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Joint Faculty of Intensive Care Medicine



The Royal Australasian
College of Physicians

MINIMUM STANDARDS FOR INTENSIVE CARE UNITS

This Document outlines the minimum standards relating to work practice/caseload, staffing and operational requirements, design, equipment and monitoring for Level I, II, III and Paediatric Intensive Care Units. The Document IC-13 (2002) – 'Recommendations on Standards for High Dependency Units Seeking Accreditation for Training in Intensive Care Medicine' outlines similar minimum standards for High Dependency Units'.

LEVELS OF INTENSIVE CARE UNITS

The level of intensive care available should support the delineated role of the particular hospital. The role of the ICU will vary, depending on staffing expertise, facilities and support services as well as the severity of illness and number of patients admitted.

1. LEVEL III INTENSIVE CARE UNIT

A Level III ICU is a tertiary referral unit for intensive care patients and should be capable of providing comprehensive critical care including complex multi-system life support for an indefinite period. Level III units should have a demonstrated commitment to academic education and research. All patients admitted to the unit must be referred for management to the attending intensive care specialist.

A Level III unit should have:

1.1 Work practice/caseload

- 1.1.1 At least six staffed and equipped beds to adequately discharge clinical, teaching and research commitments consistent with the functioning of an Intensive Care unit in a tertiary referral centre.
- 1.1.2 Sufficient clinical workload and case-mix of patients to maintain a high level of clinical expertise and to provide adequate clinical exposure and education of staff, including Intensive Care trainees if relevant. This should normally be more than 300 mechanically ventilated patients per annum.

1.2 Staffing Requirements

- 1.2.1 A medical director who is a Fellow of the Joint Faculty of Intensive Care Medicine. The medical director must have a clinical practice predominantly in Intensive Care Medicine.
- 1.2.2 Sufficient supporting specialist(s) so that consultant support is always available to the medical staff in the unit. For training units classified as C12 or C24 (refer Document IC-3 'Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine') trainees must be exposed to at least two specialists who are Fellows of the Joint Faculty of Intensive Care Medicine. At least two specialists should have a minimum of 50% involvement in the unit. There should also be sufficient specialist staff to provide for reasonable working hours and leave of all types and to allow the duty specialist to be available exclusively to the unit at all times. The majority of attending specialists in the unit must be Fellows of the Joint Faculty of Intensive Care Medicine.

- 1.2.3 At least one of the specialists exclusively rostered to the unit at all times. During normal working hours this specialist must be predominantly present in the unit, and at all times be able to proceed immediately to it.
- 1.2.4 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience exclusively rostered and predominantly present in the unit at all times.
- 1.2.5 A minimum of 1:1 nursing for ventilated and other similarly critically ill patients, and nursing staff available to greater than 1:1 ratio for patients requiring complex management (eg. ventricular assist device).
- 1.2.6 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical specialty of the unit.
- 1.2.7 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 1.2.8 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 1.2.9 At least one nurse educator.
- 1.2.10 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.

1.3 Operational Requirements

- 1.3.1 Defined management, admission, discharge and referral policies.
- 1.3.2 Demonstrable and documented formal audit and review of its activities and outcomes with staff who have dedicated time to collect and manage data.
- 1.3.3 A documented orientation program for new staff.
- 1.3.4 Educational programs for medical staff, and a formal nursing education program.
- 1.3.5 An active research program, preferably with staff who have dedicated time to collect and manage data.
- 1.3.6 Suitable infection control and isolation procedures and facilities.
- 1.3.7 24 hour access to pharmacy, pathology, operating theatres and tertiary level imaging services, and appropriate access to physiotherapy and other allied health services when necessary.
- 1.3.8 Appropriate clerical and secretarial support.

1.4 Design

- 1.4.1 A self-contained area, with easy access to the emergency department, operating theatres and organ imaging.
- 1.4.2 An appropriate design, providing a suitable environment with adequate space for patient care delivery, storage, staff accommodation (including office space), education and research.

1.5 Equipment and Monitoring

Equipment and monitoring of appropriate type and quantity suitable for the function of the unit and appropriate as judged by contemporary standards.

1.6 Suitability for training

Only Level III units may apply for accreditation as C24 training units, but may also apply for C6 or C12 accreditation (refer Document IC-3 'Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine').

2. LEVEL II INTENSIVE CARE UNIT

A Level II ICU should be capable of providing a high standard of general intensive care, including complex multi-system life support, which supports the hospital's delineated responsibilities. It should be capable of providing mechanical ventilation, renal replacement therapy and invasive cardiovascular monitoring for a period of at least several days. All patients admitted to the unit must be referred for management to the attending intensive care specialist.

A Level II unit should have:

2.1 Work practice/caseload

- 2.1.1 At least 4 staffed and equipped beds to adequately discharge clinical and teaching functions.
- 2.1.2 Sufficient clinical workload for maintaining clinical expertise and to provide adequate clinical exposure and education of intensive care staff, including trainees if relevant. This should normally be more than 200 mechanically ventilated patients per annum.

2.2 Staffing requirements

- 2.2.1 A medical director who is a Fellow of the Joint Faculty of Intensive Care Medicine. The medical director must have a clinical practice predominantly in intensive care medicine.
- 2.2.2 At least one other specialist who is a Fellow of the Joint Faculty of Intensive Care Medicine¹.
- 2.2.3 Sufficient specialist staff to provide reasonable working hours and leave of all types and to allow the duty specialist to be rostered and available exclusively to the unit.
- 2.2.4 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience exclusively rostered and predominantly present in the unit at all times.
- 2.2.5 A nursing staff: patient ratio of 1:1 for all critically ill patients.
- 2.2.6 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical specialty of the unit.
- 2.2.7 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 2.2.8 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 2.2.9 Access to a nurse educator.
- 2.2.10 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.

2.3 Operational Requirements

- 2.3.1 Defined management, admission, discharge and referral policies.
- 2.3.2 Demonstrable and documented formal audit and review of its activities and outcomes, with staff who have dedicated time to collect and manage data.
- 2.3.3 A documented orientation program for new staff.
- 2.3.4 Educational programs for medical staff, and a formal nursing education program.
- 2.3.5 Suitable infection control and isolation procedures and facilities.
- 2.3.6 24 hour access to pharmacy, pathology, operating theatres and imaging services commensurate with the designated role of the hospital, and appropriate access to physiotherapy and other allied health services when necessary.
- 2.3.7 An active research program is desirable.

2.4 Design

- 2.4.1 A self-contained area, with easy access to the emergency department, operating theatres and organ imaging.
- 2.4.2 Appropriate design, providing a suitable environment with adequate space for patient care delivery, storage, staff accommodation (including office space), education and research.

¹ The Joint Faculty of Intensive Care Medicine acknowledges that recruitment of Fellows of the Joint Faculty to rural units may be difficult and would support the designation Level II for a rural ICU if this were the only deficiency and if genuine attempts had been made at recruitment of suitable personnel.

2.5 Equipment and Monitoring

Equipment and monitoring of appropriate type and quantity suitable for the function of the unit and appropriate as judged by contemporary standards.

2.6 Suitability for training

Level II units may apply for maximum accreditation as C12 training units, but may also apply for C6 accreditation (refer Document IC-3 'Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine').

3. LEVEL I INTENSIVE CARE UNIT

A Level I ICU should be capable of providing immediate resuscitation and short term cardio-respiratory support for critically ill patients. It will also have a major role in monitoring and prevention of complications in 'at risk' medical and surgical patients. It must be capable of providing mechanical ventilation and simple invasive cardiovascular monitoring for a period of at least several hours. Provision of such care for more than 24 hours is allowed for patients with essentially single system failure but only within the context of ongoing discussion with a Level II or Level III unit with which the host unit has an established referral relationship. Such a relationship should include mutual transfer and back transfer policies and an established, joint review process. All patients admitted to a Level I unit must be referred to the Medical Director of the unit or the specialist taking responsibility for the unit at the time of admission.

The patients most likely to benefit from Level I care include:

- a) Patients with uncomplicated myocardial ischaemia.
- b) Post-surgical patients requiring special observations and care.
- c) Unstable medical patients requiring special observations and care beyond the scope of a conventional ward, and
- d) Patients requiring short term mechanical ventilation.

3.1 Work practice/caseload

The number of ICU beds and number of patients' admissions should be sufficient to maintain clinical skills by both medical and nursing staff.

A Level I unit should have:

3.2 Staffing Requirements

- 3.2.1 A medical director who is experienced in intensive care medicine.
- 3.2.2 Consultant support, always available from a specialist with experience in intensive care medicine.
- 3.2.3 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience, rostered for the intensive care unit at all times.
- 3.2.4 A nursing staff: patient ratio of 1:1 for all critically ill patients.
- 3.2.5 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical specialty of the unit.
- 3.2.6 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 3.2.7 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 3.2.8 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.
- 3.2.9 A minimum of two registered nurses present in the unit at all times when there is a patient admitted to the unit.

3.3 Operational Requirements

- 3.3.1 Defined management, admission, discharge and referral policies.
- 3.3.2 Demonstrable and documented formal audit and review of its activities and outcomes.
- 3.3.3 A documented orientation program for new staff.
- 3.3.4 Educational programs for medical staff, and a formal nursing education program.
- 3.3.5 Suitable infection control and isolation procedures and facilities.
- 3.3.6 24 hour access to pharmacy, pathology, operating theatres and tertiary level imaging services, and appropriate access to physiotherapy and other allied health services when necessary.
- 3.3.7 An active research program is desirable.

3.4 Design

- 3.4.1 A self-contained area, with easy access to the emergency department, operating theatres and organ imaging.
- 3.4.2 Appropriate design, providing a suitable environment with adequate space for patient care delivery, storage, staff accommodation (including office space), education and research.

3.5 Equipment and Monitoring

The type and quantity of equipment and monitoring suitable for the function of the unit and appropriate as judged by contemporary standards.

3.6 Suitability for training

Level I units are ineligible to apply for accreditation for training in Intensive Care Medicine.

4. PAEDIATRIC INTENSIVE CARE UNIT

A tertiary referral Paediatric Intensive Care Unit (PICU) should be capable of providing comprehensive critical care including complex multi-system life support for an indefinite period to children less than 16 years. These units should have a commitment to academic education and research. All patients admitted to the unit must be referred for management to the attending intensive care specialist.

A PICU should have:

4.1 Work practice/caseload

- 4.1.1 Sufficient staffed and equipped beds (usually a minimum of six beds) to provide for its clinical and teaching functions.
- 4.1.2 Sufficient clinical workload to maintain clinical expertise (usually a minimum of 300 patient admissions per annum).

4.2 Staffing Requirements

- 4.2.1 A medical director who is a Fellow of the Joint Faculty of Intensive Care Medicine. The medical director should have a clinical practice predominantly in paediatric intensive care medicine.
- 4.2.2 Sufficient supporting specialist(s) so that consultant support is always available to the medical staff in the unit. For training units classified as C12 or C24 (refer Document IC-3 'Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine') trainees must be exposed to at least two specialists who are Fellows of the Joint Faculty of Intensive Care Medicine. At least two specialists should have a minimum of 50% involvement in the unit. There should also be sufficient specialist staff to provide for reasonable working hours and leave of all types and to allow the duty specialist to be available exclusively to the unit at all times. The majority of attending specialists in the unit should be Fellows of the Joint Faculty of Intensive Care Medicine.

- 4.2.3 At least one of the specialists exclusively rostered to the unit at all times. During normal working hours this specialist must be predominantly present in the unit, and at all times be able to proceed immediately to it.
- 4.2.4 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience exclusively rostered and predominantly present in the unit at all times.
- 4.2.5 A minimum of 1:1 nursing for ventilated and other similarly critically ill patients, and nursing staff available to greater than 1:1 ratio for patients requiring complex management (eg. ventricular assist device).
- 4.2.6 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical specialty of the unit.
- 4.2.7 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 4.2.8 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 4.2.9 At least one nurse educator.
- 4.2.10 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.

4.3 Operational Requirements

- 4.3.1 Defined management, admission, discharge and referral policies.
- 4.3.2 Demonstrable and documented formal audit and review of its activities and outcomes with staff who have dedicated time to collect and manage data.
- 4.3.3 A documented orientation program for new staff.
- 4.3.4 Educational programs for medical staff, and a formal nursing education program.
- 4.3.5 An active research program, preferably with staff who have dedicated time to collect and manage data.
- 4.3.6 Suitable infection control and isolation procedures and facilities.
- 4.3.7 24 hour access to pharmacy, pathology, operating theatres and tertiary level imaging services, and appropriate access to physiotherapy and other allied health services when necessary.

4.4 Design

- 4.4.1 A self-contained area, with easy access to the emergency department, operating theatres and organ imaging.
- 4.4.2 Appropriate design, providing a suitable environment with adequate space for patient care delivery, storage, staff accommodation (including office space), education and research.

4.5 Equipment and Monitoring

Equipment and monitoring of appropriate type and quantity suitable for the function of the unit and appropriate as judged by contemporary standards.

4.6 Suitability for training

Paediatric ICU's may apply for accreditation of training as C6, C12 or C24 units as detailed in Document IC-3 'Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine'.

GENERIC REQUIREMENTS FOR INTENSIVE CARE UNITS

An Intensive Care Unit (ICU) is a specially staffed, and equipped, separate and self-contained section of a hospital for the management of patients with life-threatening or potentially life-threatening, and reversible or potentially reversible organ failure.

An ICU provides resources for the support of patients and their families, and utilises the specialised skills of medical, nursing and other staff experienced in the management of critically ill patients. These skills and resources, necessary to care for the critically ill, are most efficiently concentrated in one area of the hospital. This does not preclude the division of one ICU into a higher level (eg. for ventilated patients) and lower or 'step-down' level (eg. for post-operative patients), nor does it preclude the siting of specific high dependency areas elsewhere in the hospital (eg. neurosurgical, post-operative cardiothoracic area). Neonatal and Paediatric Intensive Care Units and Coronary Care Units should preferably be separate from general ICU's. However, coronary care patients and children are effectively managed in general ICU's, where necessary.

Within each unit, policies should be available which detail the admission and discharge criteria of patients. There should also be protocols for retrieving patients, and for transferring patients to other ICU's for more comprehensive patient care when necessary.

5. STAFFING

The concentration of staff and equipment to care for critically ill patients in one area of the hospital encourages efficient use of expertise and limited resources.

5.1 Medical Staff

The medical director of Level II and III units and paediatric units and the majority of all senior medical staff appointed to Level III units and paediatric units, should be Fellows of the Joint Faculty of Intensive Care Medicine. Sufficient specialist staff with experience in intensive care to provide for administration, teaching, research, reasonable working hours and leave of all types are necessary. Except for Level I units, there must be at least one specialist exclusively rostered to the unit at all times together with 24 hour full-time junior medical staff with an appropriate level of experience rostered exclusively at all times. In Level III units and Paediatric units there must be access to a broad range of specialty consultants.

5.2 Nursing Staff

The nursing staff: patient ratio and the total number of nursing staff required by each unit depends on many variables such as the total number of patients, severity of illness of patients, the method of rostering nursing staff on 8 or 12 hour shifts, as well as individual policies for support and monitoring in each unit. All nurses involved in direct patient care should be registered nurses and the nurse in charge and the majority of nursing staff in each unit should have a post registration qualification in intensive care or in the specialties of the unit. Level I & II units should be capable of providing a nursing staff: patient ratio of 1:1 for all critically ill patients. Level III units and Paediatric units should be capable of providing nursing care to greater than 1:1 ratio for critically ill or unstable patients.

An artificially ventilated patient needs at least one nurse at the bedside at all times. A ventilated patient with more complex support such as renal replacement therapy and inotropic support may need two nurses per patient for at least some of the shift. Others such as post-operative patients admitted for overnight monitoring and treatment with a continuous epidural and supplemental oxygen, may require only one nurse per 2-3 patients. Allowances must be made for meal breaks, handover times, holidays, sickness, study leave, etc.

5.3 Other Staff

Depending on the needs of the unit, physiotherapists, radiographers, dieticians, technicians, including biomedical engineering and scientific officers, cleaning staff, social workers, occupational therapists, interpreters, pastoral, secretarial and clerical staff are all required. Secretarial services should be available to support educational and administrative activities. These should be separate from ward clerk duties in the ICU.

5.4 Educational

The unit should have a documented educational program for medical, nursing and other staff. Level III Units and Paediatric Units should have a nurse educator and formal nursing educational program. Level II units should have access to a nurse educator.

6. OPERATIONAL

All units should have defined policies for admission, management, discharge and referral of patients. All units should be under the direction of a specialist in intensive care medicine. This person should institute agreed policies, develop a team approach for management and be responsible to the hospital administration through appropriate channels. Clinical management of the patient must be achieved within the framework of agreed policies (eg. procedural and infection control, including defined antibiotic policies). All units should have documented and demonstrable procedures for formal audit, peer review and quality assurance. Services required on a 24 hour basis include imaging, laboratory and other diagnostic facilities. Except for Level I units, all patients admitted must be referred for management to the attending intensive care specialist. Level III units and paediatric units must have an active research program. In Level II units, an active research program should be encouraged.

7. STRUCTURE OF AN ICU

7.1 Siting

The ICU should be a separate unit within the hospital with access to the Emergency Department, operating theatres and organ imaging on campus.

7.2 Design

A high standard of intensive care medicine is influenced by good design and adequate space. Whenever renovations or new structures are being planned there are certain features which should be considered.

7.2.1 *Patient Area* – in adult intensive care units at least 20m² floor area is required for each bedspace in an open area exclusive of service areas and circulation space as indicated below. Paediatric units may utilise less than 20m² when utilising cots rather than beds. At least one wash basin for every two beds is recommended and one for each bedspace is preferred. At least one single room should be available for every six open space beds. Each single room needs to have its own wash basin. There must be an adequate number of service outlets depending on the purpose of the unit. A Level III unit will require at least three oxygen, two air and three suction outlets, and at least 16 power points for each bedspace. The electrical wiring and protection of patient treatment areas must be Cardiac Protected Status AS3003. Adequate and appropriate lighting for clinical observation must be available. Service outlets and lighting must comply with standards prescribed by the appropriate authority. For the psychological well-being of patients and staff, windows and bed access to the exterior are desirable features. Design of the unit should take into account the need for patient privacy.

7.2.2 *Working Area* – the working area must include adequate space for staff to work in comfort while maintaining visual contact with the patient. Adequate space must be allowed for patient monitoring, resuscitation equipment, and medical storage areas (including a refrigerator). The Unit needs space for a mobile x-ray machine, and associated equipment. The x-ray viewing facilities must enable simultaneous viewing of multiple x-rays. There should be adequate room for telephones and other communication systems, computers and data collecting, also for the storage of stationery. Adequate space for a receptionist and/or ward clerk must be available.

7.2.3 *Environment* – the unit should have appropriate air conditioning which allows control of temperature, humidity and air change.

7.2.4 *Isolation area* – the unit must be capable of isolation procedures.

7.2.5 *Equipment storage area* – eg. for monitors, ventilators, infusion pumps and syringes, dialysis equipment, disposables, fluids, drip stands, trolleys, blood warmers, suction apparatus, linen, large items of special equipment.

- 7.2.6 *Dirty utility* – area for cleaning appliances, urine testing, emptying and cleaning bed pans and urine bottles. Unit design should provide appropriate movement pathways for contaminated equipment.
- 7.2.7 *Staff Facilities* – should be sited close to the patient area and have adequate communication with it.
- 7.2.8 *Seminar Room* – should be situated close to the patient area with adequate communication and be equipped with seating, audiovisual aids, wall boards and other teaching aids.
- 7.2.9 *Nursing Offices* – separate offices must be provided at least for the Nurse in Charge and Nurse Educator.
- 7.2.10 *Medical Offices* – each senior doctor should have adequate office space. There should be adequate office space for junior medical staff to perform educational, research or clerical work during quiet clinical periods.
- 7.2.11 *Relatives' area* – a separate waiting area must be available (with drinks dispenser, radio, television and comfortable seating desirable). A separate interview room and a separate area for distressed relatives should be available and overnight rooms for relatives should also be considered.
- 7.2.12 *Secretarial area* – a separate area should be available for departmental secretarial assistance. Records storage has to be accommodated.
- 7.2.13 *Computing facilities* – a separate area should be designated for computerised patient data entry and analysis. Confidentiality should be built into any system.
- 7.2.14 *Cleaners' area* – for storage of equipment and materials.
- 7.2.15 *Workshop and Laboratory* – should be considered for any unit which does not rely on centralised services.
- 7.2.16 *Library facilities* – an appropriate range of bench manuals, textbooks, journals and access to electronic medical information should be available 24 hours a day within the unit complex.

8. EQUIPMENT

- 8.1 The type and quantity of equipment will vary with the type, size and function of the unit and must be appropriate to the workload of the Unit, judged by contemporary standards.
- 8.2 There must be a regular system in force for checking the safety of equipment.
- 8.3 Basic equipment should include:
 - ventilators
 - hand ventilating assemblies
 - suction apparatus
 - airway access equipment, including bronchoscopic equipment
 - vascular access equipment
 - monitoring equipment, both non-invasive and invasive
 - defibrillation and pacing facilities
 - equipment to control patient's temperature
 - chest drainage equipment
 - infusion and specialised pumps
 - portable transport equipment
 - specialised beds

Other equipment (eg. renal replacement therapy and intra-aortic balloon counterpulsation etc.) for specialised diagnostic or therapeutic procedures should be available when clinically indicated and in order to support the delineated role of the ICU.

Protocols and in-service training for medical and nursing staff need to be available for the use of all equipment, including steps to be taken in the event of malfunction.

9. MONITORING

Adequate monitoring is a core capability of all Intensive Care Units.

The described monitoring methods below are not meant to replace vigilance by medical and nursing staff in the unit and may fail to detect unfavourable clinical developments. Furthermore, it is understood that the use of monitoring does not guarantee any specific patient outcome.

The health care facility is responsible for provision of equipment for intensive care and monitoring on the advice of one or more designated intensive care specialists, and for effective maintenance of this equipment.

9.1 Personnel

Clinical monitoring by a vigilant nurse is the basis of intensive patient care. This should be supplemented by appropriate devices to assist the nurse.

9.2 Patient Monitoring

9.2.1 Circulation

The circulation must be monitored at frequent and clinically appropriate intervals by detection of the arterial pulse, ECG display and measurement of the arterial blood pressure.

9.2.2 Respiration

Respiratory function should be assessed at frequent and clinically appropriate intervals by observation, supported by capnography and blood gas analysis.

9.2.3 Oxygenation

The patient's oxygenation should be assessed at frequent and clinically appropriate intervals by observation, pulse oximetry and blood gas analysis as appropriate.

9.3 Equipment (including portable equipment used for patient transports)

9.3.1 *Piped gas supply failure alarm* – There must be piped gas supply failure alarms.

9.3.2 *Oxygen supply failure alarm* – An automatically activated device to monitor oxygen supply pressure and to warn of low pressure must be fitted to ventilators.

9.3.3 *Oxygen analyser* – An oxygen analyser must be available to measure the oxygen concentration delivered by ventilators or breathing systems.

9.3.4 *Alarms for Breathing System Disconnection or Ventilator Failure* – When an automatic ventilator is in use, a device capable of warning promptly of a breathing system disconnection or ventilator failure must be in continual operation.

9.3.5 *Ventilator volumes and pressures* – When a ventilator is in use, ventilatory volumes should be measured although it is accepted that this is not always possible with some ventilators used for paediatric and neonatal patients. Airway and respiratory circuit pressure must be monitored continuously and prompt warning given of excessive pressures.

9.3.6 *Humidifier temperature* – When a heated humidifier is in use monitoring of the inspired temperature must be available which alarms at high temperature.

9.3.7 *Electrocardiograph* – Equipment to monitor and continually display the electrocardiograph must be available for every patient.

9.3.8 *Pulse Oximeter* – A pulse oximeter must be available for every patient in the Intensive Care Unit.

9.3.9 *End tidal CO₂ monitor* – Capnography must be available at each bed in the Intensive Care Unit and must be used to confirm tracheal placement of the endotracheal or tracheostomy tube immediately after insertion.

9.3.10 *Air embolism* – When a patient is treated by renal replacement therapy, plasmapheresis or circulatory perfusion, monitoring for air embolism must be in use.

9.3.11 *Other Equipment* – When clinically indicated, equipment must be available to measure other physiological variables such as intra-arterial and pulmonary artery pressures, cardiac output, inspiratory pressure and air flow, intracranial pressure, temperature, neuromuscular transmission.

OTHER DOCUMENTS RELEVANT TO INTENSIVE CARE

- IC-2 'The Duties of an Intensive Care Specialist in Hospitals Accredited for Training in Intensive Care'
- IC-3 'Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine'
- IC-4 'The Supervision of Vocational Trainees in Intensive Care'
- IC-6 'The Role of Supervisors of Training in Intensive Care Medicine'
- IC-7 'Secretarial Services to Intensive Care Units'
- IC-13 'Recommendations on Standards for High Dependency Units Seeking Accreditation for Training in Intensive Care Medicine'

This Document has been prepared having regard to general circumstances, and it is the responsibility of the practitioner to have regard to the particular circumstances of each case, and the application of this document in each case.

Documents are reviewed from time to time, and it is the responsibility of the practitioner to ensure that the practitioner has obtained the current version. Documents have been prepared having regard to the information available at the time of their preparation, and the practitioner should therefore have regard to any information, research or material which may have been published or become available subsequently.

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