

# ACHS Clinical Indicator Users' Manual 2007

## Intensive Care



Health Services  
Research Group  
University of Newcastle



The Australian Council  
on Healthcare Standards

*safety, quality, performance*

# **INTENSIVE CARE INDICATORS**

## **CLINICAL INDICATOR USERS' MANUAL**

**VERSION 3 FOR USE IN 2007**

**The data collected with this Users' Manual are to be reported using the  
ACHS Performance Indicator Reporting Tool (PIRT)**

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## FORWARD

The purpose of this forward is to assist organisations with the collection and reporting of clinical indicators. The forward summarises:

1. Data collection periods
2. Data collection methods
3. Suggested sources for data collection of indicators
4. Stratification variables
5. Data cleaning rules
6. EQUIP 4 and clinical indicators

### 1. Data Collection periods

For the **July to December 2006** collection period organisations must submit their data to the ACHS by **28 February 2007**.

For the **January to June 2007** collection period organisations must submit their data to the ACHS by **31 August 2007**.

**All data must be submitted using the PIRT program.**

### 2. Data Collection Methods

Pre-existing data sources should be used where ever possible to reduce duplication and maximise efficiency. Relevant departments should be consulted regarding possible data sources. Data collection is most easily done by integrating this into an existing organisation function.

### 3. Suggested sources for data collection of indicators

The following data sources are typical:

- Clinical data (adverse event system, medical record review, clinical pathways, specific specialty databases eg triage database, intensive care database, pathology database).
- Administrative data (inpatient statistics forms, patient admission system, ICD10CM codes).

Empty Booklets: The ACHS provides empty booklets (**see appendix 1**) for each of the clinical indicator sets. The booklets can be used as a (hard copy) data collection device. We recommend that you print the appropriate booklets and start distributing them to the units / departments at the beginning of the data collection period. You can access the booklets from the **Clinical Indicator and PIRT 2007 CD ROM**, from the website ([www.achs.org.au](http://www.achs.org.au)) or through PIRT 1.3 (under Housekeeping, set the data collection period to 2007 and access the Empty Booklets from the left hand side of the menu).

### 4. Stratification variables

The ACHS, in collaboration with Medical Colleges, Associations or Societies have developed the following stratification variables to enable 'like' organisations to be grouped for the purpose of comparison.

Three levels of comparison are available:

- An individual organisations data results compared to ALL organisations who submit data to a particular indicator.
- An individual organisations data results compared to present stratification variables (where defined) as described below within the same sector, that is, public or private.
- An individual organisations data results compared the same sector, that is, public or private.

### Intensive Care stratification variables

All organisations are stratified into public / private categories and intensive care unit classification:

- Adult ICU – level III
- Adult ICU – level II
- Adult ICU – level I

### 5. Data cleaning rules for Intensive Care Indicators version 3

1. The *denominator figures* for **indicators 2.4 and 2.5** should be the same, as they share the same definition.
2. The *denominator figures* for **indicators 1.1, 3.1 and 4.1** should be the same, as they share the same definition.
3. The *denominator figure* for **indicator 2.1** equals the *denominator* of **indicator 1.1** (3.1/4.1) PLUS the *numerator figure* of **indicator 2.1**.
4. The *denominator figure* for **indicator 2.2** equals the *denominator* of **indicator 1.1**(3.1/4.1) PLUS the *numerator figure* of **indicator 2.2**.

### 6. EQulP 4 and clinical indicators

The use of clinical indicators by health care organisations continues to be an important component of the Evaluation and Quality Improvement Program (EQulP). The collection of specific clinical indicators is not mandatory however in EQulP 4 ***critierion 1.1.4 Care is evaluated by healthcare providers and when appropriate with the consumer/patient and carer***, is a mandatory criterion.

All clinical indicators are referenced to specific EQulP 4 criteria. The clinical indicators are a valid source of clinical audit criteria and may be used as evidence to support criteria 1.1.4 and other appropriate criteria. Table 1 shows the EQulP 4 functions, standards and criteria and highlights the mandatory criteria.

The *Clinical Indicator Summary Guide* is a publication which has been developed to demonstrate the usefulness and relevance of the current ACHS clinical indicators. This publication consolidates more than 300 clinical indicators in an easy to use reference guide including linkage of individual indicators to the EQulP 4 criteria. This document also provides further information about the 20<sup>th</sup> and 80<sup>th</sup> centile rates for individual clinical indicators and whether indicators are associated with a potentially undesirable outcome or an adverse event. The publication is available on the ***Clinical Indicator and PIRT 2007 CD ROM*** or from the ACHS website ([www.achs.org.au](http://www.achs.org.au)).

Table 1 following identifies at a glance, the three functions, the 13 standards (Colour highlighted) and each of the 45 criteria.

1. CLINICAL	2. SUPPORT	3. CORPORATE
1.1 Consumers / patients are provided with high quality care throughout the care delivery process.	2.1 The governing body leads the organisation in its commitment to improving performance and ensures the effective management of corporate and clinical risks.	3.1 The governing body leads the organisation's strategic direction to ensure the provision of quality, safe services.
1.1.1 The assessment system ensures current and ongoing needs of the consumer / patient are identified.	2.1.1 The organisation's continuous quality improvement system demonstrates its commitment to improving the outcomes of care and service delivery.	3.1.1 The organisation provides quality, safe care through strategic and operational planning and development.
1.1.2 Care is planned and delivered in partnership with the consumer / patient and when relevant, the carer, to achieve the best possible outcomes.	2.1.2 The integrated organisation-wide risk management policy and system ensure that corporate and clinical risks are identified, minimised and managed.	3.1.2 Governance is assisted by formal structures and delegation practices within the organisation.
1.1.3 Consumers / patients are informed of the consent process, understand and provide consent for their health care.	2.1.3 Health care incidents, complaints and feedback are managed to ensure improvements to the systems of care.	3.1.3 Processes for credentialling and defining the scope of clinical practice support safe, quality health care.
1.1.4 Care is evaluated by health care providers and when appropriate with the consumer / patient and carer.	2.2 Human resources management supports quality health care, a competent workforce and a satisfying working environment for staff.	3.1.4 External service providers are managed to maximise quality care and service delivery.
1.1.5 Processes for discharge / transfer address the needs of the consumer / patient for ongoing care.	2.2.1 Human resources planning supports the organisation's current and future ability to address needs.	3.1.5 Documented corporate and clinical policies assist the organisation to provide quality care.
1.1.6 Systems for ongoing care of the consumer / patient are coordinated and effective.	2.2.2 The recruitment, selection and appointment system ensures that the skill mix and competence of staff, and mix of volunteers, meet the needs of the organisation.	3.2 The organisation maintains a safe environment for employees, consumers / patients and visitors.
1.1.7 Systems exist to ensure that the care of dying and deceased consumers / patients is managed with dignity and comfort.	2.2.3 The continuing employment and performance development system ensures the competence of staff and volunteers.	3.2.1 Safety management systems ensure safety and wellbeing for consumers / patients, staff, visitors and contractors.
1.1.8 The health record ensures comprehensive and accurate information is recorded and used in care delivery.	2.2.4 The learning and development system ensures the skill and competence of staff and volunteers.	3.2.2 Buildings, signage, plant, equipment, supplies, utilities and consumables are managed safely and used efficiently and effectively.
1.2 Consumers / patients / communities have access to health services and care appropriate to their needs.	2.2.5 Employee support systems and workplace relations assist the organisation to achieve its goals.	3.2.3 Waste and environmental management supports safe practice and a safe environment.
1.2.1 The community has information on, and access to, health services and care appropriate to its needs.	2.3 Information management systems enable the organisation's goals to be met.	3.2.4 Emergency and disaster management supports safe practice and a safe environment.
1.2.2 Access and admission to the system of care is prioritised according to clinical need.	2.3.1 Records management systems support the collection of information and meet the organisation's needs.	3.2.5 Security management supports safe practice and a safe environment.
1.3 Appropriate care and services are provided to consumers / patients.	2.3.2 Information and data management and collection systems are used to assist in meeting the strategic and operational needs of the organisation.	
1.3.1 Health care and services are appropriate and delivered in the most appropriate setting.	2.3.3 Data and information are used effectively to support and improve care and services.	
1.4 The organisation provides care and services that achieve expected outcomes.	2.3.4 The organisation has an integrated approach to the planning, use and management of information and communication technology (I&CT).	
1.4.1 Care and services are planned, developed and delivered based on the best available evidence and in the most effective way.	2.4: The organisation promotes the health of the population.	
1.5 The organisation provides safe care and services.	2.4.1 Better health and wellbeing for consumers / patients, staff and the broader community are promoted by the organisation.	
1.5.1 Medications are managed to ensure safe and effective practice.	2.5 The organisation encourages and adequately governs the conduct of health and medical research to improve the safety and quality of health care.	
1.5.2 The infection control system supports safe practice and ensures a safe environment for consumers / patients and health care workers.	2.5.1 The organisation's research program promotes the development of knowledge and its application in the health care setting, protects consumers / patients and manages organisational risks associated with research.	
1.5.3 The incidence and impact of pressure ulcers are minimised through a pressure ulcer prevention and management strategy.		
1.5.4 The incidence of falls and fall injuries is minimised through a falls management program.		
1.5.5 The system for prescription, sample collection, storage and transportation and administration of blood and blood components ensures safe and appropriate practice.		
1.5.6 The organisation ensures that the correct patient receives the correct procedure on the correct site.		
1.6 The governing body is committed to consumer participation.		
1.6.1 Input is sought from consumers, carers and the community in planning, delivery and evaluation of the health service.		
1.6.2 Consumers / patients are informed of their rights and responsibilities.		
1.6.3 The organisation makes provision for consumers / patients from culturally and linguistically diverse backgrounds and consumers / patients with special needs.		

## **INTRODUCTION**

This is the third time that the indicators have been reviewed and the Working Party considered a number of factors during their deliberations.

Outcomes are obviously the most important way of determining the quality of care delivered in any setting. The Australia and New Zealand Intensive Care Society (ANZICS) Database is one of the largest and most sophisticated databases in the world. It was agreed that Indicator Area 1 – number of adult admissions to the ANZICS APD - should remain unchanged.

Indicator Area 2 has been expanded to include other indicators of pressure on the intensive care unit. As well as refused appropriate admissions, cancellations of elective surgery and transfers due to there being no IC bed available. In addition after hours (1800-0600) discharges from the ICU has been included and as a consequence the definition of exit block has been increased to 12 hours.

Indicator Area 3: Intensive Care patient Management – Unplanned readmission into an ICU within 72 hours of discharge -remains unchanged. There was considerable discussion as to whether this indicator reflects less than optimal management or premature discharge from the ICU, or is a more general marker of hospital care reflecting at times inadequate ward care. It was agreed that this indicator would be further reviewed by the Working Party in 2007.

Lastly, Indicator Area 4: Intensive Care Patient Treatment. It was decided to include a 'process indicator' for the first time. There was discussion about the validity of thromboembolism prophylaxis as an indicator when it is unlikely that DVT prophylaxis alone will influence outcome. This indicator was selected because it could be conveniently collected with the APD data in the first 24 hours. It was recognised that as written there is no way of accounting for that group in whom prophylaxis is contraindicated for a specific clinical reason. As no simple solution presented itself, it was agreed that the indicator should stand as written and results be reviewed next year.

Safety and quality of care in intensive care is a rapidly evolving area of research. Since structure and process influence outcome, there is increasing emphasis on 'process bundles' internationally. This choice of indicators reflects that changing emphasis.

**Dr Anthony Burrell**

**INDICATOR AREA 1: UTILISATION OF PATIENT ASSESSMENT SYSTEMS****Indicator Topic**

Participation in the National Patient Database and the ANZICS Research Centre for Critical Care Resources (ARCCCR) Survey.

**Rationale**

Participation in the National Patient Database and the ANZICS Research Centre for Critical Care Resources (ARCCCR) Survey provides national comparative data to objectively assess casemix and severity adjusted mortality together with available ICU resources.

**Type of Indicator**

These are comparative rate based indicators addressing the process of patient care.

**Definitions of Terms****For the purpose of these indicators:**

- **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 a potentially life threatening condition. **Appendix 3** Joint Faculty of Intensive Care ANZCA IC-1(2003).
- ANZICS Adult Patient Database: refers to adult intensive care patients
- National Survey
- ANZICS Research Centre for Critical Care Resources (ARCCCR): refers to adult and paediatric intensive care units.
- The most recent APCCCR survey refers to one completed in the past 12 months.
- **Paediatric and neonatal patients** are excluded from this indicator.

**INDICATOR**

<b>CI. 1.1</b>	<b>Numerator</b>	Total number of <b>adult intensive care submissions</b> to the <b>ANZICS Adult Patient Database</b> with completed information and review of results, during the 6 month time period.
	<b>Denominator</b>	Total number of adult admissions into the intensive care unit, during the 6 month time period.
<b>CI. 1.2</b>	<b>Question</b>	Have you responded to the most recent ARCCCR survey?

<b>CI. 1.1</b>	<b>Dimension of Quality</b>	Safety
	<b>EQUIP 4 Criterion</b>	1.1.4
<b>CI. 1.2</b>	<b>Dimension of Quality</b>	Safety
	<b>EQUIP 4 Criterion</b>	1.1.4

## INDICATOR AREA 2: ACCESS AND EXIT BLOCK TO THE ICU

### Indicator Topic

Inability to admit into an intensive care unit.

### Rationale

Inability by a facility to admit a patient into an intensive care unit may be a consequence of inadequate resources.

### Type of Indicator

These are rate based indicators addressing the availability and utilisation of resources.

### Definitions of Terms

#### For the purpose of these indicators:

- **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 conditions. Joint Faculty of Intensive Care ANZCA IC-1 (2003).
- **Deferred or cancelled** refers to the non performance of a procedure due to the unavailability of an ICU / HDU bed.

### Definitions of Terms (continued)

- **Appropriate patient** - refers to a patient who would have been admitted to an intensive care unit if a bed were available (this includes cancelled elective admissions).
- **Refused request** - documented evidence, by the Intensivist receiving the request, of the inability to admit an appropriate patient. Delayed admissions (that is: less than twelve hours) are not included for the purpose of this indicator.
- A **no bed transfer** (Cl. 2.3) occurs when the reason for patient / inter facility transfer is that the expertise or resources (eg hospital bed, staff, equipment etc) which are normally available at the referring hospital are insufficient to accommodate the patient at the time the inter hospital transfer is initiated.
- **Discharged** patients from the ICU includes patients that were readmitted but excludes patients who died while in the ICU.
- **Paediatric and neonatal patients** are excluded from this indicator.

### INDICATOR

Cl. 2.1	<b>Numerator</b>	Total number of appropriate patients referred to an intensive care unit, who are not admitted to the unit because of <b>inadequate resources</b> , during the 6 month time period.
	<b>Denominator</b>	Total number of admissions into an intensive care unit plus the non-admissions (that is numerator 2.1), during the 6 month time period.
Cl. 2.2	<b>Numerator</b>	Total number of <b>elective surgical cases deferred or cancelled</b> due to lack of ICU/HDU bed, during the 6 month time period.
	<b>Denominator</b>	Total number of admissions into an intensive care unit plus the non-admissions (that is numerator 2.2), during the 6 month time period.
Cl. 2.3	<b>Numerator</b>	Total number of patients who were <b>transferred to another facility/area/ICU</b> due to unavailability of an ICU bed, during the 6 month time period.
	<b>Denominator</b>	Total number of admissions into an intensive care unit plus the non-admissions (that is numerator 2.3), during the 6 month time period.

**INDICATOR**

<b>CI. 2.4</b>	<b>Numerator</b>	Total number of patients whose <b>discharge</b> from the ICU was <b>delayed more than 12 hours</b> , during the 6 month time period.
<b>CI. 2.5</b>	<b>Numerator</b>	Total number of patients <b>discharged</b> from the ICU <b>between 6pm and 6am</b> , during the 6 month time period.
	<b>Denominator</b>	Total number of patients discharged from the ICU, during the 6 month time period.

\* Please note the denominator is the same for 2.4 – 2.5.

<b>CI. 2.1</b>	<b>Dimension of Quality</b> <b>EQulP 4 Criterion</b>	Accessibility 1.2.2
<b>CI. 2.2</b>	<b>Dimension of Quality</b> <b>EQulP 4 Criterion</b>	Accessibility 1.2.2
<b>CI. 2.3</b>	<b>Dimension of Quality</b> <b>EQulP 4 Criterion</b>	Accessibility 1.2.2
<b>CI. 2.4</b>	<b>Dimension of Quality</b> <b>EQulP 4 Criterion</b>	Accessibility 1.2.2
<b>CI. 2.5</b>	<b>Dimension of Quality</b> <b>EQulP 4 Criterion</b>	Accessibility 1.2.2

## INDICATOR AREA 3: INTENSIVE CARE PATIENT MANAGEMENT

### Indicator Topic

Unplanned readmission into an intensive care unit, up to (and including) 72 hours post discharge from the intensive care unit.

### Rationale

Unplanned re-admission into an intensive care unit may reflect less than optimal management of a patient. It may also reflect premature discharge as a consequence of inadequate resources or reflect the standard of ward care.

### Type of Indicator

This is a comparative rate based indicator addressing the outcome of patient care.

### Definitions of Terms

For the purpose of these indicators:

- **Unplanned readmission** - refers to an:
  - unexpected re-admission for further treatment of the **same condition** for which the patient was previously admitted to the intensive care unit

### Definitions of Terms (continued)

- unexpected re-admission for treatment of a condition **related** to one for which the patient was previously admitted to the intensive care unit
- unexpected admission for a **complication** of the condition for which the patient was previously admitted to the intensive care unit.
- The time frame of **72 hours** is an arbitrary measure, which aims to identify deficiencies in management rather than complications / progression of the disease process. Admissions after this time are more likely to be complications of the disease process.
- **Paediatric and neonatal patients** are excluded from this indicator.

## INDICATOR

<b>CI. 3.1</b>	<b>Numerator</b>	Total number of <b>unplanned re-admissions</b> , as defined above, into an intensive care unit <b>within 72 hours</b> of discharge from an intensive care unit, during the 6 month time period.
	<b>Denominator</b>	Total number of admissions into an intensive care unit, during the 6 month time period.

**CI. 3.1**

**Dimension of Quality**  
**EQUIP 4 Criterion**

Effectiveness, Safety  
1.1.4, 1.4.1

**INDICATOR AREA 4: INTENSIVE CARE PATIENT TREATMENT****Indicator Topic**

Thromboembolism prophylaxis

**Rationale**

Omissions in care occur in the ICU. DVT prophylaxis is one of a number of evidence-based interventions which is universally accepted.

**Type of Indicator**

This is a comparative rate based indicator addressing the process of patient care.

**Definitions of Terms****For the purpose of this indicator:**

- **Thromboembolism prophylaxis** can be considered to be either subcutaneous heparin or sequential calf compressors.

**Definitions of Terms (Continued)**

- **Thromboembolism prophylaxis** is prescribed according to the organisation's local protocol. The protocol should cover indications / contraindications. Patients that are unsuitable for thromboembolism prophylaxis are **excluded** from this indicator.
- Data should be recorded at 24 hours as part of Adult Patient Database (APD) data collection.
- **Paediatric and neonatal patients** are excluded from this indicator.

**INDICATOR**

<b>CI. 4.1</b>	<b><i>Numerator</i></b>	Total number of patients receiving <b>thromboembolism prophylaxis treatment</b> within 24 hours of admission to the ICU, during the 6 month time period.
	<b><i>Denominator</i></b>	Total number of admissions into an intensive care unit, during the 6 month time period.

<b>CI. 4.1</b>	<b><i>Dimension of Quality</i></b> <b><i>EQUIP 4 Criterion</i></b>	Effectiveness, Safety 1.1.4, 1.4.1
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## Intensive Care Indicators Version 3

First Half 2007

Area: 1 Utilisation of Patient Assessment Systems

Topic: Participation in the National Patient Databases and the ANZICS RC for ARCCCR Survey

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1.1 number of adult intensive care submissions to the ANZICS Adult Patient Database with completed information and review of results

Numerator

From:

To:

Total number of adult intensive care submissions to the ANZICS Adult Patient Database with completed information and review of results, during the 6 month time period.

Denominator

The total number of adult admissions into the intensive care unit, during the 6 month time period.


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely

Yes

No

Comments:

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1.2 Have you responded to the most recent ARCCCR Survey?

Question

From:

To:

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In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely

Yes

No

Comments:

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## Intensive Care Indicators Version 3

First Half 2007

Area: 2 Access and exit block to the ICU

Topic: Inability to admit into an intensive care unit

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2.1 Appropriate patients referred to an intensive care unit, who are not admitted to the unit because of inadequate resources

Numerator

From:

To:

The number of appropriate patients referred to the intensive care unit, who are not admitted to the unit because of inadequate resources, during the 6 month time period.

Denominator

The total number of admissions into the intensive care unit plus the non-admissions (as defined in the numerator), during the 6 month time period.


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely

Yes

No

Comments:

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2.2 Elective surgical cases deferred or cancelled due to lack of ICU/HDU bed

Numerator

From:

To:

The number of elective surgical cases deferred or cancelled due to lack of ICU/HDU bed, during the 6 month time period.

Denominator

The total number of admissions into the intensive care unit plus the non-admissions (as defined in the numerator), during the 6 month time period.


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely

Yes

No

Comments:

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## Intensive Care Indicators Version 3

First Half 2007

Area: 2 Access and exit block to the ICU

Topic: Inability to admit into an intensive care unit

2.3 Patients who were transferred to another facility/area/ICU due to unavailability of an ICU bed

Numerator	From:	To:	
The number of patients who were transferred to another facility/area/ICU due to unavailability of an ICU bed, during the 6 month time period.			

Denominator			
The total number of admissions into the intensive care unit plus the non-admissions (as defined in the numerator), during the 6 month time period.			


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely  Yes  No

Comments:

2.4 Patients whose discharge from the ICU was delayed more than 12 hours

Numerator	From:	To:	
The number of patients whose discharge from the ICU was delayed more than 12 hours, during the 6 month time period.			

Denominator			
The total number of patients discharged from the ICU, during the 6 month time period.			


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely  Yes  No

Comments:

## Intensive Care Indicators Version 3

First Half 2007

Area: 2 Access and exit block to the ICU

Topic: Inability to admit into an intensive care unit

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2.5 Patients discharged from the ICU between 6pm and 6am

Numerator

From:

To:

The number of patients discharged from the ICU between 6pm and 6am, during the 6 month time period.

Denominator

The total number of patients discharged from the ICU, during the time period under study, during the 6 month time period.


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely

Yes

No

Comments:

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## Intensive Care Indicators Version 3

First Half 2007

Area: 3 Intensive Care Patient Management

Topic: Unplanned re-admission into an ICU, up to (and including) 72 hours post discharge from the ICU

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3.1 Total number of unplanned re-admissions into an ICU within 72 hours of discharge from an ICU

Numerator

From:

To:

The total number of unplanned re-admissions, as defined in the CI users manual, into the intensive care unit within seventy-two hours of discharge from an intensive care unit, during the 6 month time period.

Denominator

The total number of admissions into the intensive care unit, during the 6 month time period.


In collecting and reporting the data for this indicator the definitions in the Users Manual were followed precisely

Yes

No

Comments:

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## Intensive Care Indicators Version 3

First Half 2007

Area: 4 Intensive Care Patient Treatment

Topic: Thromboembolism prophylaxis

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4.1 Patients receiving thromboembolism prophylaxis treatment within 24 hours of admission to the ICU

Numerator

From:

To:

The total number of patients receiving thromboembolism prophylaxis treatment within 24 hours of admission to the ICU, during the 6 month time period.

Denominator

The total number of admissions into an intensive care unit, during the 6 month time period.


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## APPENDIX 2

### Working Party Membership

#### AUSTRALIAN AND NEW ZEALAND INTENSIVE CARE SOCIETY (ANZICS)

Dr Tony Burrell	Director Intensive Care Coordination and Monitoring Unit (ICCMU) New South Wales
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#### CLINICIANS

Dr Dan Mullany	Intensive Care Unit Prince Charles Hospital Queensland
Dr David Pilcher	The Alfred Victoria
Prof Don Harrison	St Vincents Hospital New South Wales

#### QUALITY MANAGER

Ms Kate Boyle	Accreditation Manager Royal Perth Hospital
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#### AUSTRALIAN PRIVATE HOSPITALS ASSOCIATION

Associate Professor Simon Finfer	Senior Staff Specialist in Intensive Care Royal North Shore Hospital of Sydney New South Wales
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#### CONSUMER / CARER

Ms Janney Wale	Consumers' Health Forum of Australia Australian Capital Territory
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#### NATIONAL CENTRE FOR CLASSIFICATION IN HEALTH (NCCH)

Ms Julie Rust	National Centre for Classification in Health Faculty of Health Sciences University of Sydney New South Wales
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#### THE AUSTRALIAN COUNCIL ON HEALTHCARE STANDARDS

Dr Chris Maxwell	Clinical Director Performance and Outcomes Service New South Wales
Assoc. Prof Bob Gibberd	Director Health Services Research Group University Newcastle New South Wales
Ms Christine Farraway	Team Leader Performance and Outcome Service New South Wales
Ms Nadine Mallock	Project Officer Performance and Outcome Service New South Wales



Australian and New Zealand  
College of Anaesthetists  
ABN 82 055 042 852

# 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 Medicine<sup>1</sup>.
- 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.

<sup>1</sup>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 20m<sup>2</sup> 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 20m<sup>2</sup> 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 CO<sub>2</sub> 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'

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