 beds.

3.1.5.1.2 An intercom system that connects the related areas and laboratories.

3.1.5.1.3 Audible signals should be adjustable in intensity, and should have visual signals.

3.1.5.2 Central monitoring.



- 3.1.5.3 Drug storage and administration facilities.
- 3.1.5.4 Facilities for the storage of notes.
- 3.1.5.5 An emergency trolley.
- 3.1.5.6 Electrical sockets.
- 3.1.5.7 Refrigeration storage.

3.1.6 *Additional areas*

Additional required accommodation includes equipment and consumable stores, utility rooms, a sisters' office, doctors' office, staff lounge, doctors' bedroom, laboratory, workshop, relatives' rooms, reception area, cleaners' room, seminar rooms, receptionist's office and patient lavatories and showers, staff change rooms, and lockers and shower facilities. The kitchen should be sufficient to provide light meals for staff.

A private interview room must be available for discussions with relatives, dealing with bereavement issues and family interaction.

3.2 Additional support

- 3.2.1 Chemistry laboratory.
- 3.2.2 Microbiology laboratory.
- 3.2.3 Sterilising service.
- 3.2.4 Haematology service.
- 3.2.5 Pathology service.
- 3.2.6 Dietetic service.

4. Equipment

4.1 Monitoring equipment

Appropriate monitoring ensures:

- Early detection of abnormalities that require correction.
- Continuous surveillance of the patient's condition.
- Evaluation of the effects of any intervention.

For the early detection of abnormalities that require correction, high and low alarm limits should be determined and set appropriately for specific interventions, e.g. airway pressure, blood pressure, heart rate, oxygen saturation and end-tidal CO₂.

4.1.1 *Electrocardiogram monitor*

ICU category 3, 2 and 1 (one per bed).

4.1.2 *Pressure monitor/transducers*

- ICU category 3 (three channels per bed).
- ICU category 2 (two channels per bed).
- ICU category 1 (one channel per bed).

4.1.3 *Baumanometer (preferably an automatic manometer too, e.g. Dinamap®)*

ICU categories 3, 2 and 1 (one per bed).

4.1.4 *Oximetry*

ICU categories 3, 2 and 1 (one per bed).

4.1.5 *Exhaled CO₂ and O₂ analysers*

ICU category 3 (one per 10 beds).

4.1.6 *Glucotest machine or equivalent*

ICU categories 3, 2 and 1 (one per unit).

4.2 System support equipment

4.2.1 *Ventilators with appropriate humidification devices and air oxygen mixers, 3-4 ventilator circuits per ventilator*

- ICU category 3 (1.5 per bed)
- ICU category 2 (1 per bed).

4.2.2 *Constant positive airways pressure facilities with air oxygen mixers*

- ICU categories 3 and 2 (one per two beds).



- ICU category 1 (one per four beds).

4.2.3 *Renal replacement therapy/haemoperfusion*

ICU categories 3 and 2 (must be available).

4.2.4 *Plasmapheresis*

ICU categories 3 and 2 (must be available).

4.2.5 *Aortic balloon pump*

ICU category 3 (must be available).

4.2.7 *Manual resuscitators*

ICU categories 3, 2 and 1 (one per bed).

4.3 **Other equipment**

4.3.1 *Beds*

These must be able to tilt both head up and head down, move up and down (40-90 cm minimum), and break in the middle to sit up. Preferably, they should be electrically operated, as well as have a manual assist or hydraulics for easy movement. They must be mobile with suitable locking and must be suitable for intubation.

4.3.2 *Infusion controllers/pumps*

- ICU categories 3 (eight per bed); 2 (six per bed).
- ICU category 1 (two per bed).

4.3.3 Infusion controllers should be used for intravenous fluid administration and syringe pumps for drug administration.

4.3.4 *Suction controllers (to provide a negative pressure of 66.6 kPa and maintain a flow of 40l/minute)*

ICU categories 3, 2 and 1 (two per bed).

4.3.5 *Emergency intubation trolley*

ICU categories 3, 2 and 1 (one per unit), to carry:

4.3.5.1 Laryngoscope x 2 (small, medium and large blades).

4.3.5.2 Selection of endotracheal tubes.

4.3.5.3 Selection of tracheostomy tubes.

4.3.5.4 Endotracheal tube introducer.

4.3.5.5 Magill® forceps.

4.3.5.6 Mouth gag and wedge.

4.3.5.7 4% lignocaine solution.

4.3.5.8 Macintosh® or equivalent spray device.

4.3.5.9 Vasoconstrictor nose drops, e.g. ephedrine.

4.3.5.10 Mosquito forceps (protected jaws to clamp pilot tube).

4.3.5.11 Tracheostomy dilator.

4.3.5.12 Small Langenbeck® retractors x 2.

4.3.5.13 Headlight.

4.3.5.14 Strapping for endotracheal tubes.

4.3.5.15 Tracheostomy tape.

4.3.5.16 Hand sucker and suitable suction tube.

4.3.5.17 Appropriate drugs for sedation/anaesthesia during intubation.

4.3.5.18 Syringes and needles.

4.3.5.19 Infusion sets and intravenous cannulas, including central venous cannulas.

4.3.5.20 A range of intravenous fluids.

4.3.5.21 Manual resuscitator/catheter mount/masks.

4.3.5.22 Emergency chest drain pack.

4.3.6 *Defibrillator/external pacing device*

ICU categories 3, 2 and 1 (one per unit).



- 4.3.7 *Procedure light (pivot light of high intensity for special procedures)*
ICU categories 3, 2 and 1 (one per bed).
- 4.3.8 *Forced air convective warming devices*
ICU categories 3, 2 and 1 (one per three beds).
- 4.3.9 *Haemoglobinometer*
ICU categories 3, 2 and 1 (one per unit).
- 4.3.10 *Urine-testing apparatus*
ICU categories 3, 2 and 1 (one per unit).
- 4.3.11 *Microscope*
ICU categories 3, 2 and 1 (one per unit).
- 4.3.12 *Ophthalmoscope and bedside investigational apparatus*
ICU categories 3, 2 and 1 (one per unit).
- 4.3.13 *A flexible fibre-optic bronchoscope*
ICU categories 3 and 2 (one per unit).
- 4.3.14 Chest-drainage suction apparatus.
- 4.3.15 Micro-haematocrit.
- 4.3.16 Stethoscope (one per bed).
- 4.3.17 There should be a wall clock with a sweep second hand that is clearly visible from each bed space.
- 4.3.18 Spirit levels (one per bed).
- 4.3.19 Respirometers (one per bed).
- 4.3.20 A transport monitor.
All ICU categories (at least one per unit).

5. Services

5.1 Lighting

Natural daylight, preferably with a view, must be utilised as much as possible for both patients and staff. Artificial light should be of daylight quality with the ability to light sections of the ICU only, in addition to the single-bed area only. Facilities for suitable dimming for night lighting should also be available.

5.2 Electricity

The electricity should be 220-volt, single phase, with a single common earth ground. All outlets to the patient areas should be on the same phase. The patient area should be served by a maintained standby power source with the highest priority rating. There should be less than five seconds interruption when switching to the standby source. The standby generator should be tested at least once every month. Separate protected battery power sources may be required for emergency lighting, computers, ventilators and other sensitive equipment.

5.3 Medical gases

5.3.1 Oxygen

Medical oxygen should be available at a pressure of 4 bar. This pressure should be maintained when a flow of 50 l/minute at each outlet is in use at the same time. There should be two banks of cylinders or two tanks with automatic changeover controls with a visible indication (in the ICU and at the changeover area) when one bank of cylinders is exhausted.

5.3.2 Compressed air

Filtered oil-free medical air at a pressure of 4 bar should be available, and this pressure should be maintained with a flow of 50 l/minute at each outlet when all of them are in use. The supply should be governed by a fail-safe tandem system of providing compressed air.

5.4 Vacuum

The ICU should have a central vacuum supply that is capable of generating a negative pressure of 50 kPa and of maintaining 40 l/minute air flow at each suction outlet when all outlets are in use.



5.5 Air conditioning

The unit should be air conditioned to allow a choice of temperature from 16-27°C and a choice of humidity from 25-95%. Patient areas should have at least three changes of air per hour. A thermometer and hygrometer are necessary to monitor air conditioning in each room.

5.6 Communications

5.6.1 Telephones

Two telephones are required for every 3-4 beds.

5.6.2 An intercom should be available in every unit and connecting all other intensive care rooms and other major service departments, such as chemistry laboratories and microbiology laboratories.

5.6.3 Medical staff and other staff should be immediately contactable through some form of paging system.

5.6.4 Alarm calls displaying origin should be operated from each bedside and visible at a central station. An alarm call should be available in the doctor's bedroom.

5.6.5 A computer station should be available for computerised results if the facilities exist.

5.7 Bedhead layouts

Access to the head of the bed must be unimpeded.

5.8 Gas outlets

5.8.1 Oxygen

- ICU categories 3 and 2 (three per bed).
- ICU category 1 (one per bed).

5.8.2 Air

- ICU categories 3 and 2 (two per bed).
- ICU category 1 (one per bed).

5.9 Electricity points

These should have a pilot light indicating that the circuit is live (no more than four points per fuse):

- ICU categories 3 and 2 (16 per bed).
- ICU category 1 (six per bed).

5.10 Vacuum inlets

For suction controller, tracheal aspiration and continuous drainage suction:

- ICU categories 3 and 2 (three per bed).
- ICU category 1 (two per bed).

5.11 Mounts for monitors.

5.12 Hanging intravenous sky hooks (or equivalent)

ICU categories 3, 2 and 1 (two per bed).

5.13 Electricity points, gas outlets and equipment rails must be distributed on both sides of the bed. Some rails must be below electrical outlet.

6. Diagnostic and investigational facilities

6.1 Biochemistry laboratory (24-hour availability)

6.1.1 Full serum chemistry

ICU categories 3, 2 and 1.

6.1.2 Full urinary chemistry

ICU categories 3, 2 and 1.

6.1.3 Blood gas laboratory

- ICU categories 3 and 2 should be within the unit.
- ICU category 1 must be available immediately.



6.2 Bacteriology laboratory full microbiological service

ICU categories 3, 2 and 1 (24-hour availability).

6.3 Haematology laboratory (24-hour availability)

6.3.1 Full blood counts.

6.3.2 Coagulation screens.

6.4 Diagnostic radiography

6.4.1 Routine radiography

ICU categories 3, 2 and 1 (24-hour availability).

6.4.2 Ultrasound investigation

- ICU categories 3 and 2 (24-hour availability).
- ICU category 1 (daytime availability).

6.4.3 Computed tomography scanning

- ICU categories 3 and 2 (24-hour availability).
- ICU category 1 (daytime availability).

6.4.4 Radioisotope scanning

ICU categories 3, 2 and 1 (daytime availability).

6.4.5 Angiography

- ICU categories 3 and 2 (24-hour availability).
- ICU category 1 (daytime availability).

7. Recommended training of intensive care staff

7.1 Medical staff

A career in intensive care medicine.

7.1.1 Director of an intensive care unit

A minimum of two years in a full-time capacity in an acceptable ICU at the level of junior consultant, i.e. after higher training, is recommended. Acceptable higher training includes anaesthesia, internal medicine, paediatrics or surgery. The two years may be a combination of the following experience:

- Not less than one year in a multidisciplinary ICU (admits surgical, medical and trauma patients). The unit should treat more than 300 patients per year.
- The second year may comprise not more than six months in each of the following ICUs: surgical ICU, neurosurgical ICU, cardiac surgical ICU, coronary care unit, paediatric ICU, total parenteral nutritional unit and renal unit.

7.1.2 Director of specialised unit (coronary care or paediatric unit)

For a career in a specialised unit, the following requirement should be fulfilled: not less than 18 months in the specialised unit and not less than six months in an ICU (category 3 multidisciplinary ICU at a junior consultant level.)

7.1.3 Consultant in intensive care (intensive care unit categories 3, 2 and 1)

A consultant in ICU will supervise patient care and should be a specialist in anaesthesia, internal medicine, paediatrics or surgery, and must have had a minimum of one year's experience in an acceptable ICU. The following criteria should be met:

- Not less than six months full-time in an acceptable multidisciplinary category 3 ICU at a junior consultant level. (These six months may be in a specialised unit, i.e. coronary care or paediatric unit if the trainee is to act as a consultant in a specialised unit).
- The remaining six months may be spent in any other acceptable ICU, including multidisciplinary, general surgical, cardiac surgical, neurosurgical, paediatric or coronary care at a registrar or junior consultant level.
- No less than nine months of the total training should be full-time experience. The remaining three months may be made up of part-time experience on a pro rata basis, i.e. six months of 50% involvement.

7.1.3.1 Consultant in intensive care (category 1)

A specialist in anaesthesia, internal medicine, paediatrics or surgery with a minimum of three months'



full-time experience in an acceptable ICU, at either junior consultant or registrar level, is acceptable to supervise patient care in a category 1 ICU.

7.2 Nurse training

The South African Nursing Councillor/British Nursing Councillor equivalent ICU training courses are the recommended minimum requirements for senior control nurses.

7.3 Technologists

Any national diploma in clinical technology with not less than one year's experience in an acceptable ICU during or after training is recommended.

7.4 Physiotherapists

Completion of any acceptable intensive care course for physiotherapists and an additional six months' experience in an acceptable ICU is recommended.

8. Protocols and policies

Protocols and policies for common ICU activities (as outlined below), and where appropriate, unit-specific procedures and interventions, should be established, reviewed and practised.

8.1 For all procedures

- 8.1.1 The availability, and correct calibration and function of all necessary equipment should be checked in advance. The operator should be appropriately experienced or supervised, and competent assistance should be available.
- 8.1.2 Expected benefits should outweigh anticipated risks. Specific risk-benefit assessments should be made at least daily, and all invasive devices removed as soon as practicable.

8.2 Intravascular catheters

- 8.2.1 The location of "central" catheter tips should be checked by X-ray after insertion and repositioning.
- 8.2.2 Waveforms should be inspected critically at regular intervals.
- 8.2.3 When a pulmonary artery catheter is in place, cardiac output, oxygen delivery and consumption, and other derived variables should be determined, and the results recorded at regular intervals.

8.3 Oxygen therapy

- 8.3.1 Pulse oximetry should be used to monitor all high-risk patients.
- 8.3.2 Capnometry should be used in selected patients.
- 8.3.3 Arterial blood gases should be measured and interpreted initially and at regular intervals.

8.4 Tracheal intubation

- 8.4.1 Tracheal intubation should be considered if patients do not have sufficient reserve to clear secretions, maintain protective glottic reflexes and blood gas homeostasis, with or without supplemental oxygen therapy.
- 8.4.2 All patients should be pre-oxygenated and treated as being at risk of vomiting.
- 8.4.3 Tracheal placement of the endotracheal tube must be confirmed using chest auscultation/inspection. Capnometry is highly recommended.
- 8.4.4 The position of the endotracheal tube tip should be confirmed by chest X-ray, and tooth (or gum) or nose-to-tip distance documented.
- 8.4.5 Cuff inflation volume or pressure should be recorded.

8.5 Artificial ventilation of the lungs

- 8.5.1 Appropriate ventilator and patient monitoring should be maintained and relevant alarms set at limits that are suitable for each patient. Ventilator settings should be recorded in writing on the patient chart. Any changes should be signed by the attending physician.
- 8.5.2 All ventilator and patient alarms must be visible or audible in areas of the ICU that are staffed continuously.
- 8.5.3 In patients with severely compromised cardiorespiratory function, the most effective combination of FiO₂ rate, mode and pattern of ventilation, and level of positive end-expiratory pressure, should be determined in conjunction with blood gas determination, haemodynamic measurements, and in special situations, oxygen delivery and



consumption. Patients receiving muscle relaxants should be nursed on an individual basis.

8.6 *Tracheal extubation*

8.6.1 Extubation should be considered when the patient:

- Can maintain adequate gas exchange with spontaneous ventilation.
- Has adequate protective airway reflexes.
- Can clear secretions by coughing.

8.6.2 In patients in whom airway patency may be compromised, extubation should normally be delayed until an air leak is demonstrated when the cuff is deflated.

8.6.3 All patients should be pre-oxygenated after final clearance of pharyngeal and tracheal secretions.

8.6.4 All patients should receive supplemental oxygen after extubation.

8.6.5 The means to re-establish an artificial airway urgently must be available.

8.6.6 Patients should be closely observed and monitored in the immediate post-extubation period.

8.7 *Prevention of infection*

Precaution must be taken at all times to protect patients and ICU personnel. This should include:

8.7.1 Washing the hands frequently, and always after each patient contact.

8.7.2 Appropriate separation or isolation of infected patients or patients at risk.

8.7.3 Use of closed infusion and drainage systems.

8.7.4 Single-patient use of all intravenous drugs and invasive devices.

8.7.5 Use of an aseptic technique when inserting or accessing devices which may come into contact with normally sterile areas of the body.

8.8 *Antimicrobial use*

Each unit should generate recommended antimicrobial regimens. The cause of any infection should be sought and eliminated. Wherever possible, antimicrobial therapy should be based on microbiological test results and adjusted to produce therapeutic serum levels.

8.8.1 Antimicrobial therapy should be restricted to patients with confirmed infections, with the following exceptions:

8.8.1.1 Short-term prophylactic antimicrobial coverage:

- In association with surgery
- After invasive procedures in particularly susceptible patients.

8.8.1.2 Broad-spectrum antimicrobial coverage in life-threatening situations, after obtaining specimens for culture and sensitivity testing, and while awaiting results.

8.8.2 Microbiological data must be collected, analysed, and interpreted for individual ICUs so that unit-specific data are available and appropriate prescribing practices ensured.

8.9 *Audit and continuous quality improvement*

There should be regular objective audits of:

8.9.1 Structure.

8.9.2 Processes.

8.9.3 Outcomes from the perspectives of staff, patients, relatives and hospital administrators.