



AUSTRALIAN AND NEW ZEALAND  
INTENSIVE CARE SOCIETY

# **Review of Intensive Care Resources & Activity 2000 / 2001**

**Therese Anderson & Graeme K Hart**

**ANZICS Research Centre for Critical Care Resources**

*for the*

**ANZICS Database Management Committee**

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Every endeavour is made to represent data and information in this report accurately but data variations are possible due to differences in scope, completeness of data sources and error resolution processes. The ARCCCR is willing to discuss any aspects of the data.

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## Foreword

Once again, Therese Anderson and Graeme Hart have produced a comprehensive and extremely valuable snapshot of intensive care activity in Australasia during 2000/2001. The information was supplied by over 99% of units surveyed — a fantastic result that reflects well on the researchers and the intensive care community who collected and forwarded the data.

There are over 100,000 admissions to Australasian intensive care units each year. We also know that based on current severity of illness scores, hospital survival after ICU is much better than expected with a standardised mortality ratio around 72%.

The workforce data is unique and has been used by Commonwealth and State Government Committees. Most recently, the nursing workforce snapshot provided the only objective data for the Australian Health Workforce Advisory Committee (AHWAC) Critical Care Nursing Workforce Project, the recommendations from which will be published early next year.

Finally, I commend this report to you as a valuable reference of activity and as a resource for use within your individual institutions, and in discussions with Government and Health agencies. I urge every unit to continue to support this important initiative in the future.



John Santamaria

President  
Australian and New Zealand Intensive Care Society

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## Abbreviations

ABS	Australian Bureau of Statistics
ACCCN	Australian College of Critical Care Nurses
ACEM	Australasian College for Emergency Medicine
ACHS	Australian Council on Healthcare Standards
ACT	Australian Capital Territory
ADMC	ANZICS Database Management Committee
AHMAC	Australian Health Ministers' Advisory Council
AHWAC	Australian Health Workforce Advisory Committee
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
AMWAC	Australian Medical Workforce Advisory Committee
ANZCA	Australian and New Zealand College of Anaesthetists
ANZICS	Australian and New Zealand Intensive Care Society
ANZPIC	Australian and New Zealand Paediatric Intensive Care Registry
APACHE	Acute Physiology and Chronic Health Evaluation
ARCCCR	ANZICS Research Centre for Critical Care Resources
ARIA	Accessibility / Remoteness Index of Australia
BiPAP	Bi-Level Positive Airway Pressure
CCU	Coronary Care Unit
CMO	Career Medical Officer
CNE	Clinical Nurse Educator
CPAP	Continuous Positive Airway Pressure
DRG	Diagnosis Related Groups
FICANZCA	Faculty of Intensive Care, Australia and New Zealand College of Anaesthetists
FTE/EFT	Full Time Equivalent
HDU	High Dependency Unit
ICU (s)	Intensive Care Unit
ICU/CCU	Combined Intensive Care and Coronary Care Unit
ICU/CCU/HDU	Combined Intensive Care, Coronary Care and High Dependency Unit
ICU/HDU	Combined Intensive Care and High Dependency Unit

JFICM	Joint Faculty of Intensive Care Medicine
JSAC-IC	Joint Specialist Advisory Committee – Intensive Care
LOS	Length of Stay
MET	Medical Emergency Team
MJCICM	Multidisciplinary Joint Committee of Intensive Care Medicine
MOH	Ministry of Health (New Zealand)
MPM	Mortality Probability Model
n	number
n/a	not applicable / not available
No.	Number
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
NZHIS	New Zealand Health Information Service
NZJSAC-ICM	New Zealand Joint Specialist Advisory Committee – Intensive Care Medicine
PICU	Paediatric Intensive Care Unit
PIM	Paediatric Index of Mortality
PRISM	Paediatric Risk of Mortality Score
QLD	Queensland
RACP	Royal Australasian College of Physicians
RMO	Resident Medical Officer
RN (s)	Registered Nurse (s)
RRMA	Rural, Remote & Metropolitan Areas classification
SA	South Australia
SAPS	Simplified Acute Physiology Score
SOFA	Sequential Organ Failure Assessment
TAS	Tasmania
TISS	Therapeutic Intervention Scoring System
VIC	Victoria
WA	Western Australia

## 1. Overview

The *Review of Intensive Care Resources and Activity 2000/2001* details the distribution and attributes of critical care facilities in Australia and New Zealand for the 2000/2001 financial year. The data in this report is derived from an annual survey (Appendix 2) conducted by the ANZICS Research Centre for Critical Care Resources (ARCCCR).

The focus of the research was on:

- Distribution and characteristics of critical care units.
- Estimation/attributes of intensive care bed stock.
- Intensive care activity (critical care admissions/readmissions).
- Medical and nursing labour force profiles (workforce supply and demand).
- Selected quality characteristics of intensive care.
- Organisational overview.
- Overview of treatment protocols.

The ARCCCR surveyed more than 200 Australasian public and private sector hospitals with critical care complexes. The term 'critical care complex' encompasses all intensive care services at individual hospitals. Prior to the *Review of Intensive Care Activity 1999/2000*<sup>1</sup> published in 2001, each ICU was recorded separately. However in recent years, many ICUs have experienced infrastructure and management changes that have required new reporting methods. As a consequence of these changes the data has now been amalgamated for those sites with multiple ICUs and is represented as a single entity for each hospital in the report.

The ARCCCR was responsible for the tasks of data collection, analysis and reporting. The issues relating to data quality, limitations and missing values are outlined on p8 and should be noted when interpreting the results.

The report has 9 sections. Part 1 gives an overview of the project, the principal focus of the research and summarises the key findings. Part 2 outlines critical care services, the multiple meanings of intensive care and provides a brief history of the ANZICS Research Centre for Critical Care Resources. Part 3 describes the aims of the research and study processes, whilst Part 4 outlines data quality issues. The findings are presented separately for Australia and New Zealand in Parts 5 and 6 and include a discussion of relevant themes arising from the findings. Part 7 is data pertaining to ICUs that participate in the Joint Faculty of Intensive Care Medicine (JFICM) training programs whilst Part 8 concludes the report and Part 9 contains the references. Also included are the five appendices which include a glossary, a list of the hospitals surveyed, a copy of the survey instrument, standards for ICUs and geographic region documentation.

This report is an information resource, to be read, used and discussed by intensive care clinicians, ancillary and administrative staff, public and private sector health care providers, managers and policy makers, and relevant statutory bodies.

## 1.1 Summary of Key Findings

### *Response Rate*

- 99.5% response rate (198 of 199 eligible ICUs)

### *Survey Time Frame*

- 2000/2001 financial year (1 July 1 2000 to 30 June 2001)

### *Number of Hospitals with ICU Complexes*

- 171 hospitals in Australia and 28 hospitals in New Zealand
- Australia: 116 public sector and 55 private sector
- New Zealand: 25 public sector and 3 private sector

### **Australia**

<i>Geographic Location of ICU Complexes</i>		
<ul style="list-style-type: none"> <li>• Capital cities: 63.7% (n=109)</li> <li>• Metropolitan regions: 9.4% (n=16)</li> <li>• Rural regions: 25.7% (n=44)</li> <li>• Remote regions: 1.2% (n=2)</li> </ul>		
<i>ICU Type</i>		
<ul style="list-style-type: none"> <li>• General ICU: 45.6% (n=78)</li> <li>• ICU/CCU: 49.1% (n=84)</li> <li>• PICU: 4.1% (n=7)</li> <li>• Specialty ICU: 1.2% (n=2)</li> </ul>		
<i>ICU Level (self-classified)</i>		
• Level 3: 39.8% (n=68)	Level 2: 39.8% (n=68)	Level 1: 20.5% (n=35)
<i>ICU Beds</i>		
• 2,027 physical beds	1,803 available beds	1,240 ventilator beds
<i>Public Sector</i>		<i>Private Sector</i>
1,482 physical beds	545 physical beds	
1,272 available beds	531 available beds	
879 ventilator beds	361 ventilator beds	
<i>Beds/100,000 Population</i>		
9.25 available beds / 100,000	6.36 ventilator beds / 100,000	
<i>Public Sector</i>		<i>Private Sector</i>
6.52 available beds / 100,000	2.72 available beds / 100,000	
4.51 ventilator beds / 100,000	1.85 ventilator beds / 100,000	

**Australia**

*Medical Labour Force (public sector)*

- 214.0 intensivist FTE } total 241.4 specialist FTE
- 27.4 other specialist FTE }
- 1.09 intensivist FTE / 100,000
- 1.23 specialist FTE / 100,000
- 5.2 available beds / specialist FTE
- 3.6 ventilator beds / specialist FTE

*Nurse Labour Force*

- 5,505.8 RN FTE
- 3.0 RN FTE / available bed
- 4.4 RN FTE / ventilator bed
- 2,594.6 average number of shifts / week worked by casually employed RNs

*Public sector*

4,465.8 RN FTE  
 3.5 RN FTE / available bed  
 5.0 RN FTE / ventilator bed

*Private sector*

1,040.0 RN FTE  
 1.9 RN FTE / available bed  
 2.8 RN FTE / ventilator bed

**New Zealand (Public Sector)**

*ICU Type*

- general ICU: 48.0% (n=12)
- ICU/CCU: 44.0% (n=11)
- PICU: 4.0% (n=1)
- cardiothoracic ICU: 4.0% (n=1)

*ICU Level (self-classified)*

- Level 3: 32% (n=8)                      Level 2: 28% (n=7)                      Level 1: 40% (n=10)

*ICU Beds*

- 256 physical beds                      225 available beds                      167 ventilator beds

*Beds/100,000 Population*

- 6.0 available beds / 100,000                      4.4 ventilator beds / 100,000

*Medical Labour Force*

- 25.8 intensivist FTE } total 40.5 specialist FTE
- 14.7 other specialist FTE }
- 0.69 intensivist FTE / 100,000
- 1.08 specialist FTE / 100,000
- 5.5 available beds / specialist FTE
- 4.1 ventilator beds / specialist FTE

*Nurse Labour Force*

- 705.3 RN FTE
- 3.1 RN FTE / available bed
- 4.2 RN FTE / ventilator bed
- 111.5: average number of shifts / week worked by casually employed RNs

## **Australia**

### *Bed Stock*

- Better differentiation of bed stock
- Increased no. of available beds – ↑ 118 in public sector; ↑ 13 in private sector (since 1999/2000)
- Increased no. of ventilator beds – ↑ 28 in public sector; ↑ 25 in private sector (since 1999/2000)

### *Medical Labour Force*

- Improved data capture
- Increased proportion of intensivist to other specialists: 88.6% in public sector (78.1% in 1999/2000)
- Increased no. of intensivist FTE vacancies: 19.0 FTE (10.5 FTE in 1999/2000)
- Benchmarks - significant FTE Gap in public sector Level 3 ICUs: 105.6 FTE

### *Nursing Labour Force*

- Improved data capture
- Small increase in no. of qualified critical care RNs: 3,557 (3,529 in 1999/2000)
- Increased no. of RN FTE: 5,505.8 (5,382.9 in 1999/2000)
- Increased RN FTE vacancies: 610.1 (484.8 in 1999/2000)
- Increased no. RNs in critical care courses: 669 (621 in 1999/2000)

## **New Zealand (Public Sector)**

### *Bed Stock*

- Better differentiation of bed stock
- Diminished no. of available beds – 225 (228 in 1999/2000)
- Diminished no. of ventilator beds – 167 (173 in 1999/2000)

### *Medical Labour Force*

- Improved data capture
- Diminished no. of intensivist FTE: 25.8 (27.9 FTE in 1999/2000)
- Increased proportion of intensivist to other specialists: 63.7% (58.9% in 1999/2000)
- Diminished no. of intensivist FTE vacancies: 4.6 FTE (7.0 FTE in 1999/2000)
- Benchmarks - significant FTE Gap in Level 3 ICUs: 16.1 FTE

### *Nursing Labour Force*

- Improved data capture
- Diminished no. of qualified critical care RNs: 408 (440 in 1999/2000)
- Increased no. of RN FTE: 705.3 (697.4 in 1999/2000)
- Increased RN FTE vacancies: 43.0 (39.9 in 1999/2000)
- Increased no. RNs in critical care courses: 70 (62 in 1999/2000)

## 2. Introduction

Critical care is a generic term encompassing a diverse range of acute health care services such as adult, paediatric and neonatal intensive care, high dependency, accident and emergency, coronary care, post-anaesthesia care, hyperbaric medicine and retrieval services. Whilst the terms 'critical care' and 'intensive care' are often used interchangeably in acute care contexts, in this report the term 'intensive care' or ICU is generally used and means:

Adult and/or paediatric intensive care services providing observation, care and treatment of patients who are critically ill with single or multiple organ dysfunction, injuries or complications, or who have a potential to develop significant complications of therapy or primary illness.

The care of critically ill patients is a co-operative venture involving the contributions of a broad range of health care professionals. This collaborative effort is reflected in the definition of intensive care medicine advanced by the Multidisciplinary Joint Committee of Intensive Care Medicine (MJCIM):<sup>2</sup>

Intensive Care Medicine (ICM) combines physicians, nurses and allied health professionals in the co-ordinated and collaborative management of patients with life-threatening single or multiple system organ failure, including stabilisation after severe surgical interventions. It is a continuous (i.e. 24 hrs) management including monitoring, diagnostics, support of failing vital functions, as well as the treatment of the underlying diseases.

As stated in the overview on p1, the term critical care complex is used to describe the range of critical care services offered at each hospital. This may be at a single patient care location or at a number of locations within the same hospital. A critical care complex may include general and specialty intensive care units (ICUs), combined intensive care/coronary care units (ICU/CCUs), paediatric intensive care units (PICUs), high dependency unit(s) (HDUs) managed by an ICU, or any combination of these.

To reiterate, in ARCCCR reports published prior to 2000, individual ICUs at each hospital site were recorded separately but now such services at a single hospital location are combined. This has been necessary because of infrastructure and management changes. Thus the actual number of ICUs is greater than the number of hospitals. Recent developments at some hospitals have seen multiple critical care units amalgamated into a single service to form a critical care complex. For example, separate general and cardiothoracic ICUs existed previously at a number of sites but many of these have now been reconfigured into a single patient care location. This trend is most obvious in quaternary or tertiary level ICUs with a significant number having undergone, or in the process of, substantive redevelopment.

It should be remembered that ICUs, however named, refer to critical care services. The abbreviation 'ICU' is used in this report, as it is the term most commonly used and one to which significant meaning is attached. The term CCU is potentially misleading as it may refer to either a critical care unit or a coronary care unit.

The focus of the research project was on the infrastructure and resource dimensions that facilitate intensive care service delivery. Detailed data on paediatric services and activity can be found in the recently released paediatric report.<sup>3</sup>

## 2.1 Overview – ARCCCR

This is the sixth research report on critical care resources by the ANZICS Research Centre for Critical Care Resources (ARCCCR) published under the auspices of the Australian and New Zealand Intensive Care Society (ANZICS), the professional body for Australasian intensive care medicine.

The previous reports, *Review of Intensive Care Activity 1999/2000*<sup>1</sup>, *Influenza Pandemic Planning for Intensive Care*<sup>4</sup>, *ANZICS Intensive Care Survey 1998: An Overview of Australasian Critical Care Resources*<sup>5</sup>, *Descriptive Analysis of Intensive Care Facilities in Australia and New Zealand*<sup>6</sup> and *Descriptive Analysis of Quality Characteristics of Australasian Critical Care Facilities*<sup>7</sup> may be found on the ANZICS website (<http://www.anzics.com.au>).

The ARCCCR, formerly known as the ANZICS ICU Registry, was first established in 1993 by Dr Graeme Hart, who has directed its operation and research activities since this time. The ARCCCR is one of the three affiliated research centres administered by the ANZICS Database Management Committee (ADMC) and is located at ANZICS House in Melbourne. The other two centres are the ANZICS Adult Patient Database (APD), also located at ANZICS House and the Australian and New Zealand Paediatric Intensive Care Registry (ANZPIC), located at the Women's and Children's Hospital in Adelaide. These three entities are managed by their respective directors and administered by the ADMC, which in turn operates under the guidance of the ANZICS Board of Directors.

The research activities undertaken by the ARCCCR, together with the activities of the APD, ANZPIC and ADMC are funded bi-nationally by the Ministry of Health in New Zealand and the Commonwealth Department of Health and Ageing through the Australian Health Ministers Advisory Council (AHMAC), via State and Territory health care services. Current funding is via a triennial agreement, however recurrent funding would enable the ADMC to implement the full range of proposed research activities for adult and paediatric critical care services.

As a result of its research activities the ARCCCR holds a significant collection of data on intensive care resources. This research is quality-oriented and is directed toward intensive care infrastructure, workforce profiles and processes of care. The annual surveys completed by ICU staff assist in monitoring trends in intensive care service delivery.

Reference to contemporary and historical records, previous ICU reports<sup>1,4-8</sup>, health care literature and other materials held by the ARCCCR, has facilitated the writing of this report.

### 3. About the Project

This research builds on previous studies conducted by the ARCCCR, and similarly to those earlier reports, captures the distribution and utilisation of critical care resources and medical and nursing labour force supply in acute healthcare facilities in Australia and New Zealand.

The research findings are primarily quantitative and rely on descriptive analytical approaches. The dataset was derived from numerical responses, tick box items and written comments on the survey instrument and telephone follow up (see Appendix 2). Data analyses were conducted using *Statistical Products Services and Solutions (SPSS) Base 10.0* and *Microsoft Excel (XP Professional)* software applications.

#### 3.1 Aims of the Project

The specific aim of the project was to investigate and report the distribution and availability of Australasian critical care resources for the 2000/2001 financial year.

This was achieved through:

- Identifying the geographic location and number of ICUs.
- Charting the type and size of ICUs.
- Mapping the ICU level (based on FICANZCA criteria).
- Estimating physical, available and ventilator intensive care beds.
- Estimating the proportion of high dependency and coronary care beds.
- Enumerating admissions, readmissions bed days/hours and ventilator hours/days.
- Assessing medical and nursing labour force provision by estimation of FTE.
- Mapping organisational and reporting structures.
- Obtaining an overview of quality and audit processes
- Eliciting types of clinical guidelines and protocols utilised.

#### 3.2 Survey Instrument / Project Time Frame

The survey instrument was compiled by the authors and reviewed by members of the ANZICS Database Management Committee (ADMC). Following minor modifications it was piloted and small amendments were made. A copy of the survey instrument is included as Appendix 2.

The survey instrument comprised six pages printed double-sided on one single sheet of A3 paper and one single sheet of A4 paper. Accompanying the survey was an explanatory letter to a named ICU director, a glossary of key terms and an extract on ICU levels from the Faculty of Intensive Care, Australia and New Zealand College of Anaesthetists (FICANZCA), and now known as the Joint Faculty of Intensive Care Medicine (JFICM)<sup>9</sup> together with a pre-printed envelope (pre-stamped for Australian ICUs). This was mailed to 175 Australian and 29 New Zealand acute care hospitals in mid-February 2002 for return by 29th March, 2002. However not all of these hospitals had ICUs suitable for inclusion in the final dataset.

The follow up period extended from 1<sup>st</sup> April to late July 2002. Follow up to non-responders was by letter, telephone, facsimile and e-mail. A large number of survey instruments were redistributed during the follow up processes.

Data coding, entry, analyses and generation of research reports were undertaken by the research manager.

## 4. Data Quality and Limitations

The survey was reliant on self-reporting processes. It was hoped that the inclusion of a glossary and an extract of the FICANZCA minimum standards for intensive care units (see Appendix 3) would assist respondents with understanding key terms and provide the requisite framework for determining ICU levels.

A response to the survey did not guarantee useable data and data quality was variable. The submission of incomplete survey instruments required extensive follow up to retrieve missing items. Clarification of inconsistent or unusual responses was also required in many instances.

The willingness of ICU clinicians to be involved in the survey processes and to provide data is greatly appreciated. A number of ICUs were unable to provide core information such as patient admission information and medical and nursing FTE profiles. Where this is the case, the number of actual and potential responses is indicated in the relevant table under the heading 'number of ICUs'. There are many reasons why data is unable to be provided or retrieved at a given point in time. Such reasons include the failure of health information systems, absence or change of key personnel, alteration to hospital status or a downgrading of services. It is surprising that a significant number of ICUs were unable to report on Key Performance Indicators such as readmissions, bed hours/days, the number of patients ventilated and ventilation hours/days.

When reporting the findings, the ARCCCR takes great care to avoid identifying individual units. Therefore data has been amalgamated for some regions to prevent potential disclosure of individual ICUs. However, the Northern Territory with only two ICUs presents a unique situation and permission was obtained to present certain data in selected tables that potentially identifies the two sites.

Data definitions continue to be refined and updated and the ARCCCR endeavours to follow definitions (where applicable) listed in the *National Health Data Dictionary*.<sup>10</sup>

For inclusion in this survey, a critical care unit must possess ventilator capability and have the resources to provide continuous care. This is further discussed in relation to ICU levels.

Presentation of much of the data is by way of tables and graphs. Explanatory notes are provided where required and data obtained from external sources is acknowledged. Separate sections are devoted to data exposition for Australia, New Zealand and the Joint Faculty of Intensive Care Medicine.

## 5. Findings: Australia

Section 5 details the survey findings for intensive care services in Australian States and Territories.

170 of the eligible 171 ICUs (116 public and 55 private) listed on the ARCCCR database responded to the survey, a 99.4% response rate. Five additional ICUs were targeted but were not included in this report. Two of these ICUs had closed (one public and one private sector) and data could not be retrieved. Two ICUs had changed status from ICU to high dependency units (HDUs). Additionally, one ICU was a new unit which had opened at the beginning of the next survey period (2001/2002).

Whilst three ICUs did not submit completed survey forms to the ARCCCR, relevant data was obtained through telephone interviews with the director and/or other key staff members. Several sites had implemented work bans on clerical duties at the time of the survey and were in negotiation with health care management to obtain basic administrative services. The previous report highlighted the lack of resources for administrative support and intensive care data collection.<sup>1</sup>

The survey form was completed by:

- 37.4% - medical and nursing staff
- 24.6% - director of ICU
- 21.1% - nursing staff
- 10.5% - medical, nursing and administrative staff
- 2.9% - medical staff
- 2.4% - other / not specified
- 1.2% - administrative staff

## 5.1 Geographic Location of Critical Care Complexes

The geographic locations of ICUs by the *Rural Remote and Metropolitan Areas* classification (RRMA) are illustrated in Figures 1 and 2 (refer Appendix 4 for modified RRMA classification).<sup>11</sup> RRMA population data cited in Figures 1 and 2 was derived from 2001 census data.

Figure 1: ICU Location, Public Sector by RRMA

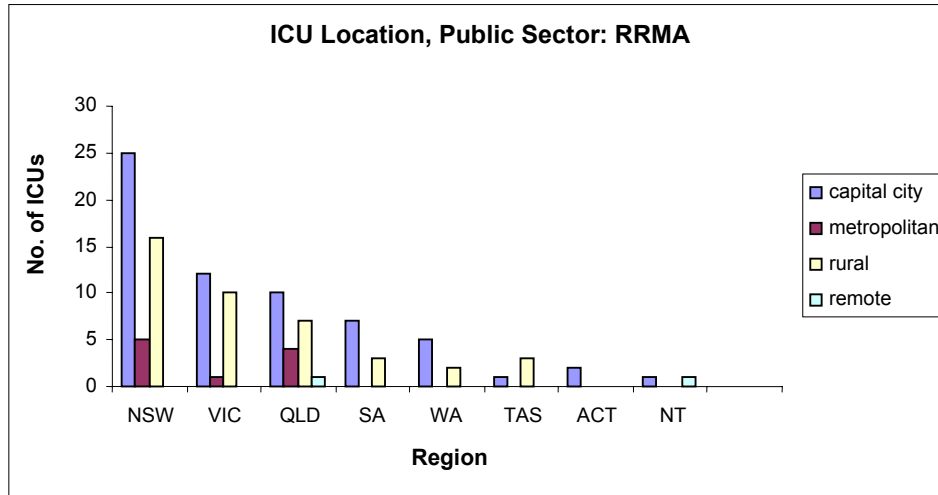
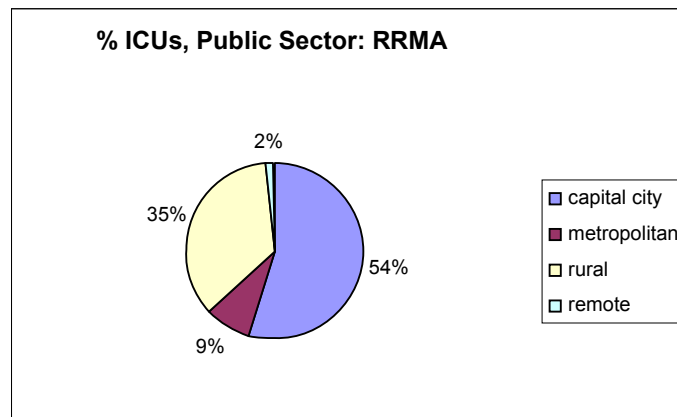


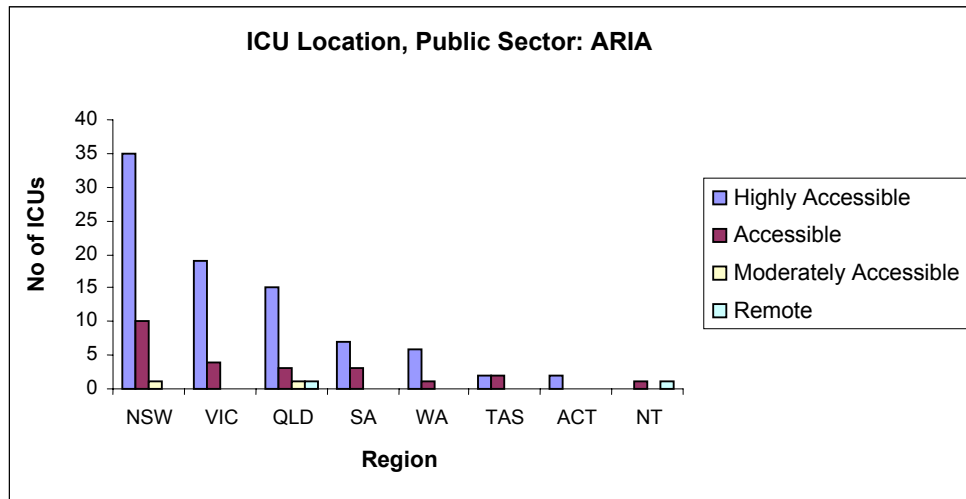
Figure 2: Proportion of Public Sector ICUs by RRMA Location



Private sector ICUs are located predominantly in capital cities (83.6%, n = 46), with 10.9% (n = 6) in metropolitan areas and 5.5% (n = 3) in rural areas.

However the concept of remoteness is not precise and new approaches to determining accessibility have been proposed. Remoteness values are based on road distances to service centres in the *Accessibility/Remoteness Index of Australia* (ARIA).<sup>12</sup> Figure 3 shows the location of public sector ICUs by ARIA classification.

Figure 3: ICU Location, Public Sector by ARIA Classification



**ARIA Categories:**

- **Highly Accessible** (ARIA score 0-1.84) – relatively unrestricted accessibility to a wide range of goods and services and opportunities for social interaction
- **Accessible** (ARIA score > 1.84-3.51) – some restrictions to accessibility of some goods and services and opportunities for social interaction
- **Moderately Accessible** (ARIA score > 3.51-5.80) – significantly restricted accessibility of goods, services and opportunities for social interaction
- **Remote** (ARIA score > 5.80-9.08) – very restricted accessibility of goods, services and opportunities for social interaction
- **Very Remote** (ARIA score > 9.08-12) – very little accessibility of goods, services and opportunities for social interaction.

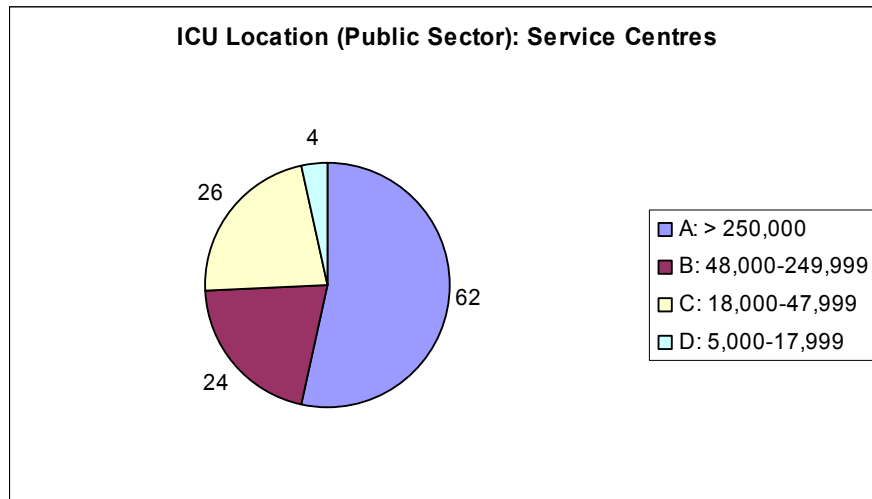
Compared to RRMA classifications, ARIA is flexible, conceptually simple, more precise and stable over time.<sup>12</sup>

Population size provides another method for locating ICUs. A population > 5,000 constitutes a service centre.<sup>12</sup> This classification is known as ARIA+ which is based on road distance to service centres.<sup>12</sup>

**ARIA+ Categories:**

- **A:** > 250,000 persons
- **B:** 48,000 to 249,999 persons
- **C:** 18,000 to 47,999 persons
- **D:** 5,000 to 17,999 persons
- **E:** 1,000 to 4,999 persons

Figure 4: ICU Location, Public Sector by Population Category



Population figures in Figure 4 are based on 2001 census data (categories have been updated by the ARCCCR).

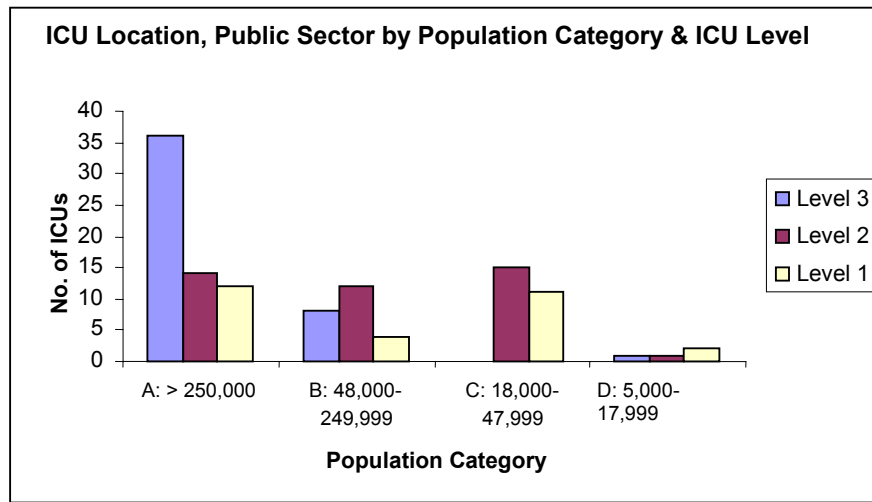
The Australian Medical Workforce Advisory Committee (AMWAC) has outlined the requirements for sustainable medical services and a synopsis is included here.<sup>13</sup> Health service planning is usually based on the characteristics and size of the population. Historically, the demand for medical services has utilised the size of the population catchment as a benchmark. Sufficient current demand and future demand are required to establish and maintain a service. Demand is centred on the age of the population, disease/condition prevalence, patient attitudes and expectations and socio-economic status. Other factors include the proximity to regional/urban centres, transport systems, referral patterns, co-payments, other resident/visiting service providers and infrastructure and support services. Supply is focused on the provision of an adequate workforce and the availability of retrieval services and private health care facilities. A degree of flexibility is required when interpreting population catchment requirements for specialist services because of the supply and demand complexities.<sup>13</sup>

Specialist medical colleges have defined population catchment requirements for a viable resident service and for intensive care this was a population  $\geq 80,000$ . ANZICS considered a sustainable resident intensive care service required a population base of at least 100,000 with increased population requirements for cardiothoracic, neurosurgical, vascular services. Other factors that impact on service provision included the availability of renal, oncology, transplantation and trauma services.<sup>13</sup>

ANZICS has previously stated that outreach services in intensive care for rural communities were best provided to rural areas by retrieval following resuscitation and stabilisation with transfer to an ICU.<sup>13</sup>

Figure 4 indicates that 30 ICUs (25.8%) were located in centres with a population of < 48,000. However the population catchment for these ICUs could not be clearly defined from the data and it is intended to identify these in the next survey. Figure 5 shows the distribution of ICUs by ICU level and population category.

Figure 5: ICU Location, Public Sector by Population Category & ICU Level



## 5.2 Distribution of ICU Services

Figures 6 and 7 show the location of available ICU beds in public and private hospitals. In both sectors the majority of available ICU beds are located in hospitals with a bed range between 101 to 200 beds. An available bed is a bed in use or immediately available for use by an admitted patient as required. In ICU an available bed refers to one which has advanced life support capability and which is fully staffed and funded.

Figure 6: Available ICU Beds by Hospital Size, Public Sector

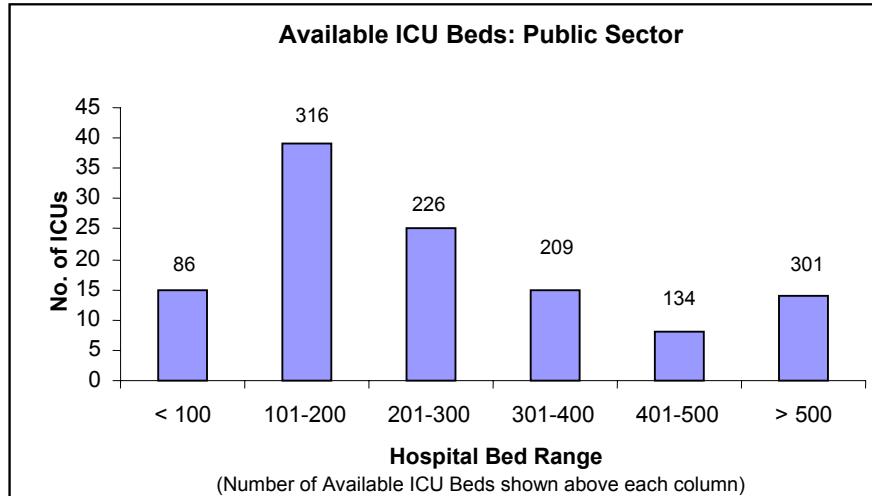


Figure 7: Available ICU Beds by Hospital Size, Private Sector

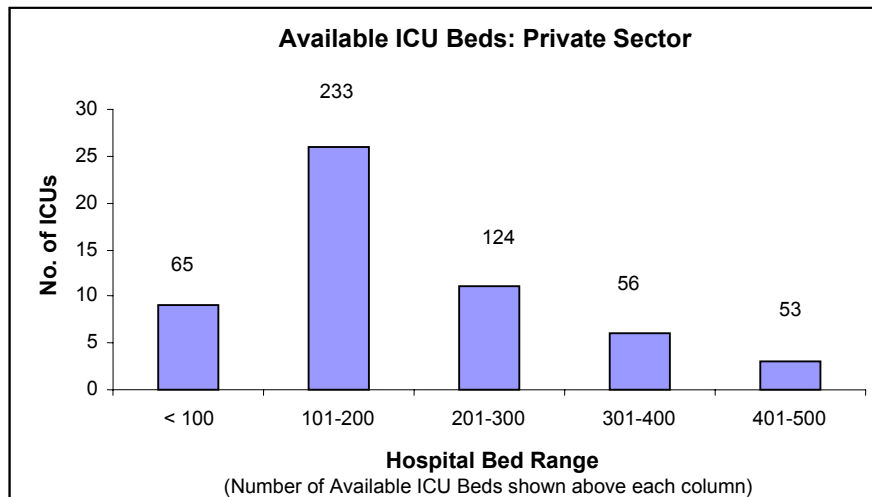


Table 1: Number of Hospitals, Public Sector

Region	No. of Hospitals with ICUs	No. of Public Acute Hospitals*	% of Public Acute Hospitals with ICUs
NSW	46	210	21.90
VIC	23	144	15.97
QLD	22	177	12.42
SA	10	79	12.65
WA	7	88	7.95
TAS	4	20	20.00
ACT	2	3	66.66
NT	2	5	40.00
<b>Australia</b>	<b>116</b>	<b>726</b>	<b>15.97</b>

\* Source: AIHW- Australian Hospital Statistics 2000-01<sup>14</sup>

Table 2: AIHW / ARCCCR Comparative Data, Public Sector 2000 / 2001

Region	Available ICU Beds	Available Public Acute Hospital Beds*	Available ICU Beds as % Hospital Beds
NSW	525	16,488	3.18
VIC	245	12,137	2.01
QLD	198	9,418	2.10
SA	145	4,600	3.15
WA	89	5,163	1.72
TAS	39	1,063	3.66
ACT	18	684	2.63
NT	13	560	2.32
<b>Australia</b>	<b>1,272</b>	<b>50,113</b>	<b>2.53</b>

\* Source: AIHW - Australian Hospital Statistics 2000-01<sup>14</sup>

Table 3: Available & Ventilator Beds as Proportion of Hospital Beds, Public Sector

Region	No. of Hospitals with ICUs	No. of Beds for Hospitals with ICUs	Available ICU Beds	Available ICU Beds as % Hospital Beds	Ventilator Beds	Ventilator Beds as % Hospital Beds
NSW	46	12,023	525	4.36	307	2.55
VIC	23	6,037	245	4.05	197	3.26
QLD	22	5,486	198	3.60	161	2.93
SA	10	2,664	145	5.44	96	3.60
WA	7	2,551	89	3.48	73	2.86
TAS	4	1,018	39	3.83	22	2.16
ACT	2	749	18	2.40	12	1.60
NT	2	461	13	2.81	11	2.38
<b>Australia</b>	<b>116</b>	<b>30,989</b>	<b>1,272</b>	<b>4.10</b>	<b>879</b>	<b>2.83</b>

Table 4: Available & Ventilator Beds as Proportion of Hospital Beds, Private Sector

Region	No. of Hospitals with ICUs	No. of Beds for Hospitals with ICUs	Available ICU Beds	Available ICU Beds as % Hospital Beds	Ventilator Beds	Available ICU Beds as % Hospital Beds
NSW	17	2,567	149	5.80	107	4.16
VIC	13	2,723	117	4.29	86	3.15
QLD	11	2,560	131	5.11	87	3.39
SA	7	1,047	69	6.59	51	4.87
WA	4	1,200	36	2.99	22	1.83
TAS	1	320	11	3.43	3	0.93
ACT	2	270	18	6.66	5	1.85
<b>Australia</b>	<b>55</b>	<b>10,687</b>	<b>531</b>	<b>4.96</b>	<b>361</b>	<b>3.37</b>

Table 5: Available ICU Beds as Proportion of Reported Hospital Beds, Private Sector

Region	No. of Acute Hospitals**a	No. of Hospitals with ICUs	Available ICU Beds	No. of Beds for Hospitals with ICUs*	Available ICU Beds as % Hospital Beds
NSW/ACT	81	19	167	6,393	2.61
VIC	80	13	117	5,937	1.97
QLD	50	11	131	5,302	2.47
SA/NT <sup>a</sup>	31	7	69	2,133 <sup>b</sup>	3.23
WA	25	4	36	2,805 <sup>b</sup>	1.28
TAS	8	1	11	831 <sup>b</sup>	1.32
<b>Australia</b>	<b>274</b>	<b>55</b>	<b>531</b>	<b>23,096<sup>c</sup></b>	<b>2.29</b>

\* Source: ABS *Private Hospitals Australia 2000-2001*<sup>15</sup>

a – No private ICU beds in NT (one private hospital located in Darwin)

b – Includes psychiatric beds

c – Acute hospital beds (excludes psychiatric beds)

There are some differences between the number of hospitals with intensive care services reported by the Australian Bureau of Statistics (ABS) and the ARCCCR. This may be due to differences in the interpretation of what constitutes an ICU or the inclusion / exclusion of particular ICUs. Privately administered health care facilities (n = 6) that offer public services and operate ICUs for public sector patients are included in public sector data by the ARCCCR. A small number of public sector ICUs have a number of private sector beds incorporated within a single unit. The differences between the ABS and ARCCCR data are illustrated in Table 5.

Table 6: Selected Specialised Units, Public Sector

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	<b>Australia</b>
ARCCCR <sup>a</sup>	46	23	22	10	7	4	2	2	<b>116</b>
Separate ICU* (Level III)	39	21	12	5	5	3	1	2	<b>88</b>
Cardiac Surgery Unit*	11	9	4	4	2	1	1	0	<b>32</b>
Coronary Care Unit	49	30	23	11	5	3	2	2	<b>125</b>
Neurosurgical Unit*	11	10	6	4	3	1	1	0	<b>36</b>
Transplant Unit* <sup>b</sup>	22	19	10	5	6	1	1	0	<b>64</b>

\* Source: AIHW *Australian Hospital Statistics 2000-01*<sup>14</sup>

a – Total number of ICUs (General ICU; ICU/CCU; Specialty ICUs)

b – All Transplant Units – includes bone marrow, heart (heart/lung), liver, pancreas, renal

The definition of a Level III ICU is not clear from data reported by the AIHW.

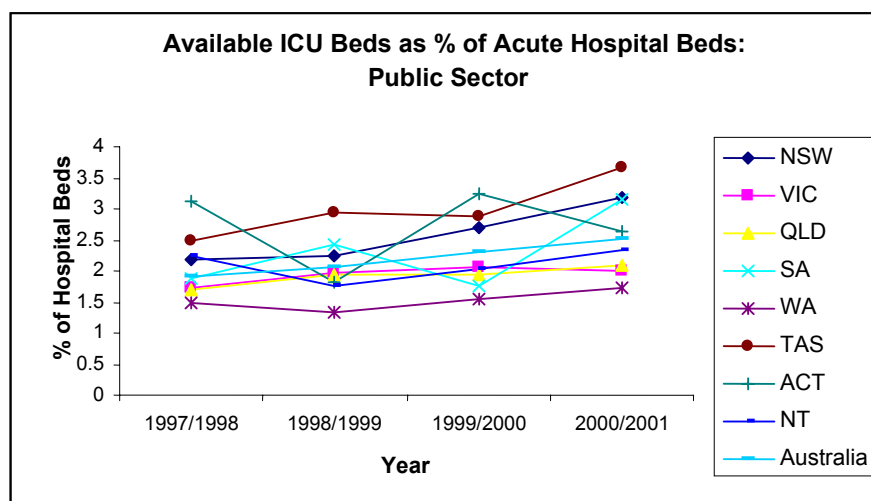
Table 7: Selected Specialised Units, Private Sector

	NSW / ACT	VIC	QLD	SA / NT	WA	TAS	Australia
ARCCCR <sup>a</sup>	19	13	11	7	4	1	<b>55</b>
Separate ICU*	13	7	10	6	2	-	<b>38</b>
Combined ICU / CCU*	11	7	7	1	3	2	<b>31</b>
HDU*	15	25	8	9	2	5	<b>64</b>
Cardiac Surgery Unit*	6	9	6	2	1	-	<b>24</b>
Coronary Care Unit	10	6	5	3	2	1	<b>27</b>
Neurosurgical Unit*	1	5	3	-	1	1	<b>11</b>
Transplant Unit*	-	-	1	-	-	-	<b>1</b>

\* Source: ABS *Private Hospitals Australia 2000-2001*<sup>15</sup>

a – Total number of ICUs (General ICU; ICU/CCU; Specialty ICUs)

Figure 8: Available ICU Beds as Proportion of Acute Hospital Beds, Public Sector



Source: AIHW - *Australian Hospital Statistics 2000-01; 1999-00; 1998-99; 1997-98*<sup>14,16-18</sup>

- ARCCCR data for 1998 was for a calendar year.
- An anomaly in data capture processes for the ACT (1998/99) is evident.
- There is a marked rise in ICU beds in SA due to the inclusion of HDU beds from 2 sites in 2000/01.

Figure 8 shows the distribution of available ICU beds as a proportion of acute hospital beds in the public sector over time.

## Public Hospital Peer Groups

The Australian Institute of Health and Welfare (AIHW), together with the National Health Ministers' Benchmark Working Group and the National Health Performance Committee has developed a national public hospital peer group classification system for use in relation to casemix-adjusted separation data to enable meaningful comparison. The hospitals, which are grouped in terms of admitted patient activities and geographical location, have names assigned that reflect the types of hospitals in each category. Such classifications however, are not mutually exclusive.

The categories are reproduced in Table 8.

Table 8: Public Hospital Peer Group Classification\*

Peer Group	Sub-Group	Definition
Principal referral & specialist women's & children's	Principal referral	Metropolitan hospitals with >20,000 acute casemix-adjusted separations & rural hospitals with >16,000 acute casemix-adjusted separations per annum.
	Specialist women's & children's	Specialised acute women's & children's hospitals with >10,000 acute casemix-adjusted separations per annum.
Large hospitals	Metropolitan	Metropolitan acute hospitals treating >10,000 acute casemix-adjusted separations per annum.
	Rural & remote	Rural acute hospitals treating >8,000 acute casemix-adjusted separations per annum, & remote hospitals with >5,000 acute casemix-weighted separations.
Medium hospitals	Group 1	Acute hospitals in metropolitan areas treating between 5,000 & 10,000 acute casemix-adjusted separations per annum, & in rural areas treating between 5,000 & 8,000 acute casemix-adjusted separations per annum.
	Group 2	Acute hospitals in rural & metropolitan areas treating between 2,000 & 5,000 acute casemix-adjusted separations per annum, & acute hospitals treating < 2,000 casemix-adjusted separations per annum but with >2,000 separations per annum.
Small acute hospitals	Rural	Small rural acute hospitals (mainly small country town Hospitals), acute hospitals treating <2,000 separations per annum, & with < 40% non-acute & outlier patient days of total patient days.
	Remote	Small remote hospitals (<5,000 acute casemix-weighted separations but not 'MPS' and not 'community non-acute'). Most are <2,000 separations

Source: AIHW - *Australian Hospital Statistics 2000-01*<sup>14</sup>

Additionally there are categories for sub-acute and non-acute hospitals. Almost all hospitals with ICUs were located in principal referral or large hospital categories.

There is recognition that the peer group classification may be useful in presenting other types of statistical information. For example, in the round 5 cost report (2000-2001), there was comparison of critical care average cost buckets to national cost buckets and this is shown in Table 9. Information was not available for all States and Territories at the time of writing this report. It should also be noted that these figures have not been adjusted for acuity and severity.<sup>19</sup>

Table 9: Comparison for Critical Care Average & National Cost Buckets

Region	Average cost per separation (\$)	Regional % of Total Cost	National (\$)	% Regional to National
NSW	228	8.3	202	112.9
VIC	214	8.0	202	105.9
QLD	186	7.1	202	92.1
WA	174	6.17	202	86.14
TAS	235	7.5	202	116.3

Source: National Hospital Cost Data Collection *Cost Report Round 5, 2000-2001*<sup>19</sup>

- Averaged over all acute separations, not just ICU separations

Table 9 is included for interest but we have not yet had the opportunity to examine the modelling and data reporting mechanisms which are known to vary across jurisdictions. Costs appear to be under represented.

Comparisons across jurisdictions are problematic due to the differences in funding models and data reporting processes. There are many factors that contribute to the distortion of costs resulting in higher or lower than expected costs. Mapping of ancillary costs associated with diagnostics and pharmacy are reflected in higher costs for critical care in comparison with other cost buckets.<sup>19</sup> Reference to the cost report is advised to ensure adequate understanding of the methodology and limitations pertaining to cost differentials for each region. This data is presented as an example of the type of information that is potentially useful to assist clinicians and administrators in gaining a better understanding of critical care services.

Summary results were given for the four highest critical care cost bucket AR-DRGs in the private sector for rounds 4 and 5 and two of these are reproduced in Table 10.<sup>19</sup>

Table 10: Comparison of 2 Highest Cost Critical Care Bucket AR-DRGs, AR-DRG4.1, Private Sector, Round 4 & Round 5

AR-DRG	Description	Total Average Cost per AR-DRG Round 4 (\$)	Total Average Cost per AR-DRG Round 5 (\$)	Average Component Cost for Critical Care Round 4 (\$)	Average Component Cost for Critical Care Round 5 (\$)
AO6Z	Tracheostomy Any Age Any Cond	38,035	54,435	21,973	33,096
E40Z	Resp Sys Dx + Ventilator Suppt	15,228	15,809	10,437	10,692

Source: National Hospital Cost Data Collection *Cost Report Round 5, 2000-2001*<sup>19</sup>

### 5.3 Distribution of ICU Beds

Intensive care beds are categorised as physical, available or ventilator and are defined as:

**Physical Bed:** A single patient care location fully configured to ICU standards, it is an actual bed (or bed equivalent), not a bed space.

**Available Bed:** Bed in use or immediately available for use by admitted patients as required. In ICU this refers to a bed with advanced life support capability that is fully staffed and funded.

**Ventilator Bed:** A physical ICU bed plus ventilator.

Table 11: ICU Bed Distribution Public & Private Sectors

Sector	Bed Category	Region / Number of ICUs & Beds							
		NSW n = 46	VIC n = 23	QLD n = 22	SA n = 10	WA n = 7	TAS n = 4	ACT n = 2	NT n = 2
Public	Physical Beds	620	289	241	147	97	41	34	13
	Available Beds	525	245	198	145	89	39	18	13
	Ventilator Beds	307	197	161	96	73	22	12	11
	Sub-total	Physical Beds: 1,482 Available Beds: 1,272 Ventilator Beds: 879							
Private		NSW N = 17	VIC n = 13	QLD n = 11	SA n = 7	WA n = 4	TAS n = 1	ACT n = 2	NT n = 0
	Physical Beds	151	120	131	72	36	17	18	-
	Available Beds	149	117	131	69	36	11	18	-
	Ventilator Beds	107	86	87	51	22	3	5	-
	Sub-total	Physical Beds: 545 Available Beds: 531 Ventilator Beds: 361							
<b>Australia</b>		<b>Physical Beds: 2,027</b> <b>Available Beds: 1,803</b> <b>Ventilator Beds: 1,240</b>							

- Includes a number of CCU, HDU and specialist beds managed by ICU
- Includes PICU beds: 110 physical beds; 73 available beds; 84 ventilator beds.
- No private sector ICU beds in NT

Table 12: Distribution of Public Sector Beds, Adult ICUs

Bed Category	Region / Number of ICUs & Beds							
	NSW n = 44	VIC n = 22	QLD n = 20	SA n = 9	WA n = 6	TAS n = 4	ACT n = 2	NT n = 2
Physical Beds	576	265	225	131	87	41	34	13
Available Beds	503	227	185	131	83	39	18	13
Ventilator Beds	285	173	145	84	63	22	12	11
<b>Total</b>	<b>Physical Beds: 1,372</b> <b>Available Beds: 1,199</b> <b>Ventilator Beds: 795</b>							

*Public Sector*

- Available Beds – 85.8% of physical beds
- Ventilator Beds – 59.3% of physical beds
- Ventilator Beds - 69.1% of available beds

*Public Sector (PICUs excluded)*

- Available Beds – 87.3% of physical beds
- Ventilator Beds – 57.9% of physical beds
- Ventilator Beds - 66.3% of available beds

*Public Sector - PICUs (a number of PICUs 'flex up' to meet service demands)*

- Available Beds – 66.3% of physical beds
- Ventilator Beds – 76.3% of physical beds
- Ventilator Beds - 115.0% of available beds

*Private Sector*

- Available Beds – 97.4% of physical beds
- Ventilator Beds – 66.2% of physical beds
- Ventilator Beds - 67.9% of available beds

*Public and Private Sectors*

- Available Beds – 88.9% physical beds
- Ventilator Beds – 61.1% of physical beds
- Ventilator Beds - 68.7% of available beds

Table 13: Minimum, Maximum, Mean & Median No. of Available & Ventilator Beds

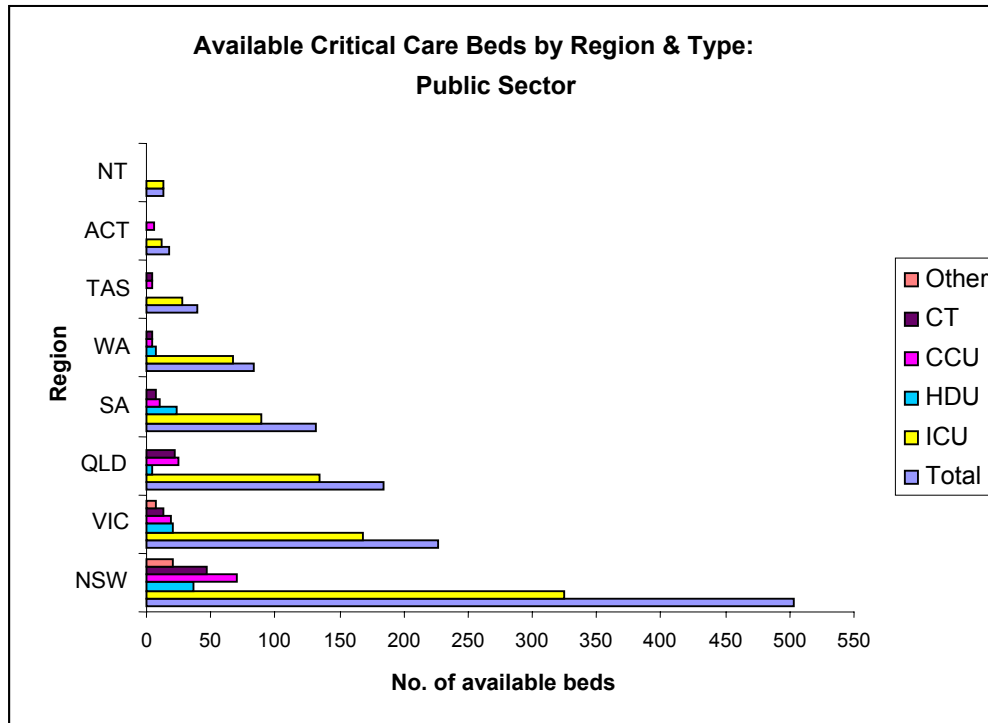
	Region	Available Beds				Ventilator Beds			
		Minimum	Maximum	Mean	Median	Minimum	Maximum	Mean	Median
<b>Public</b>	NSW	4	33	11.4	10.0	1	22	6.6	4.0
	VIC	4	33	10.6	8.0	1	27	8.5	6.0
	QLD	4	23	9.0	7.0	1	23	7.3	5.5
	SA	5	35	14.5	11.0	1	27	9.6	5.5
	WA	5	30	12.7	10.0	1	24	10.4	10.0
	TAS	4	16	9.7	9.5	2	11	5.5	4.5
	ACT <sup>a</sup>	8	10	9.0	9.0	2	10	6.0	6.0
	NT <sup>b</sup>	5	8	6.5	6.5	3	8	5.5	5.5
	<i>Sub-total</i>	4	35	10.9	8.5	1	27	7.5	5.0
<b>Private</b>	NSW	4	17	8.7	8.0	2	12	6.2	6.0
	VIC	5	15	9.0	8.0	2	15	6.6	6.0
	QLD	7	25	11.9	10.0	2	17	7.9	6.0
	SA	6	14	9.8	10.0	1	14	7.2	7.0
	WA	5	12	9.0	9.5	3	10	5.5	4.5
	ACT <sup>a</sup>	6	12	9.0	9.0	2	3	2.5	2.5
		<i>Sub-total</i>	4	25	9.6	10.0	1	17	6.5
<b>Australia</b>		<b>4</b>	<b>35</b>	<b>10.5</b>	<b>9.0</b>	<b>1</b>	<b>27</b>	<b>7.2</b>	<b>5.0</b>

a – ACT two public sector and two private sector ICUs only

b – NT – two public sector ICUs only

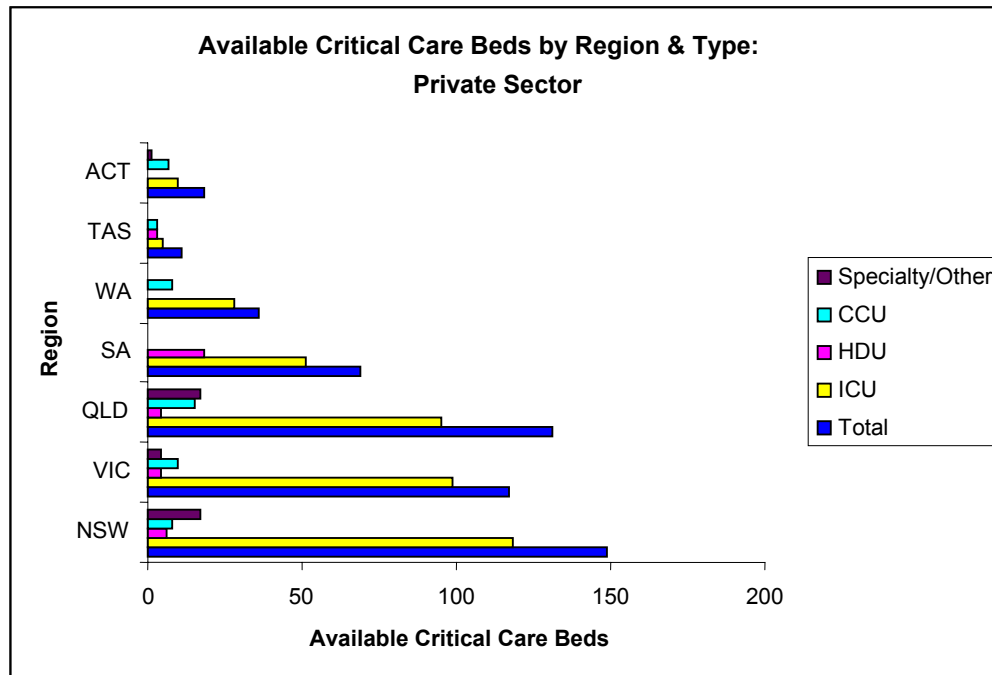
- Tasmania private sector – data not available as single site

Figure 9: Available Critical Care Beds by Region and Type, Public Sector



- 32 of the 61 ICU/CCUs (52.4%) were unable to differentiate bed types – all undifferentiated beds were included in the ICU bed category.

Figure 10: Available Critical Care Beds by Region and Type, Private Sector



- 9 of the 23 ICU/CCUs (39.1%) were unable to differentiate bed types – all undifferentiated beds were included in the ICU bed category.

Table 14: Interchangeable Beds

Sector	Region	General ICU <sup>a</sup>			ICU/CCU <sup>b</sup>		
		Available Beds	No. Interchangeable	% Interchangeable	Available Beds	No. Interchangeable	% Interchangeable
Public	NSW	256	117	45.7	247	161	65.1
	VIC	150	100	66.6	77	63	81.8
	QLD	124	30	24.1	61	33	54.0
	SA	83	0	0	48	39	81.2
	WA	60	0	0	23	18	78.2
	TAS	16	4	25.0	23	19	82.6
	ACT	10	0	0	8	8	100.0
	NT	8	0	0	5	5	100.0
	<i>Sub-Total</i>	<i>707</i>	<i>251</i>	<i>35.5</i>	<i>492</i>	<i>346</i>	<i>70.3</i>
Private	NSW	68	35	51.4	69	67	97.1
	VIC	74	25	33.7	43	36	83.7
	QLD	72	33	45.8	59	50	84.7
	SA	55	20	36.3	14	14	100.0
	WA	15	0	0	21	21	100.0
	TAS	0	0	0	11	11	100.0
	ACT	6	6	100.0	12	7	58.3
		<i>Sub-total</i>	<i>290</i>	<i>119</i>	<i>41.0</i>	<i>229</i>	<i>206</i>
<b>Australia</b>		<b>997</b>	<b>370</b>	<b>37.1</b>	<b>721</b>	<b>552</b>	<b>76.5</b>

a – ICU/HDU Interchangeable Beds

b – ICU/CCU/HDU Interchangeable Beds

Table 15: Proportion of Available & Ventilator Beds by Region, Public Sector

Region	Available Beds as % Physical Beds			Ventilator Beds as % Available Beds		
	Level 3	Level 2	Level 1	Level 3	Level 2	Level 1
NSW	77.1	89.8	95.2	81.8	44.3	32.1
VIC	85.3	82.7	100	95.7	51.9	20.0
QLD	84.4	77.1	86.2	> 100	59.3	52.0
SA	97.9	100	100	79.3	38.8	39.9
WA	89.1	100	100	96.9	50.0	30.7
TAS	93.1	100	0	62.9	38.4	0
ACT	45.4	0	66.6	100	0	25.0
NT	100	100	0	100	60.0	0
<b>Australia</b>	<b>83.3</b>	<b>86.5</b>	<b>93.6</b>	<b>88.6</b>	<b>49.0</b>	<b>34.8</b>

Table 16: Proportion of Available & Ventilator Beds by Region, Private Sector

Region	Available Beds as % Physical Beds			Ventilator Beds as % Available Beds		
	Level 3	Level 2	Level 1	Level 3	Level 2	Level 1
NSW	100	89.8	95.2	81.1	44.3	32.1
VIC	94.7	100	100	100	54.9	33.3
QLD	100	100	100	70.4	63.8	28.5
SA	100	90.3	100	87.8	74.9	12.5
WA	100	100	0	100	46.1	0
TAS	0	64.7	0	0	27.2	0
ACT	0	100	0	0	27.7	0
<b>Australia</b>	<b>98.9</b>	<b>96.0</b>	<b>94.8</b>	<b>82.9</b>	<b>55.7</b>	<b>29.7</b>

Table 17: Available Beds by ICU Level

Region	Public Sector			Private Sector		
	Level 3	Level 2	Level 1	Level 3	Level 2	Level 1
NSW	243	142	140	90	49	10
VIC	163	77	5	54	51	12
QLD	109	64	25	88	36	7
SA	97	18	30	33	28	8
WA	66	10	13	10	26	0
TAS	27	12	0	0	11	0
ACT	10	0	8	0	18	0
NT	8	5	0	0	0	0
<b>Australia</b>	<b>723</b>	<b>328</b>	<b>221</b>	<b>275</b>	<b>219</b>	<b>37</b>

Table 18: Demographic Distribution of Public Sector Beds

Region	Population*	Physical Beds	Available Beds	Ventilator Beds	Available Beds / 100,000	Ventilator Beds / 100,000
NSW	6,609,304	620	525	307	7.94	4.64
VIC	4,822,663	289	245	197	5.08	4.08
QLD	3,635,121	241	198	161	5.44	4.42
SA	1,514,854	147	145	96	9.57	6.34
WA	1,906,114	97	89	73	4.66	3.83
TAS	472,931	41	39	22	8.26	4.66
ACT	321,680	34	18	12	5.60	3.73
NT	200,019	13	13	11	6.50	5.50
<b>Australia</b>	<b>19,482,686</b>	<b>1,482</b>	<b>1,272</b>	<b>879</b>	<b>6.52</b>	<b>4.51</b>

\*Source: ABS *Population Growth Australia and New Zealand, 1991-2001*<sup>20</sup>

Table 19: Demographic Distribution of Private Sector Beds

Region	Population*	Physical Beds	Available Beds	Ventilator Beds	Available Beds / 100,000	Ventilator Beds / 100,000
NSW	6,609,304	151	149	107	2.25	1.61
VIC	4,822,663	120	117	86	2.42	1.78
QLD	3,635,121	131	131	87	3.60	2.39
SA	1,514,854	72	69	51	4.55	3.36
WA	1,906,114	36	36	22	1.88	1.15
TAS	472,931	17	11	3	2.33	0.63
ACT	321,680	18	18	5	5.60	1.55
<b>Australia</b>	<b>19,482,686</b>	<b>545</b>	<b>531</b>	<b>361</b>	<b>2.72</b>	<b>1.85</b>

\*Source: ABS *Population Growth Australia and New Zealand, 1991-2001*<sup>20</sup>

Table 20: Demographic Distribution of Public & Private Sector Beds

Region	Population*	Physical Beds	Available Beds	Ventilator Beds	Available Beds / 100,000	Ventilator Beds / 100,000
NSW	6,609,304	771	674	414	10.19	6.26
VIC	4,822,663	409	362	283	7.50	5.86
QLD	3,635,121	372	329	248	9.05	6.82
SA	1,514,854	219	214	147	14.13	9.70
WA	1,906,114	133	125	95	6.55	4.98
TAS	472,931	58	50	25	10.59	5.29
ACT	321,680	52	36	17	11.21	5.29
NT	200,019	13	13	11	6.50	5.50
Australia	19,482,686	2,027	1,803	1,240	9.25	6.36

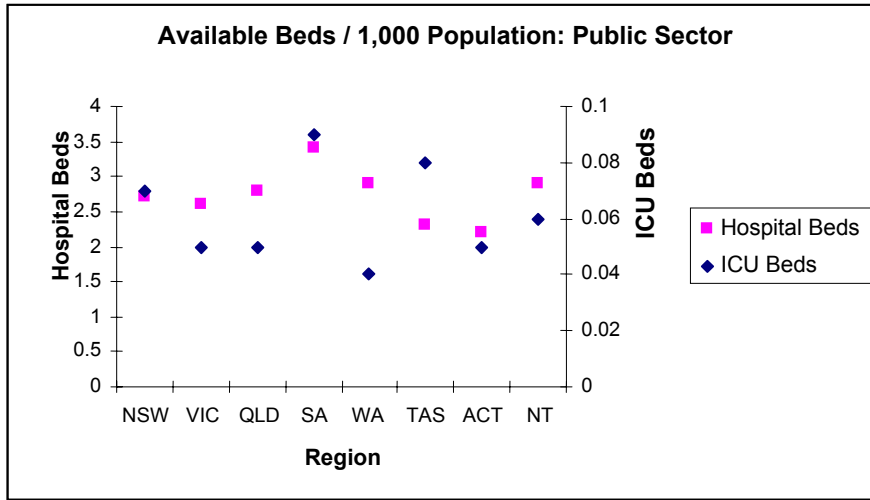
\* Source: ABS *Population Growth Australia and New Zealand, 1991-2001*<sup>20</sup>

Table 21: Demographic Distribution of Level 3 Beds, Public Sector

Region	Population*	Physical Beds	Available Beds	Ventilator Beds	Available Beds / 100,000	Ventilator Beds / 100,000
NSW	6,609,304	315	243	199	3.67	3.01
VIC	4,822,663	191	163	156	3.38	3.23
QLD	3,635,121	129	109	110	2.99	3.02
SA	1,514,854	99	97	77	6.40	5.08
WA	1,906,114	74	66	64	3.46	3.35
TAS	472,931	29	27	17	5.72	3.60
ACT	321,680	22	10	10	3.11	3.11
NT	200,019	8	8	8	4.00	4.00
Australia	19,482,686	867	723	641	3.71	3.29

\*Source: ABS *Population Growth Australia and New Zealand, 1991-2001*<sup>20</sup>

Figure 11: Available Hospital and ICU Beds per 1,000 Population by Region, Public Sector



Source: AIHW Australian Hospital Statistics 2000-01<sup>14</sup>  
 ABS Population Growth Australia and New Zealand, 1991-2001<sup>20</sup>

Figure 12: ICU Beds by RRMA Category, Public Sector

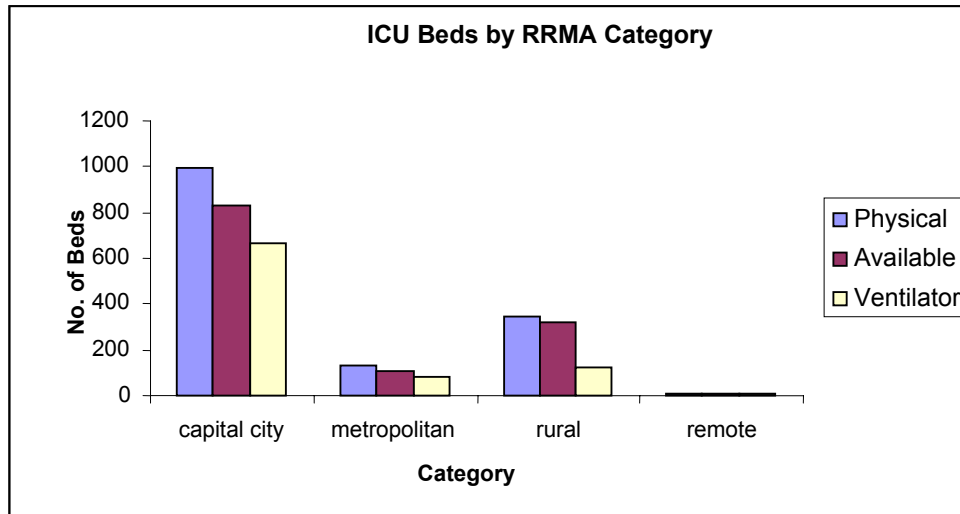


Figure 13: ICU Beds by ARIA Classification, Public Sector

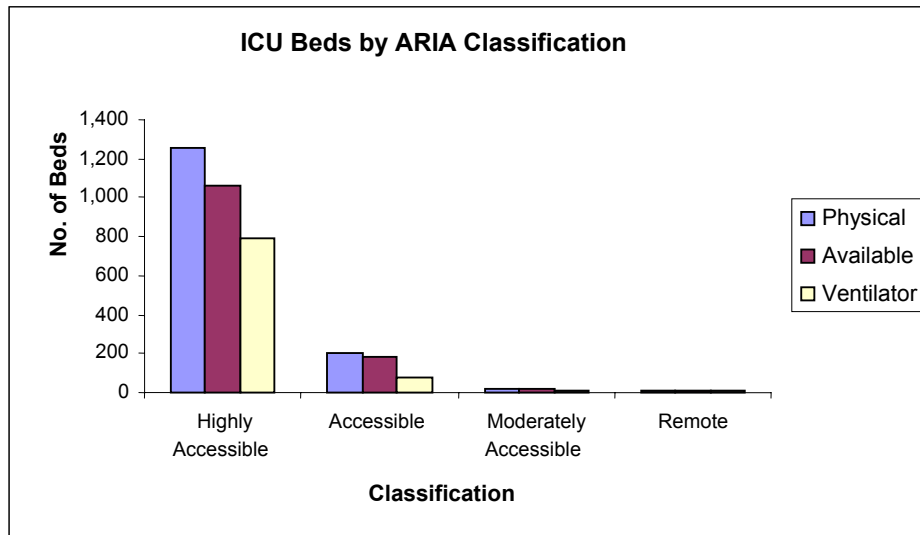
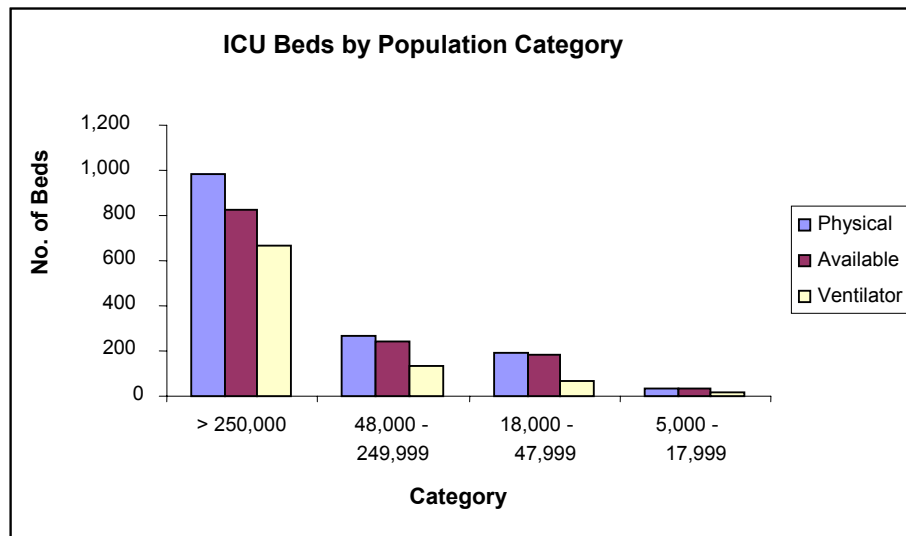


Figure 14: ICU Beds by Population Category, Public Sector



## 5.4 ICU Type

Critical care facilities may be classified in a number of ways but in this report the following categories are used:

### **General ICU**

- Medical and / or surgical care. May incorporate HDU facilities/beds. HDU and ICU beds may be interchangeable.

### **ICU/CCU**

- Combined intensive and coronary care services within a single patient care location. Much variation in bed configurations was apparent from the survey and beds may be interchangeable. May also include HDU facilities/beds.

### **PICU**

- Medical and surgical care. A paediatric patient for the purposes of this survey is one < 16 years of age<sup>10</sup> (however variable upper age range end point - may be < 14 or 15 years of age in some regions). PICUs may also accept neonates (live birth < 28 days old) or patients > 16 years of age.<sup>10</sup>

### **Specialty**

- A specialty service for neuro-intensive care or cardiothoracic intensive care patients. A cardiothoracic ICU has cardiac and thoracic surgery as its primary focus whilst a neuro ICU has a predominantly neurological/neurosurgical focus.

### **HDU**

- An HDU provides an intermediate level of care between intensive care and general ward care.<sup>21</sup> HDU beds may be interchangeable with ICU or CCU beds. For the purposes of this report, only HDU beds managed by critical care services were included.

These critical care categories are quite broad however and do not limit the types of care or services provided to patients. Both adult and paediatric patients may be admitted to any of these ICUs. Neonates may also comprise a small proportion of the patient population at some sites.

Information was sought on the number and type of other special care units at individual hospitals. That is, 'stand-alone' units not managed by the ICU. In the public sector there were 41 Coronary Care Units (CCUs), 43 neonatal special care units and 23 HDUs. In the private sector there were 21 CCUs, 14 neonatal special care units and 8 HDUs. It is likely that this information was under-reported by a number of respondents.

Figure 15: ICU Type by Region, Public Sector

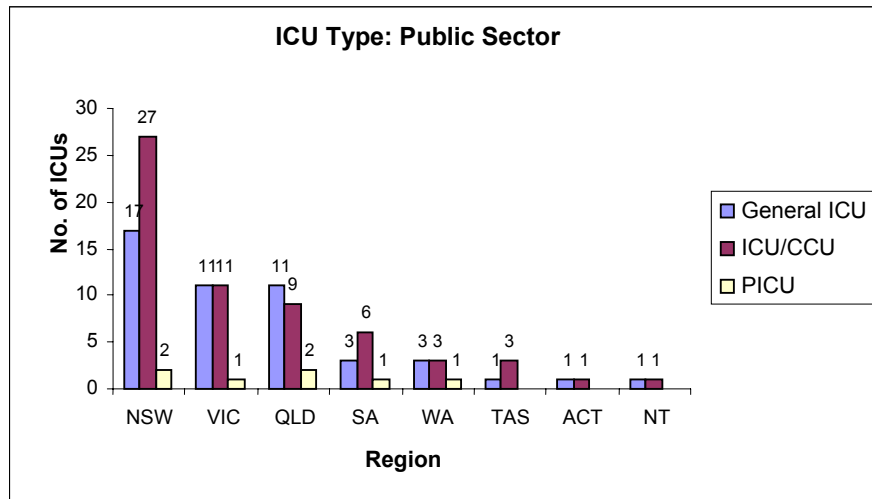
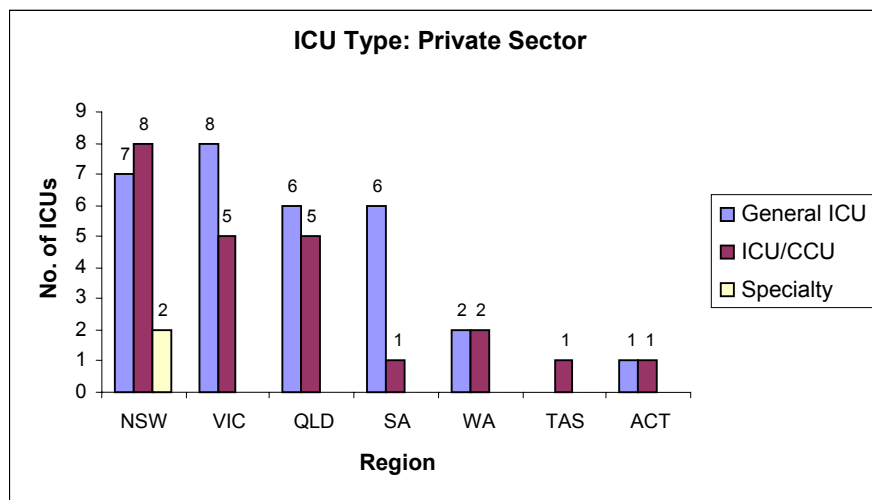


Figure 16: ICU Type by Region, Private Sector



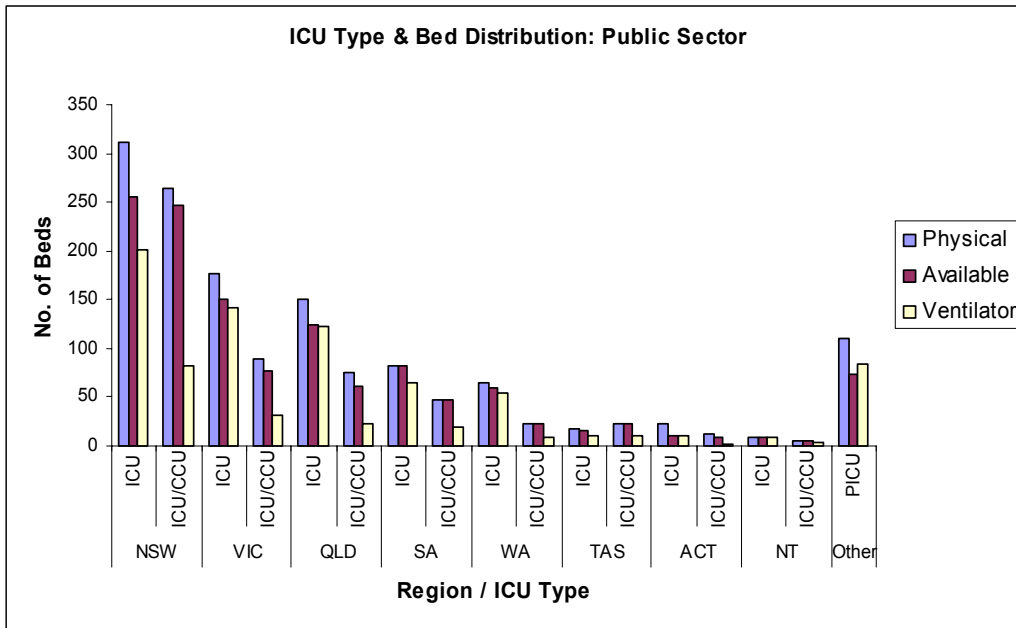
Proportion / Number of ICU Types: Public & Private Sectors

- 45.6% (n=78) general ICU
- 49.1% (n=84) ICU/CCU/HDU
- 4.1% (n=7) PICU
- 1.1% (n=2) specialty ICU (neuro-intensive care and cardiothoracic intensive care)

As can be seen in Figures 15 and 16, the number of combined intensive care/coronary care units was greater than general intensive care units. This finding has implications for ICU staffing requirements and for service delivery.

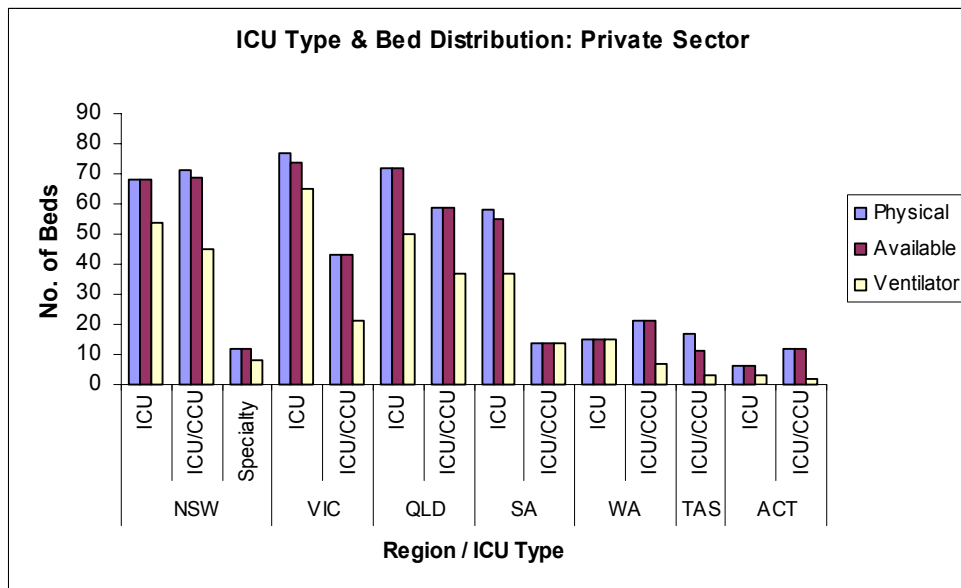
Available ICU beds in ICU/CCUs comprised 40.1% of the total number of available beds in the public sector (general ICU, 53.4%). In the private sector, available ICU beds for ICU/CCU were 35.9% of the number of available beds (general ICU, 61.7%).

Figure 17: ICU Beds by ICU Type & Region, Public Sector



PICU beds are shown grouped together in the 'other' category in Figure 19.

Figure 18: ICU Beds by ICU Type & Region, Private Sector



## ICU Type and Bed Characteristics

Public Sector	Private Sector
<p><i>General ICU included:</i></p> <ul style="list-style-type: none"> <li>▪ Total 707 available beds</li> <li>▪ 98 available cardiothoracic beds</li> <li>▪ 61 available HDU beds</li> <li>▪ 25 available other beds</li> <li>▪ 251 interchangeable ICU/HDU beds</li> </ul> <p><i>ICU/CCU/HDU included:</i></p> <ul style="list-style-type: none"> <li>▪ Total 492 available beds</li> <li>▪ 139 available CCU beds</li> <li>▪ 0 available cardiothoracic beds</li> <li>▪ 34 available HDU beds</li> <li>▪ 2 available other beds</li> <li>▪ 346 interchangeable ICU/CCU/HDU beds</li> </ul> <p><i>Paediatric:</i></p> <ul style="list-style-type: none"> <li>▪ Total 73 available beds</li> <li>▪ 4 available HDU beds</li> <li>▪ 5 available cardiothoracic beds</li> <li>▪ 12 interchangeable ICU/HDU beds</li> </ul>	<p><i>General ICU included:</i></p> <ul style="list-style-type: none"> <li>▪ Total 290 available beds</li> <li>▪ 13 available cardiothoracic beds</li> <li>▪ 32 available HDU beds</li> <li>▪ 6 available other beds</li> <li>▪ 119 interchangeable ICU/HDU beds</li> </ul> <p><i>ICU/CCU/HDU included:</i></p> <ul style="list-style-type: none"> <li>▪ Total 229 available beds</li> <li>▪ 51 available CCU beds</li> <li>▪ 8 available cardiothoracic beds</li> <li>▪ 3 available HDU beds</li> <li>▪ 0 available other beds</li> <li>▪ 206 interchangeable ICU/CCU/HDU beds</li> </ul> <p><i>Specialty (neuro &amp; cardiothoracic ICU)</i></p> <ul style="list-style-type: none"> <li>▪ Total 12 available beds</li> <li>▪ 0 interchangeable ICU/HDU beds</li> </ul>

## 5.5 ICU Levels

ICU levels support the delineated roles of each health care facility. The attributes of an ICU are determined by the type and number of critically ill patients and the provision of resources, staffing and support services.<sup>9</sup>

All ICU levels in this report are self-determined. An extract of the FICANZCA standards document was included with the survey (see Appendix 3). Reference to ICU levels may also be found in the National Health Data Dictionary.<sup>10</sup> NSW Health stipulates six levels of care in health facilities with levels six, five and four corresponding with ICU Levels 3, 2 and 1 respectively.<sup>22</sup>

Despite the application of JFICM standards, there may be little to distinguish between ICU levels in some instances. For example, differentiating between a Level 3 and a Level 2 ICU or a Level 1 and Level 2 can be potentially problematic. Even Level 3 ICUs may be different in terms of patient acuity, outcomes and casemix. Moreover, ICU levels for an individual ICU may vary from year to year.

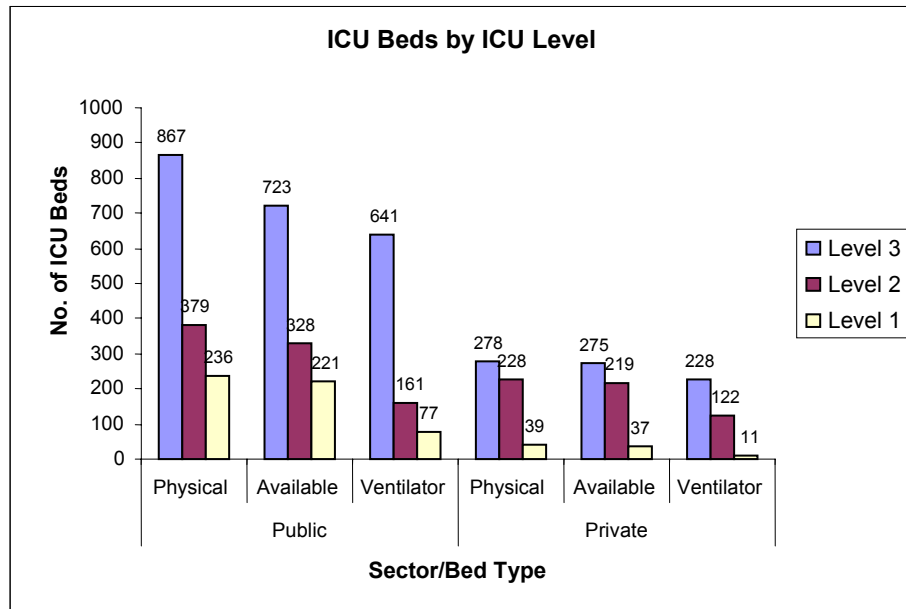
The ICU levels should be viewed with a degree of caution for a number of reasons. For example, casemix, morbidity and mortality data and severity of illness scores do not form part of the analysis so little is known about patient acuity. Additionally, casemix data may not reflect ICU admission diagnoses, as diagnostic data currently available from the AIHW does not adequately capture ICU admissions. Moreover, the specified time lines in the standards may be difficult to apply in some settings, particularly ICUs located in rural and remote regions.

A small number of ICUs may have over/underestimated the ICU level when objective criteria for infrastructure, throughput, staffing and research activities are applied. Despite objective definitions, respondents may not answer objectively. Political pressures, funding mechanisms, clinical capabilities, research activities and a belief that the standards are flawed are just a few of the reasons why this may occur.

Proportion/Number of ICU Levels, Public and Private Sectors:  
(All Level 3 data includes the seven PICUs unless otherwise indicated).

- 39.8% (n= 68) Level 3
- 39.8% (n=68) Level 2
- 20.4% (n=35) Level 1

Figure 19: ICU Beds by ICU Level & Sector



**ICU Level / Bed Characteristics**

Public Sector	Private Sector
<p><i>Level 3 ICU included:</i></p> <ul style="list-style-type: none"> <li>Total 723 available beds</li> <li>63 available HDU beds</li> <li>11 available CCU beds</li> <li>103 available cardiothoracic beds</li> <li>25 available other beds</li> <li>244 interchangeable ICU/HDU beds</li> <li>22 interchangeable ICU/CCU/HDU beds</li> <li>Total 236 interchangeable beds</li> </ul> <p><i>Level 2 included:</i></p> <ul style="list-style-type: none"> <li>Total 328 available beds</li> <li>18 available HDU beds</li> <li>71 available CCU beds</li> <li>0 available cardiothoracic beds</li> <li>2 available other beds</li> <li>132 interchangeable ICU/HDU beds</li> <li>132 interchangeable ICU/CCU/HDU beds</li> <li>Total 218 interchangeable beds</li> </ul> <p><i>Level 1 included:</i></p> <ul style="list-style-type: none"> <li>Total 221 available beds</li> <li>18 available HDU beds</li> <li>57 available CCU beds</li> <li>65 interchangeable ICU/HDU beds</li> <li>138 interchangeable ICU/CCU/HDU beds</li> <li>Total 155 interchangeable beds</li> </ul>	<p><i>Level 3 ICU included:</i></p> <ul style="list-style-type: none"> <li>Total 275 available beds</li> <li>14 available HDU beds</li> <li>10 available CCU beds</li> <li>21 available cardiothoracic beds</li> <li>5 available other beds</li> <li>117 interchangeable ICU/HDU beds</li> <li>29 interchangeable ICU/CCU/HDU beds</li> <li>Total 124 interchangeable beds</li> </ul> <p><i>Level 2 included:</i></p> <ul style="list-style-type: none"> <li>Total 219 available beds</li> <li>14 available HDU beds</li> <li>41 available CCU beds</li> <li>6 available cardiothoracic beds</li> <li>7 available other beds</li> <li>79 interchangeable ICU/HDU beds</li> <li>133 interchangeable ICU/CCU/HDU beds</li> <li>Total 175 interchangeable beds</li> </ul> <p><i>Level 1 included:</i></p> <ul style="list-style-type: none"> <li>Total 37 available beds</li> <li>7 available HDU beds</li> <li>0 available CCU beds</li> <li>19 interchangeable ICU/HDU beds</li> <li>15 interchangeable ICU/CCU/HDU beds</li> <li>Total 26 interchangeable beds</li> </ul>

## 5.6 ICU Activity

In section 2 of the report it was noted that intensive care services are provided to critically ill patients with single or multiple organ dysfunction, injuries or complications, or who are at risk of developing complications due to therapy or primary illness.

Many contemporary definitions of an intensive care patient however are reliant on a requirement for mechanical ventilation which has significant limitations given the array of new treatment modalities in caring for the critically ill. Mechanical ventilation is currently a poor proxy for defining critical illness and new interpretations are sought. This is of particular importance in relation to the funding of intensive care services. For example, a number of jurisdictions have provision for ventilator co-payments, but this alone is not a marker of critical illness and does not take into account the complexity of care for a significant proportion of ICU patients.

Characteristics of an adult intensive care patient have been proposed and these are based (in part) on criteria from the PROWESS (Protein C Worldwide Evaluation in Severe Sepsis) study group and may include:<sup>23-24</sup>

- Two or more acute organ system failures receiving active support (support beyond that available on a general ward)
- One acute organ system failure and an APACHE score > 25
- Invasive ventilation
- Invasive therapy – haemodynamic monitoring, inotropes, renal replacement therapy.

In the United Kingdom four levels of patient care have been proposed:<sup>25-26</sup>

- **Level 0:** patients whose needs can be met through normal ward care in an acute hospital.
- **Level 1:** patients at risk of their condition deteriorating or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team.
- **Level 2:** patients requiring more detailed observation or intervention including support for a single failing organ system or post-operative care and those 'stepping down' from higher levels of care.
- **Level 3:** patients requiring advanced respiratory support alone or basic respiratory support of at least two organ systems. This level includes all complex patients requiring support for multi-organ failure.

Additionally, a supplemental classification for patients requiring specialist services was proposed whereby an additional letter reflecting the most significant disorder is appended to the level of acuity, e.g. N for neurosurgical care, S for spinal care and so on.<sup>25</sup> All acute hospitals that carry out elective surgery must provide Level 2 care.<sup>25</sup>

Development of definitions for intensive care patients in an Australasian context needs to be undertaken.

Table 22: Total Admissions by Sector & Region

<b>Sector</b>	<b>Region</b>	<b>No. ICUs</b>	<b>ICU Admissions</b>
<b>Public</b>	NSW	44/46	36,202
	VIC	22/23	19,772
	QLD	22/22	17,008
	SA	9/10	11,360
	WA	7/7	7,548
	TAS	4/4	2,925
	ACT	2/2	2,833
	NT	2/2	1,158
	<i>Sub-total</i>	<i>112/116</i>	<i>98,806</i>
<b>Private</b>	NSW	16/17	9,070
	VIC/TAS	13/13	9,840
	QLD	11/11	10,093
	SA	7/7	6,648
	WA	3/4	2,377
	ACT	2/2	764
	<i>Sub-total</i>	<i>52/55</i>	<i>38,792</i>
<b>All Sectors</b>	<b>Australia</b>	<b>164/171</b>	<b>137,598</b>

- Total of 131,580 admissions to adult ICUs

Table 23: ICU Admissions as a Proportion of all Hospital Admissions

Sector	Region	Total ICU Admissions	AIHW All Separations*	ICU Admissions As %	AIHW Same Day Separations Excluded*	ICU Admissions As %
Public <sup>a</sup>	NSW	36,202	1,227,593	2.94	724,565	4.99
	VIC	19,772	1,028,295	1.92	499,414	3.95
	QLD	17,008	687,952	2.47	369,031	4.60
	SA	11,360	359,962	3.15	189,597	5.99
	WA	7,548	353,868	2.13	182,908	4.12
	TAS	2,925	71,524	4.08	40,514	7.21
	ACT <sup>c</sup>	2,833	61,308	4.62	29,003	9.76
	NT	1,158	58,973	1.96	28,898	4.00
	<i>Sub-Total</i>		<i>98,806</i>	<i>3,849,475</i>	<i>2.55</i>	<i>2,063,930</i>
Private <sup>b</sup>	NSW	9,070	639,762	1.41	247,633	3.66
	VIC/TAS	9,840	645,676	1.52	271,027	3.62
	QLD	10,093	526,313	1.91	209,083	4.82
	SA	6,648	250,129	2.65	112,263	5.92
	WA	2,377	184,305	1.28	88,956	2.67
	ACT <sup>c</sup>	764	24,606	3.10	12,809	5.96
	<i>Sub-Total</i>		<i>38,792</i>	<i>2,270,791</i>	<i>1.70</i>	<i>941,771</i>
<b>Australia</b>		<b>137,598</b>	<b>6,120,266</b>	<b>2.24</b>	<b>3,005,701</b>	<b>4.56</b>

\* Source: AIHW Australian Hospital Statistics 2000-2001<sup>14</sup>

a - public acute hospitals

b - private hospitals

c - the ACT services areas of southern NSW

- Total ICU admissions includes CCU admissions for combined ICU/CCUs and HDU admissions where applicable.

Table 24: ICU Admissions by ICU Type, Adult ICUs

Sector	ICU Type	ICU Admissions	HDU Admissions	CCU Admissions	Other Admissions	Total Admissions
Public	General	35,436	3,868	0	8,591	47,895
	ICU/CCU	21,032	5,501	18,306	72	44,893
	<i>Sub-total</i>	<i>56,468</i>	<i>9,369</i>	<i>18,306</i>	<i>8,663</i>	<i>92,788</i>
Private	General	16,422	3,024	0	984	20,430
	ICU/CCU	9,885	835	6,465	648	17,833
	Specialty	0	0	0	529	529
	<i>Sub-total</i>	<i>26,307</i>	<i>3,859</i>	<i>6,465</i>	<i>2,161</i>	<i>38,792</i>
<b>Total</b>		<b>131,580</b>				

Range, mean and median number of admissions for adult ICUs

- ICU admissions: minimum 30; maximum 2,069; mean 537.7; median 428.0 (Public Sector)
- ICU admissions: minimum 65; maximum 1,502; mean 522.0; median 440.0 (Private Sector)
- CCU admissions: minimum 88; maximum 927; mean 435.8; median 380.0 (Public Sector)
- CCU admissions: minimum 50; maximum 1,545; mean 538.7; median 468.5 (Private Sector)
- HDU admissions: minimum 7; maximum 1,451; mean 360.3; median 313.0 (Public Sector)
- HDU admissions: minimum 14; maximum 855; mean 321.5; median 190.5 (Private Sector)
- Other admissions: minimum 26; maximum 1,967; mean 666.3 median 438.0 (Public Sector)
- Other admissions: minimum 213; maximum 694; mean 461.2; median 469.0 (Private Sector)
- Total admissions: minimum 227; maximum 3,254; mean 883.7; median 705.0 (Public Sector)
- Total admissions: minimum 145; maximum 2,212; mean 746.0; median 733.0 (Private Sector)

Table 25: ICU Admissions by ICU Level, Adult ICUs

Sector	ICU Level	ICU Admissions	HDU Admissions	CCU Admissions	Other Admissions	Total Admissions
Public	Level 3	31,155	4,359	1,204	8,591	45,309
	Level 2	13,003	3,492	11,755	72	28,304
	Level 1	12,310	1,518	5,347	0	19,175
	<i>Sub-total</i>	<i>56,468</i>	<i>9,369</i>	<i>18,306</i>	<i>8,663</i>	<i>92,788</i>
Private	Level 3	16,167	1,276	997	1,632	20,072
	Level 2	8,443	2,319	4,989	529	16,280
	Level 1	1,697	264	479	0	2,440
	<i>Sub-total</i>	<i>26,307</i>	<i>3,859</i>	<i>6,465</i>	<i>2,161</i>	<i>38,792</i>
<b>Total</b>		<b>131,580</b>				

Table 26: Readmissions to Adult ICUs by Sector & Region

Sector	Region	No. ICUs	ICU Readmissions
Public	NSW	23/44	500
	VIC	14/22	1,033
	QLD	12/20	493
	SA	6/9	507
	WA	4/6	211
	TAS	2/4	16
	ACT	1/2	64
	NT	1/2	34
	<i>Sub-total</i>	<i>63/109</i>	<i>2,858</i>
Private	NSW	12/17	163
	VIC/TAS	8/14	96
	QLD	6/11	63
	SA	4/7	79
	WA	2/4	15
	ACT	1/2	11
	<i>Sub-total</i>	<i>34/55</i>	<i>416</i>
<b>All Sectors</b>	<b>Australia</b>	<b>97/164</b>	<b>3,274</b>

- Only 59.1% of ICUs provided data on this Key Performance Indicator.

The readmission to ICU item referred to all ICU readmissions within an episode of care (it is not the same as the ACHS ICU readmission clinical indicator). The definition of a readmission is any second or subsequent admission to the ICU/HDU within the same hospital admission (direct transfers to or from ICU to HDU excluded).

Table 27: Readmissions by Sector and ICU Type, Adult ICUs

Sector	ICU Type	ICU Readmissions	HDU Readmissions	CCU Readmissions	Other Readmissions	Total Readmissions
Public	General	1,727	179	0	123	2,029
	ICU/CCU	261	38	160	0	829
	<i>Sub-total</i>	<i>1,988</i>	<i>217</i>	<i>160</i>	<i>123</i>	<i>2,858</i>
Private	General	298	13	0	10	321
	ICU/CCU	61	14	14	0	89
	Specialty	0	0	0	6	6
	<i>Sub-total</i>	<i>359</i>	<i>27</i>	<i>14</i>	<i>16</i>	<i>416</i>
<b>Total</b>		<b>3,274</b>				

Range, mean and median number of readmissions for adult ICUs

- ICU readmissions: minimum 0; maximum 171; mean 32.0; median 15.0 (Public Sector)
- ICU readmissions: minimum 0; maximum 50; mean 11.0; median 8.0 (Private Sector)
- CCU readmissions: minimum 0; maximum 40; mean 12.3; median 12.0 (Public Sector)
- CCU readmissions: minimum 2; maximum 7; mean 4.6; median 5.0 (Private Sector)
- HDU readmissions: minimum 0; maximum 145; mean 27.1; median 8.0 (Public Sector)
- HDU readmissions: minimum 0; maximum 14; mean 6.7; median 6.5 (Private Sector)
- Other readmissions: minimum 2; maximum 43; mean 20.5; median 17.0 (Public Sector)
- Other readmissions: n/a – one ICU with 10 readmissions only (Private Sector)
- Total readmissions: minimum 0; maximum 371; mean 45.3; median 26.0 (Public Sector)
- Total readmissions: minimum 0; maximum 50; mean 12.2; median 10.0 (Private Sector)

Table 28: Readmissions by Sector and ICU Level, Adult ICUs

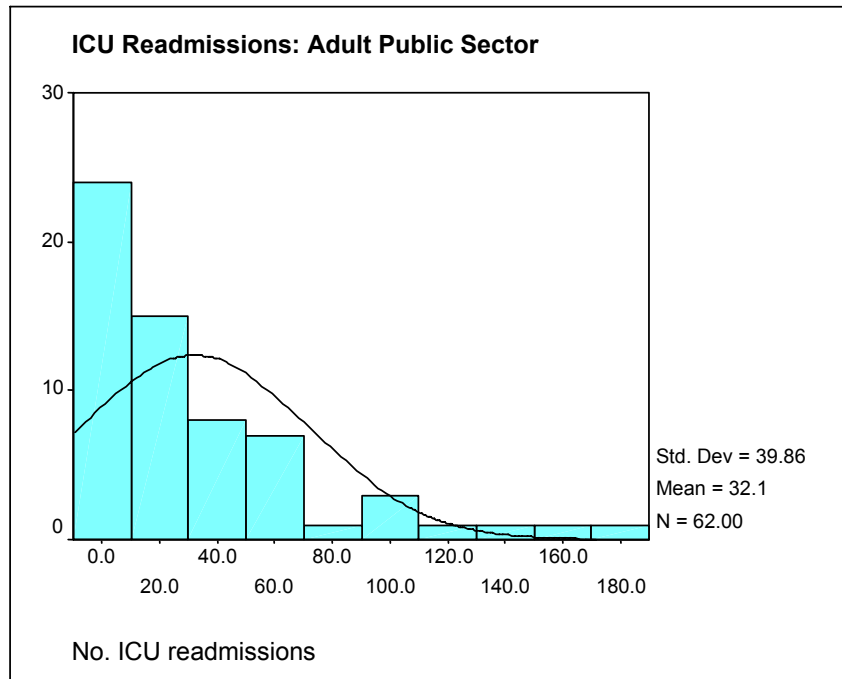
Sector	ICU Level	ICU Readmissions	HDU Readmissions	CCU Readmissions	Other Readmissions	Total Readmissions
Public	Level 3	1,595	180	0	123	1,898
	Level 2	247	36	60	0	713
	Level 1	146	1	100	0	247
	<i>Sub-total</i>	<i>1,988</i>	<i>217</i>	<i>160</i>	<i>123</i>	<i>2,858</i>
Private	Level 3	270	13	0	10	293
	Level 2	71	14	14	0	99
	Level 1	24	0	0	0	24
	<i>Sub-total</i>	<i>365</i>	<i>27</i>	<i>14</i>	<i>10</i>	<i>416</i>
<b>Total</b>		<b>3,274</b>				

Table 29: Proportion of ICU Patients Readmitted, Adult ICUs<sup>a</sup>

Sector	Region	No. ICUs	ICU Admissions	ICU Readmissions	% Readmissions
Public	NSW/ACT	22/45	11,940	441	3.69
	VIC	13/22	9,014	536	5.94
	QLD	12/20	7,307	459	6.28
	SA/NT	7/11	6,883	334	4.85
	WA	4/6	3,634	207	5.69
	TAS	2/4	692	11	1.58
	<i>Sub-total</i>		<i>60/109</i>	<i>39,470</i>	<i>1,988</i>
Private	NSW	10/17	6,806	149	2.18
	VIC/TAS	8/14	3,470	79	2.27
	QLD	6/11	3,793	53	1.39
	SA	5/7	2,314	69	2.98
	WA	2/4	1,193	15	1.25
	<i>Sub-total</i>		<i>31/55</i>	<i>17,576</i>	<i>365</i>
<b>Australia</b>		<b>91/164</b>	<b>57,046</b>	<b>2,353</b>	<b>4.12</b>

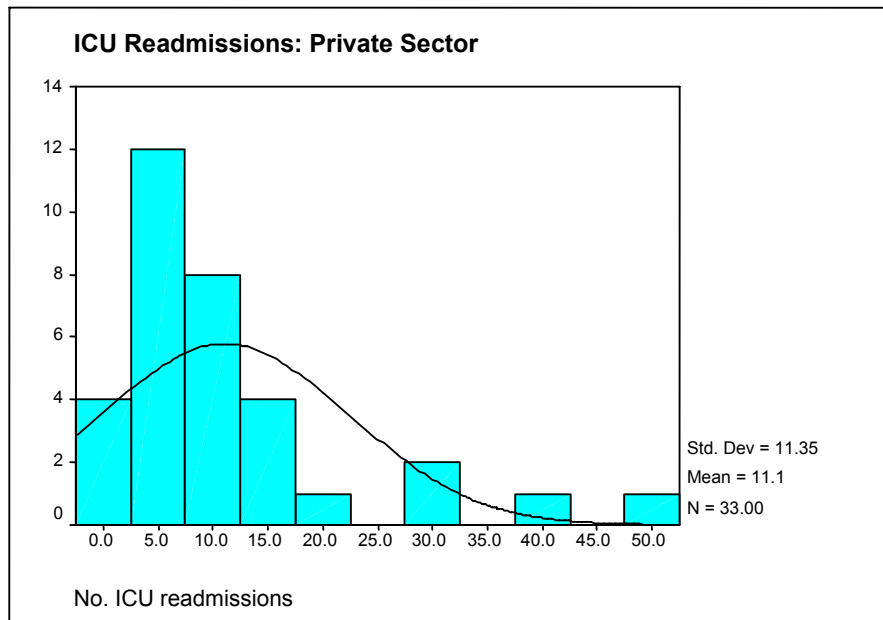
a – included only those ICUs that provided both ICU admission and readmission data

Figure 20: ICU Readmissions, Adult Public Sector



- x axis: no of readmissions
- y axis: no of ICUs
- ICU readmissions to adult public sector ICUs only, not the total number of readmissions.

Figure 21: ICU Readmissions, Private Sector



- x axis: no of readmissions
- y axis: no of ICUs
- ICU readmissions to private sector ICUs only, not the total number of readmissions.

Table 30: Proportion of ICU Patients Readmitted, General ICUs<sup>a</sup>

<b>Sector</b>	<b>Region</b>	<b>No. ICUs</b>	<b>ICU Admissions</b>	<b>ICU Readmissions</b>	<b>% Readmissions</b>
<b>Public</b>	NSW/ACT	13/18	8,957	384	4.28
	VIC/TAS	10/12	8,526	477	5.59
	QLD	10/11	6,812	443	6.50
	SA/NT	4/4	3,868	220	5.68
	WA	3/3	3,365	203	6.03
	<i>Sub-total</i>	<i>40/48</i>	<i>31,528</i>	<i>1,727</i>	<i>5.47</i>
<b>Private</b>	NSW/ACT	5/8	3,288	113	3.43
	VIC	4/8	2,094	57	2.72
	QLD	5/6	3,345	49	1.46
	SA	5/6	2,314	69	2.98
	WA	1/2	837	10	1.19
	<i>Sub-total</i>	<i>20/30</i>	<i>11,878</i>	<i>298</i>	<i>2.50</i>
<b>Australia</b>		<b>60/78</b>	<b>43,406</b>	<b>2,025</b>	<b>4.66</b>

a – included only those ICUs that provided both ICU admission and readmission data

## ANZICS Adult Patient Database<sup>27</sup>

82 ICUs submitted data to the ANZICS Adult Patient Database (APD) for the 2000/2001 financial year. In the APD dataset, ICUs are classified in a single category as tertiary, metropolitan, rural/regional or private. Care is advised as these terms have a different meaning from similar terms used elsewhere in this report. There were 43,790 episodes of care submitted to the APD in 2000/2001.<sup>27</sup>

Table 31: ANZICS Adult Patient Database – 2000/2001 Data\*

	Tertiary	Metropolitan	Rural/Regional	Private	All Sites
Episodes of care	21,688	8,756	6,535	6,770	43,788
Mean Age (years)	57.56	58.84	56.02	66.2	59.02
Length of Stay (hours) Geometric mean	43.49	46.76	40.55	41.16	43.30
Length of Stay (hours) Median	-	-	-	-	41.00
Mean APACHE II score (standard deviation)	15.24 (8.18)	16.65 (9.06)	15.33 (8.74)	16.65 (6.58)	15.15 (8.31)
APACHE II SMR (95% confidence interval)	81.0 (78.1-83.9)	69.5 (65.8-73.3)	71.3 (65.9-76.9)	49.5 (43.6-55.9)	74.0 (72.0-76.1)
Median APACHE II score	-	-	-	-	14.00

\* Source: Bristow P & George C *Benchmarking Quality in Intensive Care*<sup>27</sup>

Exclusions: Age < 12 years  
ICU Length of Stay < 18 hours  
Unknown outcome  
Unknown APACHE II diagnosis<sup>27</sup>

Mortality: 6,107 patients died in hospital<sup>27</sup> (an unadjusted mortality rate of 13.9%).

## ICU Bed Hours/Days

Table 32: ICU Bed Hours/Days Public & Private Sectors, Adult ICUs

Sector	Region	No. ICUs	Bed Hours	No. ICUs	Bed Days
Public	NSW	4/44	208,038.0	22/44	64,812.0
	VIC	10/22	357,577.2	9/22	30,841.6
	QLD	7/20	285,232.0	10/20	24,417.4
	SA	4/9	326,515.8	0/9	0
	WA	0/6	0	1/6	5,211.0
	TAS	0/4	0	3/4	4,575.4
	ACT	0/2	0	1/2	3,178.0
	NT	1/2	54,378.0	1/2	1,689.0
	<i>Sub-total</i>	<i>26/109</i>	<i>1,231,741.0</i>	<i>47/109</i>	<i>134,724.4</i>
Private	NSW	2/17	95,232.1	10/17	13,132.7
	VIC/TAS	2/14	32,405.0	8/14	13,729.2
	QLD	2/11	149,985.1	5/11	13,861.1
	SA	4/7	148,606.0	1/7	853.0
	WA	0/4	0	1/4	1,653.5
	ACT	0/2	0	2/2	1,446.0
	<i>Sub-total</i>	<i>10/55</i>	<i>426,228.2</i>	<i>27/55</i>	<i>44,675.5</i>
<b>Australia</b>		<b>36/164</b>	<b>1,657,969.2</b>	<b>74/164</b>	<b>179,399.9</b>

- 110/164 adult ICUs (67.0%) submitted data [73 of 109 public adult ICUs, 66.9%; 37 of 55 private ICUs, 67.2%].

## Ventilator Hours/Days

Table 33: ICU Ventilator Hours /Days Public & Private Sectors, Adult ICUs

Sector	Region	No. ICUs	Ventilator Hours	No. ICUs	Ventilator Days
Public	NSW	12/44	96,592	19/44	19,462
	VIC	15/22	426,818	5/22	10,214
	QLD	8/20	251,571	10/20	12,986
	SA	7/9	270,496	0/10	0
	WA	0/6	0	2/6	6,646
	TAS	0/4	0	3/4	916
	ACT	1/2	2,472	1/2	1,954
	NT	2/2	45,808	0/2	0
	<i>Sub-total</i>	<i>45/109</i>	<i>1,093,757</i>	<i>38/109</i>	<i>52,178</i>
Private	NSW	4/17	17,937	6/17	4,183
	VIC/TAS	8/14	55,025	2/14	1,049
	QLD	5/11	49,211	4/11	3,363
	SA	4/7	66,635	1/7	254
	WA	1/4	6,528	2/4	959
	ACT	1/2	2,302	1/2	197
	<i>Sub-total</i>	<i>23/55</i>	<i>197,638</i>	<i>16/55</i>	<i>10,005</i>
<b>Australia</b>		<b>68/164</b>	<b>1,291,395</b>	<b>54/164</b>	<b>62,183</b>

## Number of patients ventilated

Table 34: No. of Patients Ventilated, Public & Private Sectors, Adult ICUs

Sector	Region	No. ICUs	No. Ventilated	No. ICUs	No. Invasive Ventilation	No. ICUs	No. Non-Invasive
Public	NSW	29/44	7,911	30/44	7,157	17/44	590
	VIC	18/22	9,022	17/22	6,685	11/22	590
	QLD	14/20	6,346	14/20	4,082	11/20	1,318
	SA	6/9	2,370	5/9	691	4/9	293
	WA	5/6	2,766	4/6	2,256	3/6	82
	TAS	3/4	511	4/4	525	2/4	82
	ACT	2/2	893	2/2	829	2/2	64
	NT	2/2	493	1/2	349	1/2	12
	<i>Sub-total</i>	<i>79/109</i>	<i>30,312</i>	<i>77/109</i>	<i>22,574</i>	<i>51/109</i>	<i>3,031</i>
Private	NSW	10/17	2,936	8/17	1,434	3/17	90
	VIC/TAS	11/14	3,273	8/14	2,863	5/14	194
	QLD	10/11	3,009	8/11	2,402	5/11	142
	SA	5/7	1,111	4/7	981	4/7	82
	WA	1/4	484	2/4	582	2/4	202
	ACT	1/2	46	2/2	117	2/2	67
	<i>Sub-total</i>	<i>38/55</i>	<i>10,859</i>	<i>32/55</i>	<i>8,379</i>	<i>21/55</i>	<i>777</i>
<b>Australia</b>		<b>117/164</b>	<b>41,171</b>	<b>109/164</b>	<b>30,953</b>	<b>72/164</b>	<b>3,808</b>

Table 35: Proportion of Patients Invasively Ventilated, Adult ICUs

Sector	Region	No. ICUs	Admissions	No. Invasively Ventilated	% Admissions Ventilated
Public	NSW	30/44	15,992	7,157	44.75
	VIC	17/20	10,894	6,685	61.36
	QLD	14/20	7,653	4,082	53.33
	SA/NT <sup>b</sup>	2/11	1,134	816	71.95
	WA	4/6	3,674	2,256	61.40
	TAS	4/4	1,050	525	49.99
	ACT	2/2	1,218	829	68.06
	<i>Sub-total</i>	<i>73/109</i>	<i>41,615</i>	<i>22,350</i>	<i>53.70</i>
Private	NSW	5/17	3,337	1,396	41.83
	VIC	8/13	4,705	2,863	60.84
	QLD	7/11	4,806	2,299	47.83
	SA	4/7	1,586	981	61.85
	WA	1/4	837	582	69.53
	ACT	2/2	342	117	34.21
	<i>Sub-total</i>	<i>27/55</i>	<i>15,613</i>	<i>8,238</i>	<i>52.76</i>
	<b>Australia</b>		<b>100/164</b>	<b>57,228</b>	<b>30,588</b>

a – admissions is the total number of ICU and other admissions, excluding PICUs

b – data included a single site from each State/Territory (comparable ventilation rates)

- About half of the patients admitted to ICU were invasively ventilated.

Table 36: Proportion of Patients Invasively Ventilated, General ICUs

Sector	Region	No. ICUs	Admissions <sup>a</sup>	No. Invasively Ventilated	% Admissions Ventilated
Public	NSW	11/17	9,568	5,639	58.93
	VIC	8/11	8,410	5,911	70.28
	QLD	9/11	6,713	3,888	57.91
	SA/NT <sup>b</sup>	2/4	1,134	816	71.95
	WA	2/3	2,833	2,123	74.93
	TAS/ACT	2/2	1,654	1,006	60.82
	<i>Sub-total</i>		<i>34/48</i>	<i>30,312</i>	<i>19,383</i>
Private	NSW/ACT	4/8	2,051	886	43.19
	VIC	6/8	4,211	2,559	60.76
	QLD	5/6	3,798	2,021	53.21
	SA	3/6	1,458	918	62.96
	WA	1/2	837	482	57.58
	<i>Sub-total</i>		<i>19/30</i>	<i>12,355</i>	<i>6,866</i>
<b>Australia</b>		<b>53/78</b>	<b>42,667</b>	<b>26,249</b>	<b>61.51</b>

a – admissions is the total number of ICU and other admissions, excluding PICUs

b – data included a single site from each State/Territory (comparable ventilation rates)

- Almost 2/3 of public sector patients were invasively ventilated.
- More than half of the private sector patients were invasively ventilated.

## Paediatric Admissions

A paediatric patient for the purposes of the survey is one < 16 years of age. There was some variation between regions on the age upper end point, < 14 years or < 15 years of age. Some PICUs (paediatric intensive care unit) may also accept neonates (live birth < 28 days old) or patients > 16 years of age.<sup>10</sup>

Table 37: Paediatric Admissions, Public & Private Sector Adult ICUs

Sector	Region (No. ICUs) <sup>a</sup>	No. Admissions	No. Ventilated Patients	No. Patient Transfers	No. Deaths
Public	NSW/ACT (16)	445	142	32	12
	VIC (15)	134	24	24	3
	QLD (16)	614	406	42	23
	SA (3)	105	20	5	2
	WA (1)	3	0	0	0
	TAS (3)	41	12	8	2
	NT (2)	82	38	11	3
	<i>Sub-total</i>	<i>1,424</i>	<i>642</i>	<i>122</i>	<i>45</i>
Private	NSW (3)	26	3	0	1
	VIC/TAS (4)	44	4	0	0
	QLD (6)	26	7	1	0
	SA (4)	13	0	0	0
	WA (1)	3	0	2	0
	<i>Sub-total</i>	<i>112</i>	<i>14</i>	<i>3</i>	<i>1</i>
	<b>Australia</b>		<b>1,536</b>	<b>656</b>	<b>125</b>

a – number of ICUs that admitted paediatric patients

16 adult public sector ICUs (14.6%) and 9 private sector ICUs (16.3%) did not respond to the survey item on paediatric admission data.

Detailed data on paediatric admissions and outcomes for the calendar year 2000 has recently been published by ANZPIC.<sup>3</sup>

Table 38: Paediatric Admissions by ICU Type, Public Sector

	Paediatric Admissions	Number Ventilated	Transfers To PICU	No. Deaths
General	942	564	49	42
ICU/CCU	482	78	73	3
PICU	5,783 <sup>a</sup>	2,615	0	216
<b>Total</b>	<b>7,207</b>	<b>3,257</b>	<b>122</b>	<b>261</b>

a – there was a total of 6,018 admissions to PICUs, 5,783 of whom were < 16 years of age (96%).

- 59.8% of paediatric patients in a general ICU were ventilated.
- 16.1% of paediatric patients in an ICU/CCU were ventilated.
- 42.7% of paediatric patients in adult ICUs were ventilated.
- 45.2% of PICU patients were ventilated.
  
- 5.2% of paediatric patients in a general ICU were transferred to a PICU.
- 15.1% paediatric patients in a ICU/CCU were transferred to a PICU
- 8.5% of paediatric patients in adult ICUs were transferred to a PICU.
  
- Paediatric unadjusted mortality rate was 3.1% in public sector ICUs and 0.8% in private sector ICUs.
- Paediatric unadjusted mortality rate for paediatric patients in PICUs was 3.7% (range 3.1%-4.6%).
- Paediatric unadjusted mortality rate overall was 3.6%.

Table 39: Paediatric Admissions by ICU Level, Public Sector

	Paediatric Admissions	Number Ventilated	Transfers To PICU	No. Deaths
Level 3	6,725	3,165	44	256
Level 2	384	82	63	5
Level 1	98	10	15	0
<b>Total</b>	<b>7,207</b>	<b>3,257</b>	<b>122</b>	<b>261</b>

Table 40: Paediatric Admissions by ICU Level, Public Sector Adult ICUs

	Paediatric Admissions	Number Ventilated	Transfers To PICU	No. Deaths
Level 3	942	550	44	40
Level 2	384	82	63	5
Level 1	98	10	15	0
<b>Total</b>	<b>1,424</b>	<b>642</b>	<b>122</b>	<b>45</b>

Table 41: Paediatric Admissions as Proportion of all Admissions by ICU Level, Public Sector

	All Admissions	Paediatric Admissions	Paediatric Admissions as % All Admissions
Level 3	45,309	6,725	14.84
Level 2	28,304	384	1.35
Level 1	19,175	98	0.51
<b>Total</b>	<b>92,788</b>	<b>7,207</b>	<b>7.76</b>

*PICU Admissions:*

Minimum 455; Maximum 1,342; Median 754; Mean 859.7

*PICU Readmissions:*

Minimum 2; Maximum 183; Median 87; Mean 83

Figure 42: PICU Bed Hours/Days & Ventilator Hours/Days

Bed Hours	Bed Days	Ventilator Hours	Ventilator Days
87,761 (n=2)	14,374.1 (n=5)	109,787 (n=3)	5,369 (n=4)

*Paediatric admissions:*

- 52.0% of all ICUs (n=89) did not admit paediatric patients (data not available 14.6% n=25 ICUs)
- 5.4% of all ICU admissions were paediatric admissions
- 54.3% (n=63) of public sector ICUs admitted  $\geq 1$  paediatric patient (data not available 31.8% (n=16)
- 34.5% (n=19) of private sector ICUs admitted  $\geq 1$  paediatric patient (data not available 16.4%, n=9)
- 80.2% of paediatric patients were admitted to a paediatric ICU
- 8.5% of paediatric patients were transferred from an adult ICU to a paediatric ICU
- 7 ICUs admitted  $\geq 50$  paediatric patients (PICUs excluded) [range 51 to 331]

## 5.7 Medical Labour Force

Capturing medical labour force data in intensive care settings presents a number of challenges, especially in private sector ICUs where sessional arrangements are common. Only a small number of intensivists practise exclusively in the private sector. Accordingly, information presented in section 5.7 is biased toward public sector ICUs as the data was more readily available and verifiable. Variances between public and private sector ICUs were evident during data analyses.

The data is predominantly focused on full time equivalents (FTE/EFT). The ARCCCR has used the ABS standard with an FTE defined as  $\geq 35$  hours per week.<sup>28</sup> As FTE may vary over the course of a year, data for medical FTE is as at 30<sup>th</sup> June 2001. The AIHW data elements have 'total hours worked by a medical practitioner', 'hours worked by a medical practitioner in direct patient care', and 'hours on-call (not worked) by a medical practitioner'.<sup>10</sup>

An intensivist may be more than one FTE, dependent on the sector and administrative arrangements between ICUs. There may also be additional sessional working arrangements.

An intensivist is defined as a medical practitioner who has specifically trained in intensive care medicine and who has obtained formal certification by completing the requirements of the Joint Faculty of Intensive Care Medicine (JFICM). The survey item required data for 30<sup>th</sup> June 2001 at which time the Faculty of Intensive Care Medicine, Australian and New Zealand College of Anaesthetists (FICANZCA) and the Royal Australasian College of Physicians (RACP) were the accrediting bodies for intensive care training with a specialty qualification recognised by the Joint Specialist Advisory Committee – Intensive Care (JSAC-IC).

Intensive care medicine is a dynamic specialty and the work of an intensivist is quite diverse and not focused solely on direct patient care. The role is a multidimensional one with many intensivists participating in medical emergency teams, retrievals, hyperbaric services, parenteral nutrition services, patient follow-up, professional development, and research and teaching activities. It also includes management and organisational responsibilities and other professional obligations.

'Other specialist' is a medical practitioner with a non-intensive care qualification who is employed in intensive care. Many in the 'other specialist' category have evolved with the specialty of intensive care.

Specialist FTE refers to combined intensivist and other specialist FTE data.

An overview of registrar and resident medical officer FTE is also included.

All ARCCCR medical labour force data is as at 30<sup>th</sup> June 2001.

Table 43: Specialist FTE

Sector	Region	No. ICUs	Intensivist FTE <sup>a</sup>	Other Specialist FTE <sup>b</sup>	Total FTE
Public	NSW	40/46	83.5	10.4	93.9
	VIC	21/23	44.6	6.2	50.8
	QLD	19/22	29.8	6.8	36.6
	SA	9/10	22.1	2.5	24.6
	WA	6/7	21.3	0.1	21.4
	TAS	4/4	6.2	1.0	7.2
	ACT	2/2	4.5	0	4.5
	NT	2/2	2.0	0.4	2.4
	<i>Sub-total</i>		<i>103/116</i>	<i>214.0</i>	<i>27.4</i>
Private	NSW	12/17	13.3	4.0	17.3
	VIC/TAS	10/14	11.9	1.4	13.3
	QLD	9/11	10.5	2.0	12.5
	SA	5/7	7.5	0	7.5
	WA	4/4	3.6	0	3.6
	ACT	1/2	1.5	0	1.5
	<i>Sub-total</i>		<i>41/55</i>	<i>48.3</i>	<i>7.4</i>
<b>Australia</b>		<b>144/171</b>	<b>262.3</b>	<b>34.8</b>	<b>297.1</b>

- Overall, 84.2.7% of ICUs provided data on medical FTE (public sector 88.7%, private sector 74.5%)

a - Intensivist FTE - 226 staff intensivists and 85 sessional intensivists

b - Other Specialist FTE – 89 staff specialists and 119 sessional specialists

Table 44: Specialist FTE, Public Sector Adult ICUs

Region	No. ICUs	Intensivist FTE	Other Specialist FTE	Total FTE
NSW	38/44	74.4	10.4	84.8
VIC	20/22	39.5	6.2	45.7
QLD	18/20	27.0	6.8	33.8
SA	8/9	19.1	2.5	21.6
WA	5/6	19.3	0	19.3
TAS	4/4	6.2	1.	7.2
ACT	2/2	4.5	0	4.5
NT	2/2	2.0	0.4	2.4
<b>Australia</b>	<b>97/109</b>	<b>192.0</b>	<b>27.3</b>	<b>219.3</b>

Table 45: Specialist FTE, Public Sector Level 3 Adult ICUs

Region	Intensivist FTE	Other Specialist FTE	Total FTE
NSW/ACT	60.6	0.2	60.8
VIC	34.7	2.5	37.2
QLD	20.1	1.5	21.6
SA	17.6	1.0	18.6
WA	16.8	0	16.8
TAS	5.2	0	5.2
NT	1.0	0.4	1.4
<b>Australia</b>	<b>156.0</b>	<b>5.6</b>	<b>161.6</b>

- Data from 38 of 38 Level 3 public sector adult ICUs

Table 46: Distribution of Specialist FTE by Bed Stock, Public Sector Level 3 Adult ICUs

Region	Specialist FTE / Available Bed	Specialist FTE / Ventilator Bed	Available Beds / Specialist FTE	Ventilator Beds / Specialist FTE
NSW/ACT	0.26	0.32	3.79	3.07
VIC	0.25	0.28	3.89	3.54
QLD	0.22	0.22	4.44	4.35
SA	0.22	0.28	4.46	3.49
WA	0.28	0.31	3.57	3.21
TAS	0.19	0.30	5.19	3.26
NT	0.17	0.17	5.71	5.71
<b>Australia</b>	<b>0.24</b>	<b>0.29</b>	<b>4.02</b>	<b>3.44</b>

- Data from 38 of 38 Level 3 public sector adult ICUs

Table 47: Specialist FTE by ICU Level, Public Sector ICUs

	NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Total
Level 3	69.9	42.3	24.3	21.6	18.9	5.2	1.4	183.6
Level 2	23.5	7.5	10.6	2.0	2.5	2.0	1.0	49.1
Level 1	5.0	1.0	1.7	1.0	0	0	0	8.7
<b>Australia</b>	<b>98.4</b>	<b>50.8</b>	<b>36.6</b>	<b>24.6</b>	<b>21.4</b>	<b>7.2</b>	<b>2.4</b>	<b>241.4</b>

Table 48: Specialist FTE by ICU Type, Public Sector ICUs

	NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
<i>General ICU</i>	69.7	39.1	26.9	18.6	16.8	3.2	1.4	175.7
<i>ICU/CCU</i>	19.7	6.7	7.0	3.0	2.5	4.0	1.0	43.9
<i>PICU</i>	9.0	5.0	2.7	3.0	2.1	-	-	21.8
<b>Total</b>	<b>98.4</b>	<b>50.8</b>	<b>36.6</b>	<b>24.6</b>	<b>21.4</b>	<b>7.2</b>	<b>2.4</b>	<b>241.4</b>

Table 49: Distribution of Specialists, Public Sector

Region Population*	Intensivist FTE	Other Spec. FTE	Total Spec. FTE	Avail. Beds/ Specialist	Vent. Beds/ Specialist	Specialists/ 100,000	Intensivists/ 100,000
<b>NSW</b> 6,609,304	83.5	10.4	93.9	5.59	3.26	1.42	1.26
<b>VIC</b> 4,822,663	44.6	6.2	50.8	4.82	3.87	1.05	0.92
<b>QLD</b> 3,635,121	29.8	6.8	36.6	5.40	4.39	1.00	0.81
<b>SA</b> 1,514,854	22.1	2.5	24.6	5.89	3.90	1.62	1.45
<b>WA</b> 1,906,114	21.3	0.1	21.4	4.15	3.41	1.12	1.11
<b>TAS</b> 472,931	6.2	1.0	7.2	5.41	3.05	1.52	1.31
<b>ACT</b> 321,680	4.5	0	4.5	4.00	2.66	1.40	1.40
<b>NT</b> 200,019	2.0	0.4	2.4	5.41	4.58	1.20	1.00
<b>Australia</b> 19,482,686	<b>214.0</b>	<b>27.4</b>	<b>241.4</b>	<b>5.26</b>	<b>3.64</b>	<b>1.23</b>	<b>1.09</b>

\*Source: ABS Population Growth Australia and New Zealand, 1991-2001<sup>20</sup>

- Refer to Table 11 for number of available and ventilated beds.
- The ACT also provides critical care services to areas of southern NSW (the catchment area has a population of approximately 500,000).

Table 50: Specialist FTE by Geographic Location, Public Sector

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
Capital City	73.3	42.1	19.8	23.6	21.4	3.2	4.5	1.4
Metropolitan	12.5	3.0	10.5	0	0	0	0	0
Rural / Remote <sup>a</sup>	8.1	5.7	6.3	1.0	0	4.0	0	1.0
<i>Sub-total</i>	93.9	50.8	36.6	24.6	21.4	7.2	4.5	2.4
<b>Australia</b>	<b>241.4</b>							

a – The rural and remote categories have been collapsed in the table due to the small number of ICUs (only two remote ICUs, one had nil ICU specialists and the other, one FTE).

Table 51: Specialist FTE by ARIA Classification, Public Sector

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
Highly Accessible	87.9	49.8	29.0	23.6	21.4	5.2	4.5	0
Accessible	5.5	1.0	6.5	1.0	0	2.0	0	1.4
Moderately Accessible / Remote <sup>a</sup>	0.5	0	0	0	0	0	0	1.0
<i>Sub-total</i>	93.9	50.8	36.6	24.6	21.4	7.2	4.5	2.4
<b>Australia</b>	<b>241.4</b>							

a – The moderately accessible and remote categories have been collapsed in the table due to the small number of ICUs (only two remote ICUs, one had nil ICU specialists and the other, one FTE).

Table 52: Specialist FTE by Population Category, Public Sector

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
> 250,000	74.3	42.1	23.3	23.6	21.4	0	4.5	0
48,000 – 249,999	15.2	7.7	8.3	0	0	5.2	0	1.4
18,000 – 47,999	2.9	1.0	3.0	1.0	0	2.0	0	1.0
5,000 – 17,999	1.5	0	2.0	0	0	0	0	0
<i>Sub-total</i>	93.9	50.8	36.6	24.6	21.4	7.2	4.5	2.4
<b>Australia</b>	<b>241.4</b>							

Table 53: Variations in Available Data

	1995	1996	1997	1998	1999/2000	2000/2001
AIHW <sup>a</sup>	174	260	220	232		
ARCCCR <sup>b</sup>	90.0	124.7	260.1	290.5	305.8	297.0
AMWAC <sup>c</sup>			353			

a - main specialty of practice (number of persons)<sup>29</sup>

b - specialist FTE

c - Level II and III ICUs (number of persons)<sup>30</sup>

*Other data sources:*

- JFICM (2002): 420 fellows (330 resident in Australia)<sup>31</sup>
- ANZICS (2002): 300 full members + 19 provisional full members (Australia)<sup>32</sup>
- AIHW (2000): 282 persons with ICU qualification<sup>29</sup>

There is some variation between the data sources due to the ways in which ICU specialists are calculated e.g. % time worked in ICU; number of persons; FTE.

Table 54: Composition of Specialist FTE, Public Sector

	1995	1996	1997	1998	1999/2000	2000/2001
Intensivist FTE					191.4	214.0
Other Specialist FTE					53.6	27.4
<b>Total Specialist FTE</b>	<b>78.2</b>	<b>112.3</b>	<b>210.9</b>	<b>225.9</b>	<b>245.0</b>	<b>241.4</b>

- a - 2000/2001: Intensivist FTE - 226 staff specialists and 85 sessional intensivists  
 Other Specialist FTE – 89 staff specialists and 119 sessional specialists  
 b - 1999/2000: Intensivist FTE – 272 specialists on the roster  
 Other Specialist FTE – 258 specialists on the roster

Table 44 illustrates changes in the composition of the ICU work force with an increased ratio of intensivists to other specialists in 2000/2001.

Table 55: Reported Specialist Vacancies, Public Sector

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Australia
<b>2000/2001</b>	<b>8.0</b>	<b>2.6</b>	<b>7.0</b>	<b>0</b>	<b>1.0</b>	<b>0.4</b>	<b>0</b>	<b>0</b>	<b>19.0</b>
1999/2000	5.0	1.0	1.5	0	1.0	1.0	0	1.0	<b>10.5</b>

Table 45 shows a significant increase in reported FTE vacancies for 2000/2001. This is corroborated by advertisements for intensivists in *The Australian* newspaper.

The Australian Medical Workforce Advisory Committee in its report on the intensive care workforce proposed ICU specialist benchmarks.<sup>30</sup>

'The Working Party considers a minimum of four FTE intensive care specialists are needed for a ten bed ICU with usual occupancy and casemix. To provide adequate internal cover for annual leave, study leave, sickness etc., the Working Party considers that five FTE intensive care specialists would be desirable. The Working Party also believes that a benchmark of five specialists per ten beds is required to provide adequate staffing and maintain teaching, research, quality assurance activities and participation in hospital management structures'.<sup>30</sup> (p11)

Table 56: Specialist FTE Benchmarks & FTE Gap, Level 3 ICUs, Public Sector

		NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
	<i>Total Specialist FTE</i>	69.9	42.3	24.3	21.6	18.9	5.2	1.4	<b>183.6</b>
2000/2001	<i>Recommended FTE*</i>	101.2	65.2	43.6	38.8	26.4	10.8	3.2	<b>289.2</b>
	<i>FTE Gap</i>	31.3	22.9	19.3	17.2	7.5	5.6	1.8	<b>105.6</b>
	<i>Total Specialist FTE</i>	58.9	45.2	30.0	19.7	16.7	4.4	1.9	<b>176.8</b>
1999/2000	<i>Recommended FTE*</i>	84.4	76.4	42.0	33.6	25.6	7.2	2.4	<b>271.6</b>
	<i>FTE Gap</i>	25.5	31.2	12.0	13.9	8.9	2.8	0.5	<b>94.8</b>

\* Source: As recommended by AMWAC<sup>30</sup>

Table 57: Specialist FTE Benchmarks\*, Level 3 ICUs, Public Sector

		NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
4 FTE Specialists/ 10 Available Beds	Total Specialist FTE	69.9	42.3	24.3	21.6	18.9	5.2	1.4	<b>183.6</b>
	Recommended FTE	101.2	65.2	43.6	38.8	26.4	10.8	3.2	<b>289.2</b>
	FTE Gap	31.3	22.9	19.3	17.2	7.5	5.6	1.8	<b>105.6</b>
	Reported Vacant FTE	2.9	0.6	3.0	0	1.0	0	0	<b>7.5</b>
5 FTE Specialists/ 10 Available Beds	Total Specialist FTE	69.9	42.3	24.3	21.6	18.9	5.2	1.4	<b>183.6</b>
	Recommended FTE	126.5	81.5	54.5	48.5	33.0	13.5	4.0	<b>361.5</b>
	FTE Gap	56.6	39.2	30.2	26.9	14.1	8.3	2.6	<b>177.9</b>
	Reported Vacant FTE	2.9	0.6	3.0	0	1.0	0	0	<b>7.5</b>
4 FTE Specialists/ 10 Ventilator Beds	Total Specialist FTE	69.9	42.3	24.3	21.6	18.9	5.2	1.4	<b>183.6</b>
	Recommended FTE	83.6	62.4	44.0	30.8	25.6	6.8	3.2	<b>256.4</b>
	FTE Gap	13.7	20.1	19.7	9.2	6.7	1.6	1.8	<b>72.8</b>
	Reported Vacant FTE	2.9	0.6	3.0	0	1.0	0	0	<b>7.5</b>
5 FTE Specialists/ 10 Ventilator Beds	Total Specialist FTE	69.9	42.3	24.3	21.6	18.9	5.2	1.4	<b>183.6</b>
	Recommended FTE	104.5	78.0	55.0	38.5	32.0	8.5	4.0	<b>320.5</b>
	FTE Gap	34.6	35.7	30.7	16.9	13.1	3.3	2.6	<b>136.9</b>
	Reported Vacant FTE	2.9	0.6	3.0	0	1.0	0	0	<b>7.5</b>

\* Source: As recommended by AMWAC<sup>30</sup>

- Predicated on maintaining a full complement of available/ventilator beds.
- No assumptions re occupancy levels, ICU bed type, casemix or specialist skill mix.
- 1 region has equivalent numbers available/ventilator beds
- 1 region has ventilator beds > available beds

Table 58: Specialist FTE Benchmarks\*, Level 3 Public Sector Adult ICUs

		NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
4 FTE Specialists/ 10 Available Beds	Total Specialist FTE	60.8	37.2	21.6	18.6	16.8	5.2	1.4	<b>161.6</b>
	Recommended FTE	92.4	58.0	38.4	33.2	24.0	10.8	3.2	<b>260.0</b>
	FTE Gap	31.6	20.8	16.8	14.6	7.2	5.6	1.8	<b>98.4</b>
	Reported Vacant FTE	2.9	0.6	2.0	0	0	0	0	<b>5.5</b>
5 FTE Specialists/ 10 Available Beds	Total Specialist FTE	60.8	37.2	21.6	18.6	16.8	5.2	1.4	<b>161.6</b>
	Recommended FTE	115.5	72.5	48.0	41.5	30.0	13.5	4.0	<b>325.0</b>
	FTE Gap	54.7	35.3	26.4	22.9	13.2	8.3	2.6	<b>163.4</b>
	Reported Vacant FTE	2.9	0.6	2.0	0	0	0	0	<b>5.5</b>
4 FTE Specialists/ 10 Ventilator Beds	Total Specialist FTE	60.8	37.2	21.6	18.6	16.8	5.2	1.4	<b>161.6</b>
	Recommended FTE	74.8	52.8	37.6	26.0	21.6	6.8	3.2	<b>222.8</b>
	FTE Gap	14.0	15.6	16.0	7.4	4.8	1.6	1.8	<b>61.2</b>
	Reported Vacant FTE	2.9	0.6	2.0	0	0	0	0	<b>5.5</b>
5 FTE Specialists/ 10 Ventilator Beds	Total Specialist FTE	60.8	37.2	21.6	18.6	16.8	5.2	1.4	<b>161.6</b>
	Recommended FTE	93.5	66.0	47.0	32.5	27.0	8.5	4.0	<b>278.5</b>
	FTE Gap	32.7	28.8	25.4	13.9	10.2	3.3	2.6	<b>116.9</b>
	Reported Vacant FTE	2.9	0.6	2.0	0	0	0	0	<b>5.5</b>

\* Source: As recommended by AMWAC<sup>30</sup>

- Predicated on maintaining a full complement of available/ventilator beds.
- No assumptions re occupancy levels, ICU bed type, casemix or specialist skill mix.
- 1 region has equivalent numbers available/ventilator beds.

Table 59: ICU Directors with JSAC-IC Recognised Qualification

		NSW n (%)	VIC n (%)	QLD n (%)	SA n (%)	WA n (%)	TAS n (%)	ACT n (%)	NT n (%)	Australia n (%)
<b>Public Sector</b>	Level 3	14/14 (100%)	11/11 (100%)	8/8 (100%)	4/4 (100%)	4/4 (100%)	2/2 (100%)	1/1 (100%)	1/1 (100%)	45/45 (100%)
	Level 2	8/16 (50%)	3/11 (27%)	4/9 (44%)	1/2 (50%)	1/1 (100%)	0/2 (0%)	-	1/1 (100%)	18/42 (43%)
	Level 1	2/16 (12%)	0/1 (0%)	2/5 (40%)	0/4 (0%)	0/2 (0%)	-	1/1 (100%)	-	5/29 (17%)
<b>Private Sector</b>	Level 3	7/8 (87%)	5/5 (100%)	6/6 (100%)	3/3 (100%)	1/1 (100%)	-	-	-	22/23 (96%)
	Level 2	6/7 (86%)	6/6 (100%)	3/4 (75%)	3/3 (100%)	3/3 (100%)	1 (100%)	1/2 (50%)	-	23/26 (88%)
	Level 1	1/2 (50%)	1/2 (50%)	1/1 (100%)	1/1 (100%)	-	-	-	-	4/6 (67%)

## Registrars and Residents

Table 60: Registrar & Resident FTE by Sector & Region

Sector	Region	No. ICUs	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Public	NSW	44/44	34.0	90.8	93.8	24.0
	VIC	21/22	20.0	68.0	55.4	20.0
	QLD	18/20	14.0	60.2	18.3	4.0
	SA	9/9	10.0	26.0	7.0	1.0
	WA	6/6	5.0	16.2	18.0	0
	TAS	4/4	2.0	5.0	5.0	5.0
	ACT	1/2	2.0	4.0	4.0	0
	NT	2/2	1.0	5.0	1.0	0
	<i>Sub-total</i>	<i>105/116</i>	<i>88.0</i>	<i>275.2</i>	<i>202.5</i>	<i>54.0</i>
Private	NSW	11/17	4.0	18.0	11.0	30.5
	VIC/TAS	12/14	4.5	31.0	16.0	2.0
	QLD	8/11	2.0	6.0	31.4	6.5
	SA	5/7	0	8.0	14.0	5.0
	WA	4/4	0	1.0	13.6	0
	ACT	1/2	0	0	0	5.5
	<i>Sub-total</i>	<i>41/55</i>	<i>10.5</i>	<i>64.0</i>	<i>86.0</i>	<i>49.5</i>
<b>Australia</b>	<b>146/171</b>	<b>98.5</b>	<b>339.2</b>	<b>288.5</b>	<b>103.5</b>	

Table 61: Registrar & Resident FTE by ICU Level, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
<i>Level 3</i>	87.0	215.9	128.7	0
<i>Level 2</i>	1.0	54.3	57.7	42.0
<i>Level 1</i>	0	5.0	16.1	12.0
<b>Australia</b>	<b>88.0</b>	<b>275.2</b>	<b>202.5</b>	<b>54.0</b>

Table 62: Registrar & Resident FTE by ICU Type, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
General	79.0	212.4	137.8	4.0
ICU/CCU	1.0	23.8	64.7	50.0
PICU	8.0	39.0	0	0
<b>Australia</b>	<b>88.0</b>	<b>275.2</b>	<b>202.5</b>	<b>54.0</b>

Table 63: Registrar & Resident FTE by Geographic Location, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Capital City	75.0	238.0	143.8	8.0
Metropolitan	12.0	27.0	14.1	8.0
Rural	1.0	8.2	44.6	37.0
Remote	0	2.0	0	1.0
<b>Australia</b>	<b>88.0</b>	<b>275.2</b>	<b>202.5</b>	<b>54.0</b>

Table 64: Registrar & Resident FTE by ARIA Classification, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Highly Accessible	86.0	264.2	182.5	21.0
Accessible	2.0	9.0	16.0	32.0
Moderately Accessible	0	0	4.0	0
Remote	0	2.0	0	1.0
<b>Australia</b>	<b>88.0</b>	<b>275.2</b>	<b>202.5</b>	<b>54.0</b>

Table 65: Registrar & Resident FTE by Population Category, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
> 250,000	77.0	237.0	140.9	8.0
48,000-249,999	11.0	29.2	46.2	22.0
18,000-47,999	0	5.0	13.4	24.0
5,000-17,999	0	4.0	2.0	0
<b>Australia</b>	<b>88.0</b>	<b>275.2</b>	<b>202.5</b>	<b>54.0</b>

## 5.8 Nurse Labour Force

The term Registered Nurse (RN) refers to a nurse who has completed a three-year hospital or tertiary sector education program and who has attained a qualification at certificate level (minimum). A nurse must be on the register maintained by the State or Territory board or nursing council to practise nursing in that State or Territory. A critical care qualification was defined for the purposes of the survey as an award at a minimum of certificate level obtained by successful completion of an accredited critical care program ( $\geq 6$  months duration) at a hospital or tertiary institution.

The ARCCCR uses the ABS standard with an FTE defined as  $\geq 35$  hours worked per week.<sup>28</sup>

All ARCCCR RN data is as at 30<sup>th</sup> June 2001.

Table 66: RN FTE, No. of RNs & No. with Critical Care Qualification by Sector & Region

Sector	Region	No. ICUs	RN FTE	No. RNs On Roster	No. Crit Care Qual	% RNs Crit Care Qual
Public	NSW	45/46	1,678.0	1,950	864	44.3
	VIC	23/23	980.6	1,370	928	67.7
	QLD	21/22	850.9	1,032	457	44.2
	SA	10/10	447.9	568	319	56.1
	WA	6/7	269.0	313	130	41.5
	TAS	4/4	102.60	130	75	57.6
	ACT	2/2	68.00	82	37	45.1
	NT	2/2	68.80	75	33	43.9
	<i>Sub-total</i>	<i>113/116</i>	<i>4,465.8</i>	<i>5,520</i>	<i>2,843</i>	<i>51.5</i>
Private	NSW	16/17	251.4	308	170	55.1
	VIC/TAS	13/14	240.5	342	225	65.7
	QLD	11/11	290.1	366	168	45.9
	SA	7/7	165.2	205	92	44.8
	WA	4/4	68.3	83	47	56.6
	ACT	2/2	24.5	35	12	34.2
	<i>Sub-total</i>	<i>53/55</i>	<i>1,040.0</i>	<i>1,339</i>	<i>714</i>	<i>53.3</i>
<b>Australia</b>		<b>166/171</b>	<b>5,505.8</b>	<b>6,859</b>	<b>3,557</b>	<b>51.8</b>

Table 67: RN FTE, No. of RNs & No. & Proportion Qualified by Sector and ICU Level

Sector	ICU Level	RN FTE	No. RNs on Roster	No. Critical Care Qualification	% RNs Critical Care Qualification
Public	Level 3	3,056.3	3,795	2,000	52.7
	Level 2	995.6	1,206	637	52.8
	Level 1	413.9	519	206	39.6
	Sub-total	4,465.8	5,520	2,843	51.5
Private	Level 3	640.7	761	428	56.2
	Level 2	347.3	500	246	49.2
	Level 1	52.0	78	40	51.2
	Sub-total	1,040.0	1,339	714	53.3
<b>Australia</b>		<b>5,505.8</b>	<b>6,859</b>	<b>3,557</b>	<b>51.8</b>

Table 68: RN FTE, No. of RNs & Proportion Qualified by Sector and ICU Type

Sector	ICU Type	RN FTE	No. RNs on Roster	No. Critical Care Qualification	% RNs Critical Care Qualification
Public	General	3,023.8	3,721	1,919	51.5
	ICU/CCU	1,098.2	1,383	740	53.5
	PICU	343.8	416	184	44.2
	Sub-total	4,465.8	5,520	2,843	51.5
Private	General	644.8	789	447	56.6
	ICU/CCU	375.5	525	251	47.8
	Specialty	19.7	25	16	64.0
	Sub-total	1,040.0	1,339	714	53.3
<b>Australia</b>		<b>5,505.8</b>	<b>6,859</b>	<b>3,557</b>	<b>51.8</b>

Table 69: RN FTE, Vacancies and Casual Shifts/Week by Sector & Region

Sector	Region	No. ICUs	RN FTE	RN FTE Vacancies	Casual Shifts/Week	Vacancy Rate (%)
Public	NSW	45/46	1,678.0	124.1	668.7	6.8
	VIC	23/23	980.6	155.0	377.6	13.6
	QLD	21/22	850.9	46.6	234.0	5.1
	SA	10/10	447.9	36.0	165.5	7.4
	WA	6/7	269.0	9.3	112.0	3.3
	TAS	4/4	102.6	13.3	46.0	11.4
	ACT	2/2	68.0	12.0	5.9	15.0
	NT	2/2	68.8	9.0	66.0	11.5
	<i>Sub-total</i>	<i>113/116</i>	<i>4,465.8</i>	<i>405.3</i>	<i>1,675.7</i>	<i>8.3</i>
Private	NSW	16/17	251.4	46.5	205.2	15.6
	VIC/TAS <sup>a</sup>	13/14	240.5	60.9	242.3	20.2
	QLD	11/11	290.1	47.1	142.2	13.9
	SA	7/7	165.2	21.2	243.2	11.3
	WA	4/4	68.3	25.1	75.0	26.8
	ACT	2/2	24.5	4.0	11.0	14.0
	<i>Sub-total</i>	<i>53/55</i>	<i>1,040.0</i>	<i>204.8</i>	<i>918.9</i>	<i>16.4</i>
<b>Australia</b>		<b>166/171</b>	<b>5,505.8</b>	<b>610.1</b>	<b>2,594.6</b>	<b>9.9</b>

a – vacancy rate Victoria: 20.0%; Tasmania 21.4%

Table 70: RN FTE, Vacancies & Casual Shifts/Week Public Sector Adult ICUs

Region	No. ICUs	RN FTE	RN FTE Vacancies	Casual Shifts/Week
<b>NSW</b>	43/44	1,535.0	119.1	615.7
<b>VIC</b>	22/22	933.3	137.3	321.6
<b>QLD</b>	19/20	781.4	46.6	221.0
<b>SA</b>	9/9	392.9	29.0	155.5
<b>WA</b>	5/6	240.0	8.3	97.0
<b>TAS</b>	4/4	102.6	13.3	46.0
<b>ACT</b>	2/2	68.0	12.0	5.9
<b>NT</b>	2/2	68.8	9.0	66.0
<b>Australia</b>	<b>106/109</b>	<b>4,122.0</b>	<b>374.6</b>	<b>1,528.7</b>

NSW Health posts RN FTE positions being actively recruited by specialty on a monthly basis on the website of the Chief Nursing Officer. In June 2001 there were 142.4 positions listed for intensive care with 114.7 RN FTE positions in the metropolitan region, 12.7 RN FTE positions in rural regions and 15.0 RN FTE positions in paediatric intensive care.<sup>33</sup>

Table 71: RN FTE, Vacancies & Casual Shifts/Week by Sector & ICU Level

Sector	ICU Level	RN FTE	RN FTE Vacancies	Casual Shifts/Week	Vacancy Rate (%)
Public	Level 3	3,056.3	293.8	1,067.2	8.7
	Level 2	995.6	75.0	375.5	7.0
	Level 1	413.9	36.5	233.0	8.1
	Sub-total	4,465.8	405.3	1,675.7	8.3
Private	Level 3	640.7	108.4	538.4	14.4
	Level 2	347.3	82.4	294.0	19.1
	Level 1	52.0	14.0	86.5	21.2
	Sub-total	1,040.0	204.8	918.9	16.4
<b>Australia</b>		<b>5,505.8</b>	<b>610.1</b>	<b>2,594.6</b>	<b>9.9</b>

Table 72: RN FTE, Vacancies, Casual Shifts/Week by Sector & ICU Type

Sector	ICU Type	RN FTE	RN FTE Vacancies	Casual Shifts/Week	Vacancy Rate (%)
Public	General	3,023.8	289.7	1,018.7	8.7
	ICU/CCU	1,098.2	85.0	510.0	7.1
	PICU	343.8	30.6	147.0	8.1
	Sub-total	4,465.8	405.3	1,675.7	8.3
Private	General	644.8	133.0	609.7	17.0
	ICU/CCU	375.5	71.8	250.2	16.0
	Specialty	19.7	0	59.0	0
Sub-total	1,040.0	204.8	918.9	16.4	
<b>Australia</b>		<b>5,505.8</b>	<b>610.1</b>	<b>2,594.6</b>	<b>9.9</b>

Table 73: RN FTE, No. of RNs & No. with Critical Care Qualification by Geographic Location

Sector	Geographical Location	RN FTE	No. RNs on Roster	No. Critical Care Qualification	RN FTE Vacancies	Casual Shifts/Week
Public	Capital City	3,323.5	4,057	2,063	334.4	1,304.2
	Metropolitan	443.3	550	284	15.6	97.0
	Rural	668.8	881	484	52.8	224.5
	Remote	30.2	32	12	2.5	50.0
	Sub-total	4,465.8	5,520	2,843	405.3	1,675.7
Private	Capital City	947.8	1,204	640	189.8	863.6
	Metropolitan	56.7	88	57	13.0	43.3
	Rural	35.5	47	17	2.0	12.0
	Sub-total	1,040.0	1,339	714	204.8	918.9
<b>Australia</b>		<b>5,505.8</b>	<b>6,859</b>	<b>3,557</b>	<b>610.1</b>	<b>2,594.6</b>

Table 74: RN FTE, No. of RNs & No. with Critical Care Qualification by ARIA Classification

Sector	ARIA Classification	RN FTE	No. RNs on Roster	No. Critical Care Qualification	Vacant RN FTE	Casual Shifts/Week
Public	Highly Accessible	4,034.2	4,966	2,562	373.8	1,421.7
	Accessible	362.6	476	246	28.1	201.0
	Moderately Accessible	38.8	46	23	0.9	3.0
	Remote	30.2	32	12	2.5	50.0
	Sub-total	4,465.8	5,520	2,843	405.3	1,675.7
Private	Highly Accessible	1,019.0	1,310	697	200.8	912.9
	Accessible	21.0	29	17	4.0	6.0
	Sub-total	1,040.0	1,339	714	204.8	918.9
<b>Australia</b>		<b>5,505.8</b>	<b>6,859</b>	<b>3,557</b>	<b>610.1</b>	<b>2,594.6</b>

Table 75: RN FTE, No. of RNs & No. with Critical Care Qualification by Population Category

Sector	Population Category	RN FTE	No. RNs on Roster	No. Critical Care Qualification	Vacant RN FTE	Casual Shifts/Week
Public	> 250,000	3,323.1	4,092	2,078	315.0	1,221.7
	48,000-249,999	688.3	818	462	62.1	235.0
	18,000-47,999	358.8	486	249	24.3	177.0
	5,000-17,999	95.6	124	54	3.9	42.0
	Sub-total	4,465.8	5,520	2,843	405.3	1,675.7
Private	>250,000	932.1	1,183	628	189.8	853.6
	48,000-249,999	107.9	156	86	15.0	65.3
	Sub-total	1,040.0	1,339	714	204.8	918.9
<b>Australia</b>		<b>5,505.8</b>	<b>6,859</b>	<b>3,557</b>	<b>610.1</b>	<b>2,594.6</b>

Table 76: RN FTE Distribution, Public & Private Sectors

Region Population*	Public & Private Sectors		
	RN FTE / Available Bed	RN FTE / Ventilator Bed	RN FTE / 100,000
<b>NSW</b> 6,609,304	2.86	4.66	29.19
<b>VIC</b> 4,822,663	3.29	4.21	24.75
<b>QLD</b> 3,635,121	3.46	4.60	31.38
<b>SA</b> 1,514,854	2.86	4.17	40.49
<b>WA</b> 1,906,114	2.81	3.70	18.48
<b>TAS</b> 472,931	2.60	5.20	27.54
<b>ACT</b> 321,680	2.56	5.44	28.81
<b>NT</b> 200,019	5.29	6.25	34.40
<b>Australia</b> 19,482,686	<b>3.05</b>	<b>4.44</b>	<b>28.26</b>

\* Source: ABS Population Growth Australia and New Zealand, 1991-2001<sup>20</sup>

See Table 11 for number of available and ventilator beds.

Table 77: No. RN Critical Care Students & No. of Nurse Educators<sup>a</sup>

	Region	No. RNs – Critical Care Courses	Total Hours Nurse Educator(s) (per week)	Mean Hours Nurse Educator (per week)	Median Hours Nurse Educator (per week)
Public	NSW	133	1,077.9	23.9	20.0
	VIC	190	1,190.0	51.7	40.0
	QLD	110	662.0	31.5	38.0
	SA	48	214.0	23.7	7.0
	WA	33	290.0	48.3	45.0
	TAS	10	82.0	20.5	19.0
	ACT	7	38.0	19.0	- <sup>b</sup>
	NT	4	58.0	29.0	- <sup>b</sup>
	<i>Sub-Total</i>	<b>535</b>	<b>3,611.9</b>	<b>32.2</b>	<b>34.5</b>
	Private	NSW	17	240.0	15.0
VIC/TAS		36	233.7	- <sup>c</sup>	- <sup>c</sup>
QLD		35	266.0	24.1	20.0
SA		25	32.0	4.5	-
WA		10	105.0	26.2	25.5
ACT		11	16.0	8.0	- <sup>b</sup>
<i>Sub-Total</i>		<b>134</b>	<b>892.7</b>	<b>16.8</b>	<b>16.0</b>
<b>Australia</b>	<b>669</b>	<b>4,504.6</b>	<b>27.3</b>	<b>20.0</b>	

a - Nurse Educator – number of rostered hours per week of nurse educator(s) [includes clinical / lectures on site but not at university / other educational facility].

b - Unable to be calculated, two locations only in each region.

c - Victoria: 17.8 (mean); 15.1 (median); Tasmania single location only.

The ACCCN has recommended that each ICU should have a designated clinical nurse educator (CNE) with a ratio of one CNE per fifty nurses on the ICU roster. Tertiary level critical care courses should have additional CNEs allocated.<sup>34</sup>

Table 78: RN Critical Care Students by Sector and ICU Level

	Public Sector	Private Sector
Level 3	396	71
Level 2	115	58
Level 1	24	5
<i>Sub-total</i>	<b>535</b>	<b>134</b>
<b>Total</b>	<b>669</b>	

Table 79: RN Critical Care Students by Sector and ICU Type

	Public Sector	Private Sector
General	389	98
ICU/CCU	108	36
PICU	38	-
<i>Sub-total</i>	<i>535</i>	<i>134</i>
<b>Total</b>	<b>669</b>	

Overall, 48.8% (n=327) of RN critical care students had course fees or Higher Education Contribution Scheme (HECS) fees subsidised by the hospital or the ICU; 38.1% (n=255) in public sector ICUs and 10.7% (n=72) in private sector ICUs.

### Estimating Required RN FTE

A number of recommendations and standards have been proposed that include methods for estimation of clinical nursing requirements for intensive care.<sup>9, 25, 27-29, 35-41</sup> These methods are generally derived from standards and policies and typically include factors such as nurse/patient ratios, RN type and qualifications, patient acuity, ICU type and level, and prevailing professional practices.

RN FTE, vacant RN FTE and RN FTE gap by sector and ICU level, to estimate the minimum number of RN FTE required to staff these beds are shown in Tables 79-82. No assumptions were made for occupancy levels, RN skill mix and ICU bed type. The required RN FTE were for clinical, education and management positions in European critical care contexts and were based on the work of Ferdinande et al.<sup>37</sup> The minimum requirements stipulate 6 nurse FTE/Level 3 ICU bed; 4 nurse FTE/Level 2 ICU bed and 2 nurse FTE/Level 1 ICU bed.<sup>37</sup> These simple calculations were performed as an exercise to examine the differences in current supply and demand. Proposed is the minimum number of RN FTE likely to be required.

The required RN FTE projections are less than those proposed by the Audit Commission in England with 6.3 nurses/bed<sup>36</sup>, and in Australia by Williams and Clarke, with 6.7 nurse FTE/ICU bed and 3.89 nurse FTE/HDU bed.<sup>38</sup>

Table 80: Recommended RN FTE for Available Beds, Level 3 ICUs by Sector & Region

Sector	Region	RN FTE	Recommended RN FTE*	RN FTE Gap	No. RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>
Public	NSW/ACT	1,099.3	1,518	418.7	94.0	358.6
	VIC	701.7	978	276.3	117.5	291.6
	QLD	558.8	654	95.2	24.0	122.0
	SA	342.9	582	239.1	32.0	115.0
	WA	231.4	396	164.6	8.3	101.0
	TAS	75.3	162	86.7	9.0	38.0
	NT <sup>b</sup>	47.0	48.0	1.0	9.0	41.0
	<i>Sub-Total</i>	<i>3,056.4</i>	<i>4,338</i>	<i>1,281.6</i>	<i>293.8</i>	<i>1,067.2</i>
Private	NSW/ACT	184.6	540	355.4	27.0	99.2
	VIC/TAS	136.1	324	187.9	28.5	137.0
	QLD	210.0	528	318.0	31.3	105.0
	SA	92.1	198	105.9	11.6	148.2
	WA	17.8	60	42.2	10.0	49.0
	<i>Sub-Total</i>	<i>640.6</i>	<i>1,650</i>	<i>1,009.4</i>	<i>108.4</i>	<i>538.4</i>
<b>Australia</b>		<b>3,697.0</b>	<b>5,988</b>	<b>2,291.0</b>	<b>402.2</b>	<b>1,605.6</b>

\*Source: Ferdinande et al (1997)<sup>37</sup>

a - average number of shifts ( $\geq 4$  hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

b - Number of available beds varies according to service demands.

- Predicated on maintaining a full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix).
- These estimations include clinical, management and education RN FTE positions.
- Calculations for RN FTE projections in the Northern Territory are potentially misleading and should be interpreted with caution. This is due to the relative isolation and small size of the ICUs which are required to 'flex up' with additional ICU beds to meet service demands.

See Table 17 for number of Level 3 available beds.

Table 81: Recommended RN FTE for Available Beds, Level 3 Adult Public Sector ICUs

Region	RN FTE	Recommended RN FTE*	RN FTE Gap	No. RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>
NSW/ACT	956.3	1,386	429.7	89.0	305.6
VIC	654.2	870	215.8	99.8	235.6
QLD	489.2	576	86.8	24.0	109.0
SA	287.9	498	210.1	25.0	105.0
WA	202.4	360	157.6	7.3	86.0
TAS	75.3	162	86.7	9.0	38.0
NT	47.0	48	1.0	9.0	41.0
<b>Australia</b>	<b>2,712.3</b>	<b>3,900</b>	<b>1,187.7</b>	<b>263.1</b>	<b>920.2</b>

\*Source: Ferdinande et al (1997)<sup>37</sup>

a - average number of shifts ( $\geq 4$  hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

b - Number of available beds varies according to service demands.

- Predicated on maintaining a full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix).
- These estimations include clinical, management and education RN FTE positions.
- Calculations for RN FTE projections in the Northern Territory are potentially misleading and should be interpreted with caution. This is due to the relative isolation and small size of the ICUs which are required to 'flex up' with additional ICU beds to meet service demands.

Table 82: Recommended RN FTE for Available Beds, Level 2 ICUs by Sector & Region

Sector	Region	RN FTE	Recommended RN FTE*	Shortfall RN FTE	No. RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>
Public	NSW/ACT	381.6	568	186.4	20.0	169.0
	VIC	270.0	308	38.0	33.6	86.0
	QLD	226.9	256	29.1	17.1	59.0
	SA	43.4	72	28.6	0	20.5
	WA	24.5	40	15.5	0	8.0
	TAS	27.3	48	20.7	4.3	8.0
	NT	21.8	20	0	0	25.0
	<i>Sub-Total</i>		<i>995.5</i>	<i>1,312</i>	<i>318.3</i>	<i>75.0</i>
Private	NSW/ACT	75.2	268	192.8	22.5	94.0
	VIC/TAS	84.4	248	163.6	24.5	74.3
	QLD	71.7	144	72.3	10.8	14.7
	SA	65.5	112	46.5	9.5	85.0
	WA	50.5	104	53.5	15.1	26.0
	<i>Sub-Total</i>		<i>347.3</i>	<i>876</i>	<i>528.7</i>	<i>82.4</i>
<b>Australia</b>		<b>1,342.8</b>	<b>2,188</b>	<b>847.0</b>	<b>157.4</b>	<b>669.5</b>

\*Source: Ferdinande et al (1997)<sup>37</sup>

a - average number of shifts ( $\geq 4$  hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

b - Number of available beds varies according to service demands.

- Predicated on maintaining a full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix).
- These estimations include clinical, management and education RN FTE positions.
- Calculations for RN FTE projections in the Northern Territory are potentially misleading and should be interpreted with caution. This is due to the relative isolation and small size of the ICUs which are required to 'flex up' with additional ICU beds to meet service demands.

See Table 17 for number of Level 2 available beds.

Table 83: Recommended RN FTE for Available Beds, Level 1 ICUs by Sector & Region

Sector	Region	RN FTE	Recommended RN FTE*	RN FTE Gap	No. RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>
Public	NSW/ACT	265.0	296	31.0	22.0	147.0
	VIC	9.0	10	1.0	4.0	0
	QLD	65.3	50	0	5.5	53.0
	SA	61.5	60	0	4.0	30.0
	WA <sup>b</sup>	13.1	26	12.9	1.0	3.0
	<i>Sub-Total</i>	<i>413.9</i>	<i>442</i>	<i>44.9</i>	<i>36.5</i>	<i>233.0</i>
Private	NSW	16.1	20	3.9	1.0	23.0
	VIC	20.0	24	4.0	8.0	31.0
	QLD	8.4	14	5.6	5.0	22.5
	SA	7.6	16	8.4	0	10.0
	<i>Sub-Total</i>	<i>52.1</i>	<i>74</i>	<i>21.9</i>	<i>14.0</i>	<i>86.5</i>
<b>Australia</b>		<b>466.0</b>	<b>516</b>	<b>80.8</b>	<b>50.5</b>	<b>319.5</b>

\*Source: Ferdinande et al (1997)<sup>37</sup>

a - average number of shifts (≥ 4 hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

b – data from one of two sites only

- Predicated on maintaining a full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix).
- These estimations include clinical, management and education RN FTE positions.

See Table 17 for number of Level 1 available beds.

Table 84: Bedside RN FTE & Required FTE by Region & ICU Level, Public Sector Adult ICUs  
(calculated for 85% Occupancy Rate)

		NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
<b>Level 3</b>	RN FTE	956.3	654.2	489.2	287.9	202.4	75.3	47.0	<b>2,712.3</b>
	Required FTE <sup>a</sup>	1,234.8	774.9	516.6	447.3	321.3	144.9	44.1	<b>3,483.9</b>
	FTE Gap	278.5	120.7	27.4	159.4	118.9	69.6	0	<b>771.6</b>
	Reported FTE Vacancies	89.0	99.8	24.0	25.0	7.3	9.0	9.0	<b>263.1</b>
<b>Level 2</b>	RN FTE	381.6	270.0	226.9	43.4	24.5	27.3	21.8	<b>995.5</b>
	Required FTE <sup>b</sup>	617.1	331.5	275.4	76.5	45.9	51.0	20.4	<b>1,422.9</b>
	FTE Gap	235.5	61.5	48.5	33.1	21.4	23.7	0	<b>427.4</b>
	Reported FTE Vacancies	20.0	33.6	17.1	0	0	4.3	0	<b>75.0</b>
<b>Level 1</b>	RN FTE	265.0	9.0	65.3	61.5	13.1 <sup>e</sup>	-	-	<b>413.9</b>
	Required FTE <sup>c</sup>	592.2	18.8	98.7	122.2	51.7	-	-	<b>883.6</b>
	FTE Gap	327.2	9.8	33.4	60.7	38.6	-	-	<b>469.7</b>
	Reported FTE Vacancies	22.0	4.0	5.5	4.0	1.0	-	-	<b>36.5</b>
<b>All</b>	RN FTE	1,602.9	933.2	781.4	392.8	240.0	102.6	68.8	<b>4,121.7</b>
	Required FTE <sup>d</sup>	2,160.3	1,100.1	894.9	632.7	404.7	188.1	62.7	<b>5,808.3</b>
	FTE Gap	557.4	166.9	113.5	239.9	164.7	85.5	0	<b>1,686.6</b>
	Reported FTE Vacancies	131.0	137.4	46.6	29.0	8.3	13.3	9.0	<b>374.6</b>

\* Source: AHWAC *The Critical Care Nurse Workforce in Australia 2001-2011(forthcoming)*<sup>42</sup>

a – 6.3 RN FTE/available bed

b – 5.1 RN FTE/available bed

c – 4.7 RN FTE/available bed

d – 5.7 RN FTE/available bed

e– data from one ICU only – estimated RN FTE 27.6

- RN FTE/Reported FTE Vacancies as at 30/6/2001
- Calculations for RN FTE projections in the Northern Territory are potentially misleading and should be interpreted with caution. This is due to the relative isolation and small size of the ICUs which are required to 'flex up' with additional ICU beds to meet service demands.
- a-d: Adapted by the ARCCCR from the methodology proposed by AHWAC for calculation of bedside RN FTE/available bed.<sup>42</sup>

Table 85: Bedside RN FTE & Required FTE by Region & ICU Level, Private Sector ICUs  
(calculated for 70% Occupancy Rate)

		NSW/ACT	VIC/TAS	QLD	SA	WA	Australia
<b>Level 3</b>	RN FTE	184.6	136.1	210.0	92.1	17.8	<b>640.6</b>
	Projected FTE <sup>a</sup>	371.7	224.2	365.8	135.7	41.3	<b>1,138.7</b>
	FTE Gap	187.1	88.1	155.8	43.6	23.5	<b>498.1</b>
	Reported FTE Vacancies	27.0	28.5	31.3	11.6	10.0	<b>108.4</b>
<b>Level 2</b>	RN FTE	75.2	84.4	71.7	65.5	50.5	<b>347.3</b>
	Projected FTE <sup>b</sup>	239.7	219.3	127.5	102.0	91.8	<b>780.3</b>
	FTE Gap	164.5	134.9	55.8	36.5	41.3	<b>433.0</b>
	Reported FTE Vacancies	22.5	24.5	10.8	9.5	15.1	<b>82.4</b>
<b>Level 1</b>	RN FTE	16.1	20.0	8.4	7.6	-	<b>52.1</b>
	Projected FTE <sup>c</sup>	32.9	18.8	23.5	28.2	-	<b>122.2</b>
	FTE Gap	16.8	0	15.1	20.6	-	<b>70.1</b>
	Reported FTE Vacancies	1.0	8.0	5.0	0	-	<b>14.0</b>
<b>All</b>	RN FTE	275.9	240.5	290.1	165.2	68.3	<b>1,040.0</b>
	Projected FTE <sup>d</sup>	572.0	451.0	506.0	264.0	137.5	<b>2,046.0</b>
	FTE Gap	296.1	210.5	215.9	98.8	69.2	<b>1,006.0</b>
	Reported FTE Vacancies	50.5	61.0	47.1	21.1	25.1	<b>204.8</b>

\* Source: AHWAC *The Critical Care Nurse Workforce in Australia 2001-2011(forthcoming)*<sup>42</sup>

a – 5.9 RN FTE/available bed

b – 5.1 RN FTE/available bed

c – 4.7 RN FTE/available bed

d – 5.5 RN FTE/available bed

- RN FTE/Reported FTE Vacancies as at 30/6/2001

Table 86: RN FTE Requirements, by ICU Level, Public Sector Adult ICUs

ICU Level		NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
Level 3	RN FTE	956.3	654.2	489.2	287.9	202.4	75.3	47.0	<b>2,712.3</b>
	RN FTE/ Available bed	4.1	4.5	5.0	3.4	3.3	2.7	5.8	<b>4.1</b>
	RN FTE/ Ventilator Bed	5.1	4.9	5.2	4.4	3.7	4.4	5.8	<b>4.8</b>
	RN FTE Vacancies	89.0	99.8	24.0	25.0	7.3	9.0	9.0	<b>263.1</b>
	Required RN FTE <sup>a</sup> (Available Beds)	1,386	870	576	498	360	162	48	<b>3,900</b>
	Required RN FTE <sup>a</sup> (Ventilator Beds)	1,122	792	564	390	324	102	48	<b>3,342</b>
	Required RN FTE <sup>b</sup> (Available Beds)	1,455.3	913.5	604.8	522.9	378.0	170.1	50.4	<b>4,095.0</b>
	Required RN FTE <sup>b</sup> (Ventilator Beds)	1,178.1	831.6	592.2	409.5	340.2	107.1	50.4	<b>3,509.1</b>
Level 2	RN FTE	381.6	270.0	226.9	43.4	24.5	27.3	21.8	<b>995.5</b>
	RN FTE/ Available bed	2.6	3.5	3.5	2.4	2.4	2.2	4.3	<b>3.0</b>
	RN FTE/ Ventilator Bed	6.0	6.7	5.9	6.2	4.9	5.4	7.2	<b>6.1</b>
	RN FTE Vacancies	20.0	33.6	17.1	0	0	4.3	0	<b>75.0</b>
	Required RN FTE <sup>a</sup> (Available Beds)	568	308	256	72	40	48	20	<b>1,312</b>
	Required RN FTE <sup>a</sup> (Ventilator Beds)	252	160	152	28	20	20	12	<b>644</b>
	Required RN FTE <sup>b</sup> (Available Beds)	724.2	392.7	326.4	91.8	51.0	61.2	25.5	<b>1,672.8</b>
	Required RN FTE <sup>b</sup> (Ventilator Beds)	321.3	204.0	193.8	35.7	25.5	25.5	15.3	<b>821.1</b>
Level 1	RN FTE	265.0	9.0	65.3	61.5	13.1	-	-	<b>413.9</b>
	RN FTE/ Available bed	1.7	1.8	2.6	2.0	2.1 <sup>c</sup>	-	-	<b>1.8</b>
	RN FTE/ Ventilator Bed	5.6	9.0	5.0	5.1	6.9 <sup>c</sup>	-	-	<b>5.3</b>
	RN FTE Vacancies	22.0	4.0	5.5	4.0	1.0	-	-	<b>36.5</b>
	Required RN FTE <sup>a</sup> (Available Beds)	296	10	50	60	26	-	-	<b>442</b>
	Required RN FTE <sup>a</sup> (Ventilator Beds)	94	2	26	24	8	-	-	<b>154</b>
	Required RN FTE <sup>b</sup> (Available Beds)	695.6	23.5	117.5	141.0	61.1	-	-	<b>1,038.7</b>
	Required RN FTE <sup>b</sup> (Ventilator Beds)	220.9	4.7	61.1	56.4	18.8	-	-	<b>361.9</b>

a – calculated using Ferdinande methodology - includes clinical, management and education RN FTE positions

b – adapted by the ARCCCR from the methodology proposed by AHWAC for calculation of bedside RN FTE/available bed.<sup>42</sup>

c – calculated on estimated RN FTE (as data from one ICU only – estimated RN FTE 27.6)

- Predicated on maintaining full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix)
- Calculations for RN FTE projections in the Northern Territory are potentially misleading and should be interpreted with caution. This is due to the relative isolation and small size of the ICUs which are required to 'flex up' with additional ICU beds to meet service demands.

Table 87: RN FTE Requirements, Level 3 Adult ICUs, Public Sector

Occupancy		NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
Full Occupancy	RN FTE	956.3	654.2	489.2	287.9	202.4	75.3	47.0	<b>2,712.3</b>
	RN FTE/ Available bed	4.1	4.5	5.0	3.4	3.3	2.7	5.8	<b>4.1</b>
	RN FTE/ Ventilator Bed	5.1	4.9	5.2	4.4	3.7	4.4	5.8	<b>4.8</b>
	RN FTE Vacancies	89.0	99.8	24.0	25.0	7.3	9.0	9.0	<b>263.1</b>
	Required RN FTE <sup>a</sup> (Available Beds)	1,386	870	576	498	360	162	48	<b>3,900</b>
	Required RN FTE <sup>a</sup> (Ventilator Beds)	1,122	792	564	390	324	102	48	<b>3,342</b>
	Required RN FTE <sup>b</sup> (Available Beds)	1,455.3	913.5	604.8	522.9	378.0	170.1	50.4	<b>4,095.0</b>
	Required RN FTE <sup>b</sup> (Ventilator Beds)	1,178.1	831.6	592.2	409.5	340.2	107.1	50.4	<b>3,509.1</b>
85% Occupancy	RN FTE	956.3	654.2	489.2	287.9	202.4	75.3	47.0	<b>2,712.3</b>
	RN FTE/ Available bed	4.8	5.3	5.9	4.0	3.9	3.2	6.7	<b>4.9</b>
	RN FTE/ Ventilator Bed	6.0	5.8	6.1	5.2	4.4	5.3	6.7	<b>5.7</b>
	RN FTE Vacancies	89.0	99.8	24.0	25.0	7.3	9.0	9.0	<b>263.1</b>
	Required RN FTE/ Available Bed <sup>a</sup>	1,176	738	492	426	306	138	42	<b>3,318</b>
	Required RN FTE/ Ventilator Bed <sup>a</sup>	954	672	480	330	276	84	42	<b>2,838</b>
	Required RN FTE/ Available Bed <sup>b</sup>	1,234.8	774.9	516.6	447.3	321.3	144.9	44.1	<b>3,483.9</b>
	Required RN FTE/ Ventilator Bed <sup>b</sup>	1,001.7	705.6	504.0	346.5	289.8	88.2	44.1	<b>2,979.9</b>

a – calculated using Ferdinande methodology - includes clinical, management and education RN FTE positions

b – adapted by the ARCCCR from the methodology proposed by AHWAC for calculation of bedside RN FTE/available bed.<sup>42</sup>

- Calculations for RN FTE projections in the Northern Territory are potentially misleading and should be interpreted with caution. This is due to the relative isolation and small size of the ICUs which are required to 'flex up' with additional ICU beds to meet service demands.

Table 88: ARCCCR/AIHW Critical Care RN Comparative Data

		NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Australia
ARCCCR	RN FTE	1,929.4	1,193.7	1,141.0	613.1	337.3	130.0	92.5	68.8	<b>5,505.8</b>
	No. RNs	2,258	1,678	1,398	773	396	164	117	75	<b>6,859</b>
AIHW*	RNs <sup>a</sup>	3,285	2,124	1,692	831	873	195	196	66	<b>9,261</b>
	Enrolled Nurses <sup>b</sup>	32	87	49	5	30	2	-	6	<b>211</b>

\*Source: AIHW Nursing Labour Force 1999<sup>43</sup>

a - registered nurses employed as clinicians and clinical nurse managers: area of clinical nursing (critical care/intensive care)

b - enrolled nurses employed as clinicians and clinical nurse managers: area of clinical nursing (critical care/intensive care)

- AIHW data is for 1997; ARCCCR data is as at June 2001.
- ARCCCR data pertains to RNs in permanent employment.

Figure 22: Nurse Unit Manager: % time (FTE) on Direct Patient Care by Sector

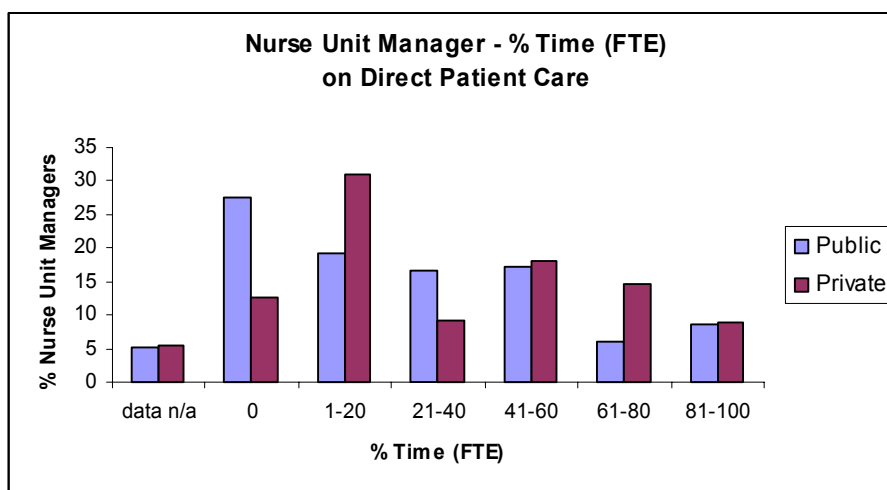


Table 89: Critical Care/ All RNs, Hours Worked (1997)

	Hours Worked*						
	1-9	10-19	20-29	30-34	35-39	40-49	50+
No. Critical Care RNs	235	819	1,728	1,419	2,368	2,234	458
% of RN ICU Workforce	2.5	8.8	18.6	15.3	25.5	24.1	4.9
All RNs	6,127	21,194	36,925	23,168	43,791	37,891	6,841
% of RN Workforce	3.4	12.0	20.9	13.1	24.8	21.5	3.8

\*Source: AIHW Nursing Labour Force 1999<sup>43</sup>

Table 88 shows the hours worked by critical care RNs compared with those worked by all RNs. More recent data is not yet available. An overview of trends on working hours for critical care RNs can be found in the previous report.<sup>1</sup>

## 5.9 Quality Overview 2000/2001

The survey sought responses to questions on a range of quality issues. These included the consultant or unit under which the patient was admitted to ICU; the number of formal rounds per day; the type (if any) of formal post-ICU patient review; severity of illness scoring system utilised; the presence of bedside clinical information systems; the implementation of Medical Emergency Teams (MET) and the year these commenced operation; participation in clinical trials; the number of publications; criteria to restrict access to ICU; the number and type of treatment protocols; and, ICU audit processes.

Figure 23: ICU Bed Card

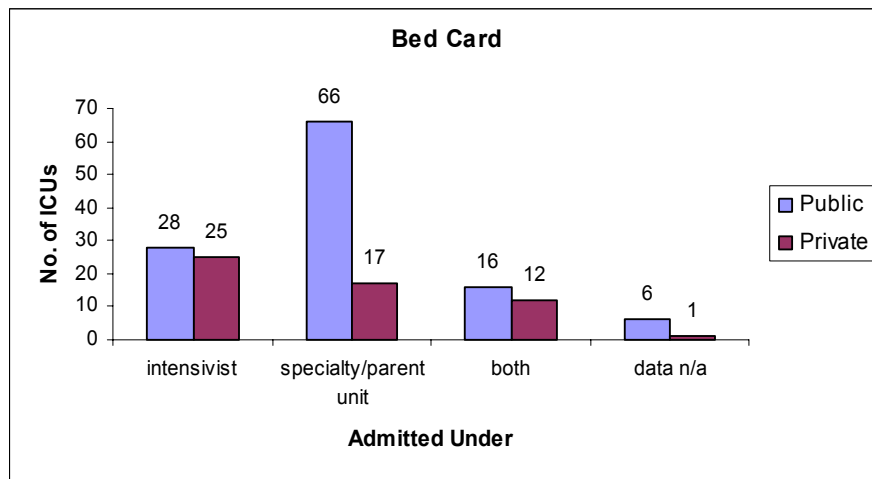


Figure 24: No. Formal Rounds/Day by ICU Consultant

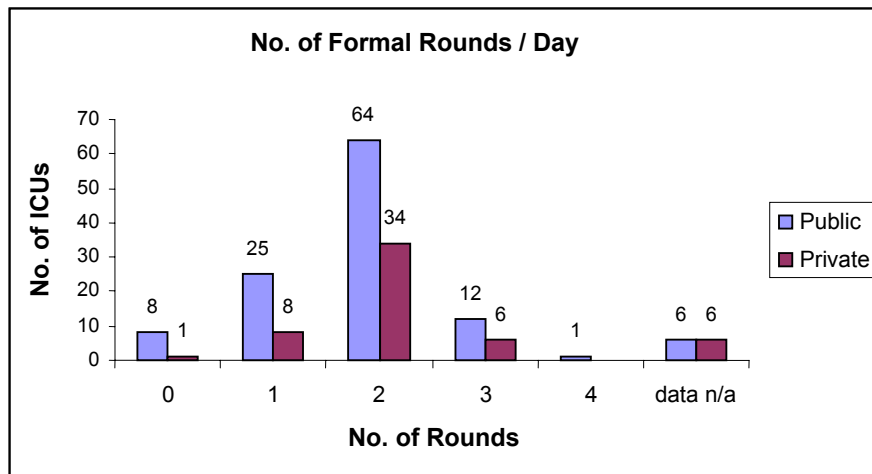


Figure 25: Formal Post-ICU Review

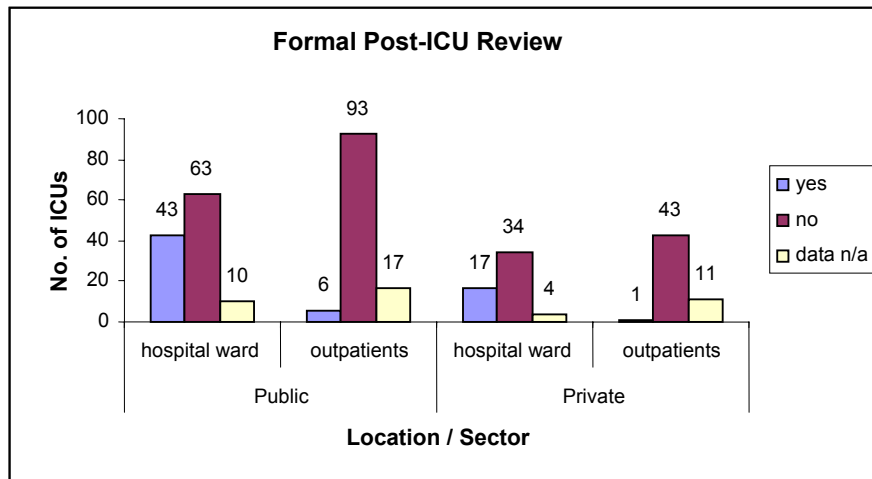
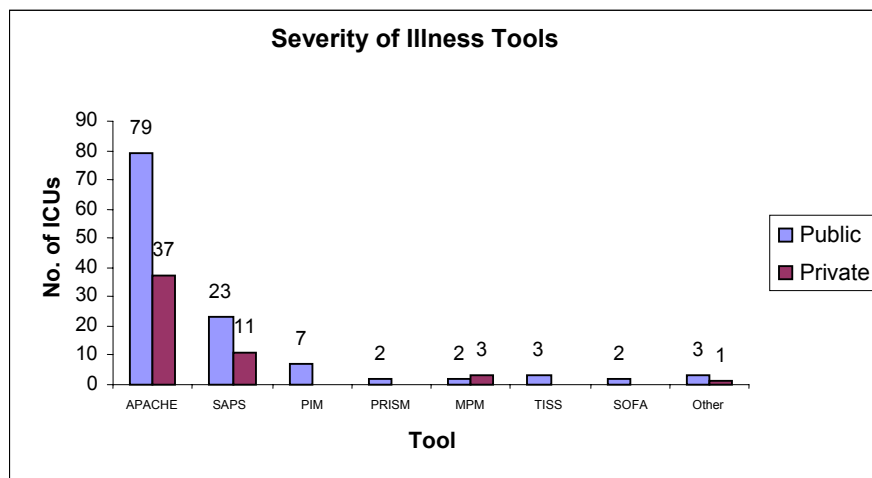


Figure 26: Severity of Illness Scoring Systems



Severity of illness scoring systems were utilized by the majority of ICUs. The most commonly used system was APACHE (Acute Physiology and Chronic Health Evaluation) with APACHE II used by 53 public sector ICUs and 26 private sector ICUs. APACHE III was used by 4 public sector ICUs and 1 private sector ICU. Both APACHE II and III were used by 9 public sector ICUs and one private sector ICU. 13 public sector ICUs and 9 private sector ICUs listed 'APACHE' only, so it was not possible to determine if APACHE II or III had been used, though APACHE II is the most likely.

Figure 27: Bedside Clinical Information Systems

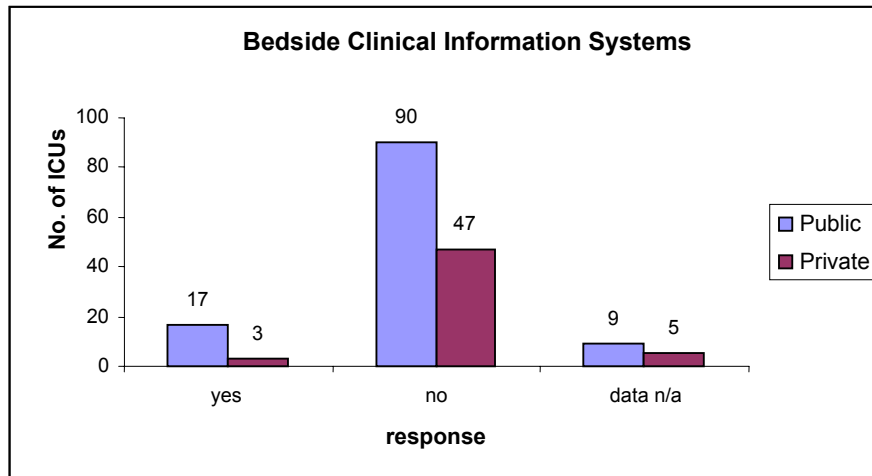
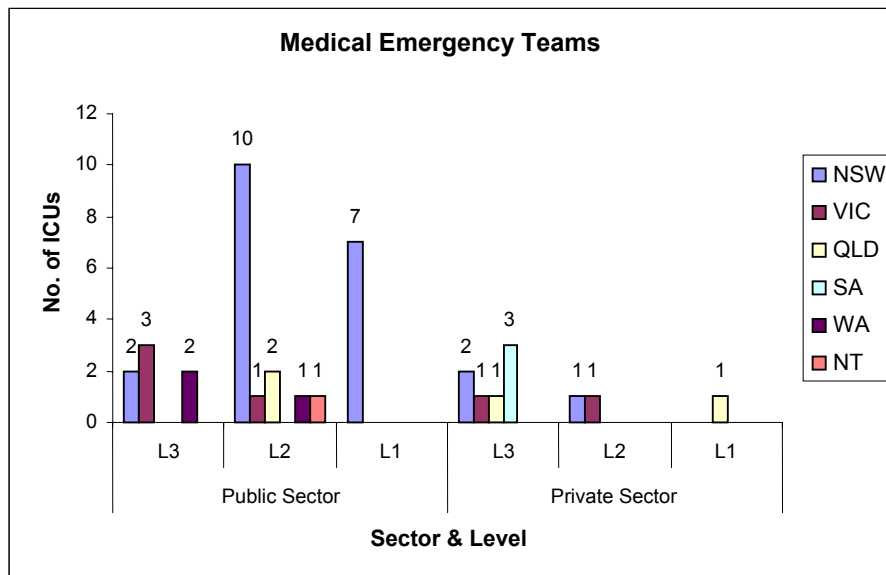


Figure 28: Medical Emergency Teams by Sector & ICU Level



- Total 39 ICUs (38 adult, 1 PICU)

Figure 29: Medical Emergency Teams by ICU Type

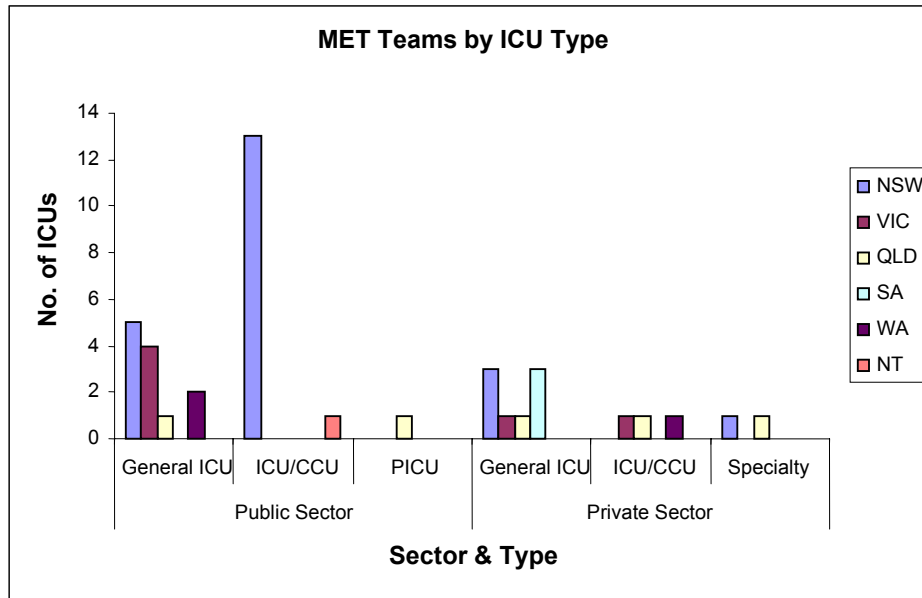


Figure 30: Year MET Team Commenced Operation

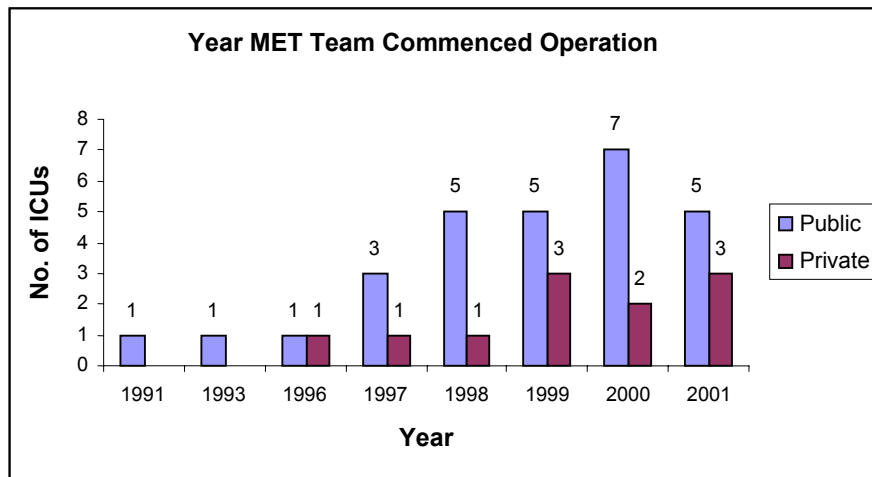


Figure 31: Unit Participation in ICU Clinical Trials

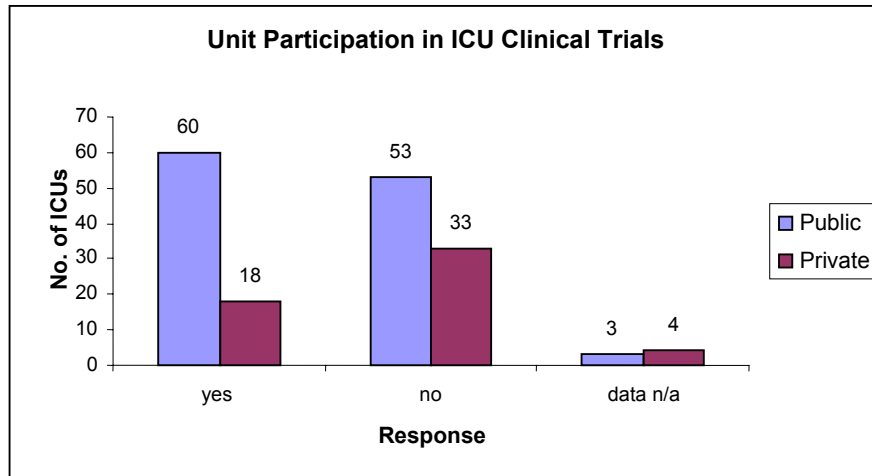


Figure 32: No. of Publications by Sector

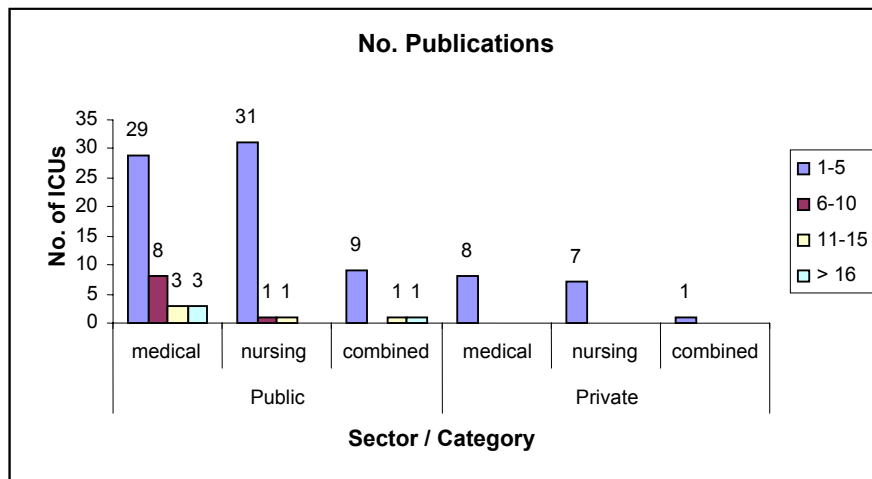


Figure 33: Criteria to Restrict Access to ICU

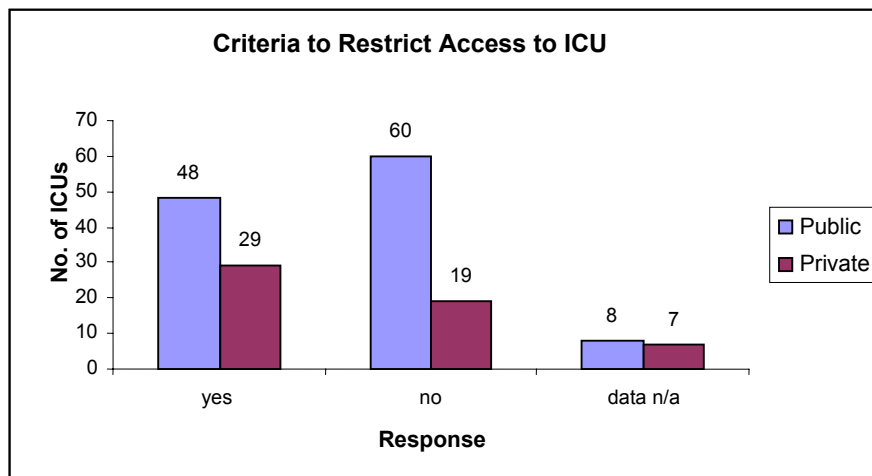
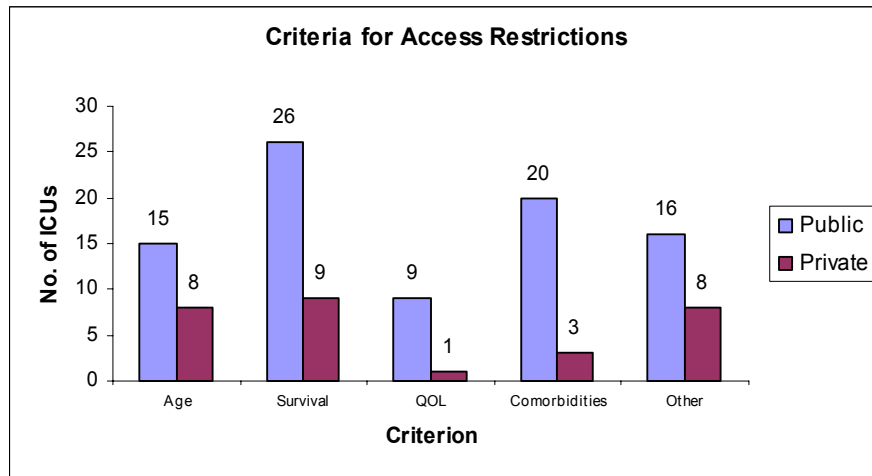


Figure 34: Criteria for Access Restrictions



- QOL – Quality of Life
- Age - this may be at either end of the age range e.g. the young or the elderly

Figure 35: Treatment Protocols

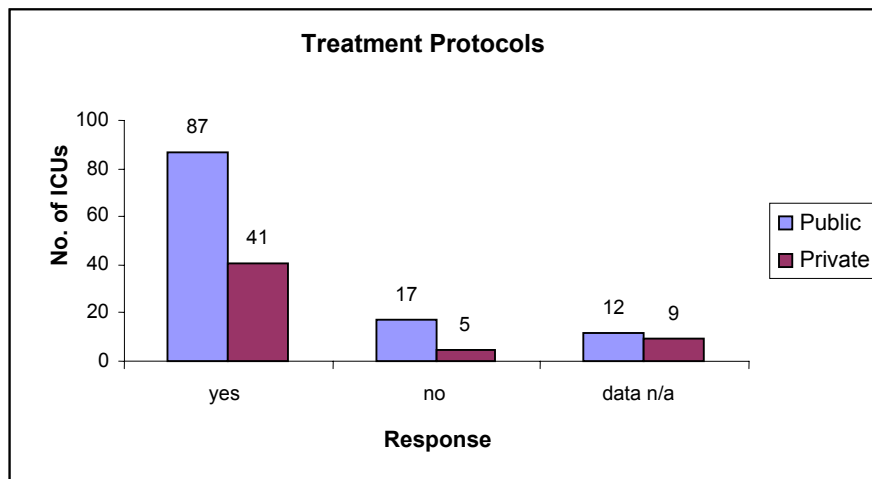


Figure 36: No. of Protocols

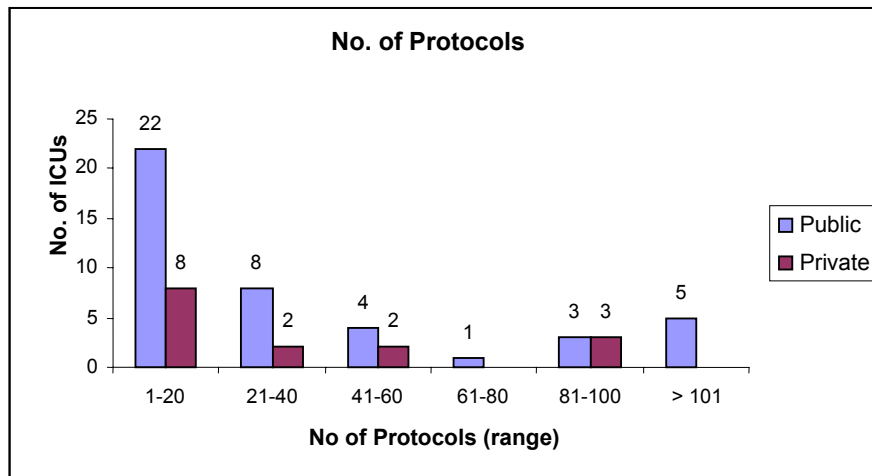


Figure 37: Number of Protocols Reviewed 2000/2001

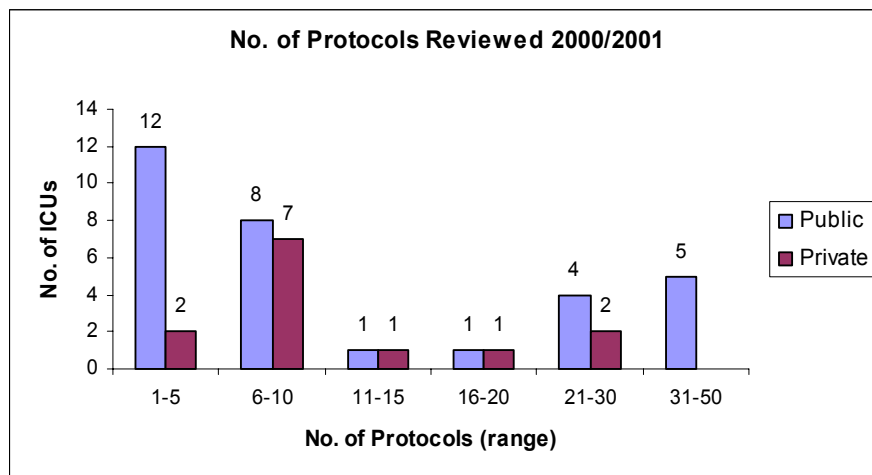
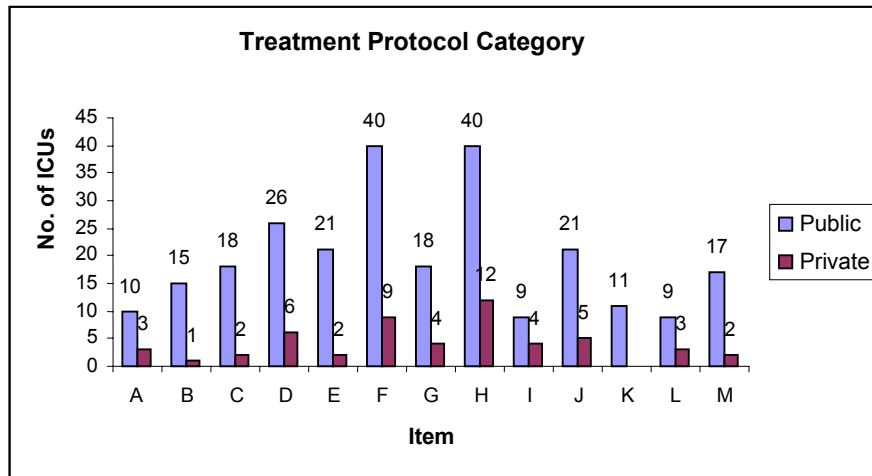


Figure 38: Treatment Protocol Category

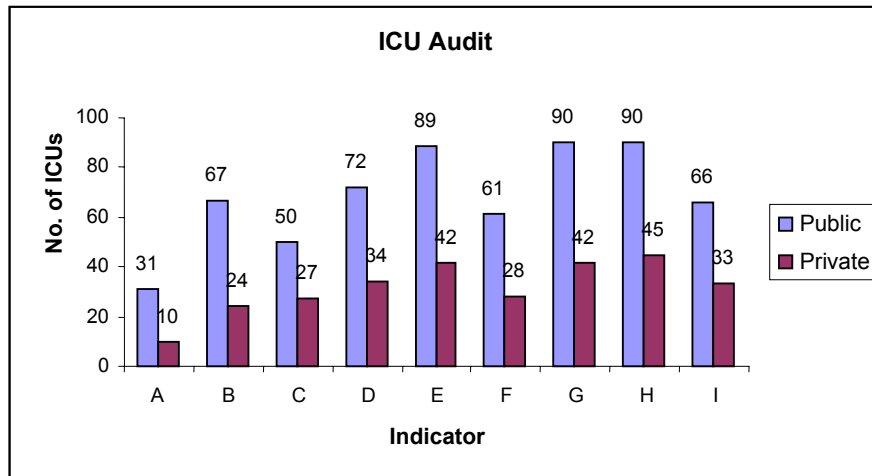


*Item:*

- A: Admission / Discharge
- B: Resuscitation
- C: Airway Management
- D: Ventilation
- E: Lines
- F: Drugs
- G: Renal Replacement Therapy
- H: Medical Conditions
- I: Sedation / Pain / Paralysis
- J: Enteral / Parenteral Nutrition
- K: Brain Death / Organ Donation
- L: Equipment
- M: Other

57 of the 116 public sector ICUs indicated that they utilised treatment protocols, 4 ICUs indicated that they had no protocols in place (one ICU stated that this was because of legal liability issues), and in 55 ICUs it was unknown or not stated. In private sector ICUs 17 indicated they utilised treatment protocols but in 38 ICUs it was not stated or unknown. The listing of treatment protocols on the survey form was optional.

Figure 39: ICU Audit



*Indicators:*

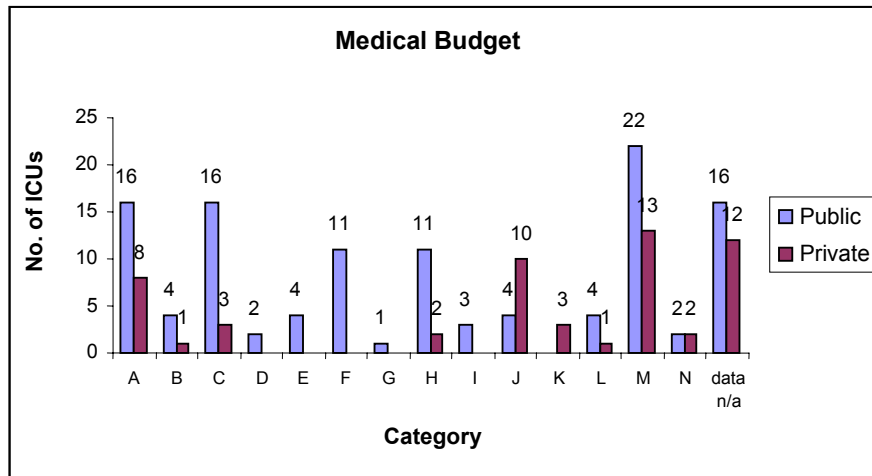
- A: Out-of-hours discharge
- B: Refusal of appropriate admission
- C: Nosocomial pneumonia
- D: Line sepsis
- E: ICU outcome
- F: Hospital outcome
- G: ICU length of stay
- H: Australian Council on Healthcare Standards (ACHS) Clinical Indicators
- I: Patient / Family Satisfaction

## 5.10 ICU Organisational Overview

87 ICUs in the public sector indicated that the ICU was a separate department/cost centre, 12 ICUs were not separate departments/cost centres and in 17 ICUs it was either not stated or not known. 41 ICUs in the private sector indicated that the ICU was a separate department/cost centre, 2 ICUs were not separate departments/cost centres and in 12 ICUs it was either not stated or not known.

The following figures (40-45) indicate the division/department to which the ICU directly reports or is accountable to:

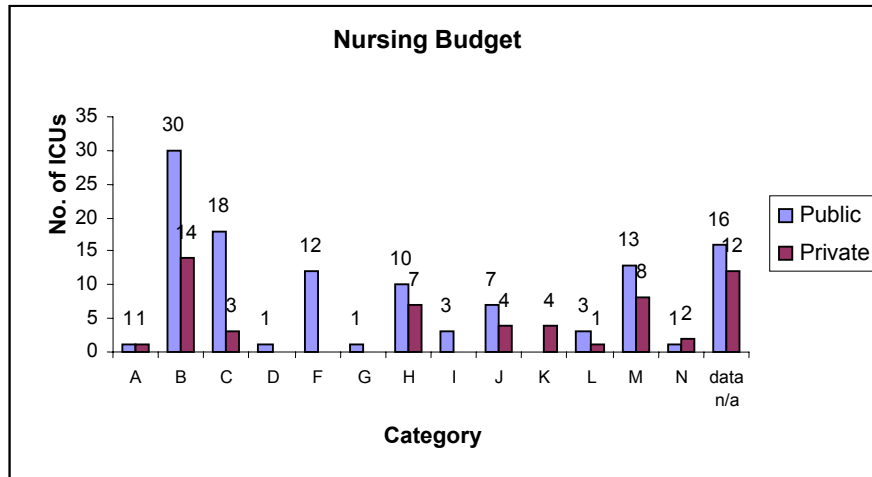
Figure 40: Medical Budget



**Category:**

- A: Medical Executive
- B: Nursing Executive
- C: Critical Care Services
- D: Anaesthesia
- E: Anaesthesia & Critical Care
- F: Surgery
- G: Medicine
- H: Clinical Services
- I: Acute Services
- J: Chief Executive Officer
- K: Finance
- L: Combined Categories
- M: Not Known
- N: Other

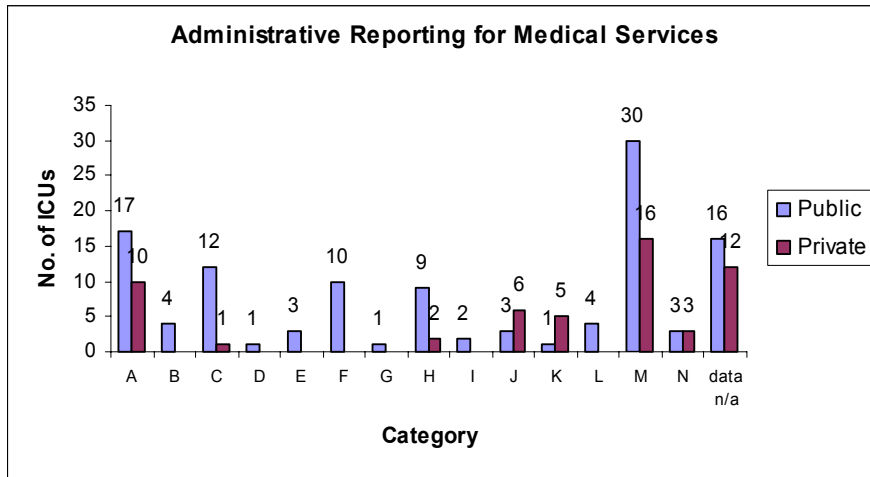
Figure 41: Nursing Budget



**Category:**

- A: Medical Executive
- B: Nursing Executive
- C: Critical Care Services
- D: Anaesthesia
- E: Anaesthesia & Critical Care
- F: Surgery
- G: Medicine
- H: Clinical Services
- I: Acute Services
- J: Chief Executive Officer
- K: Finance
- L: Combined Categories
- M: Not Known
- N: Other

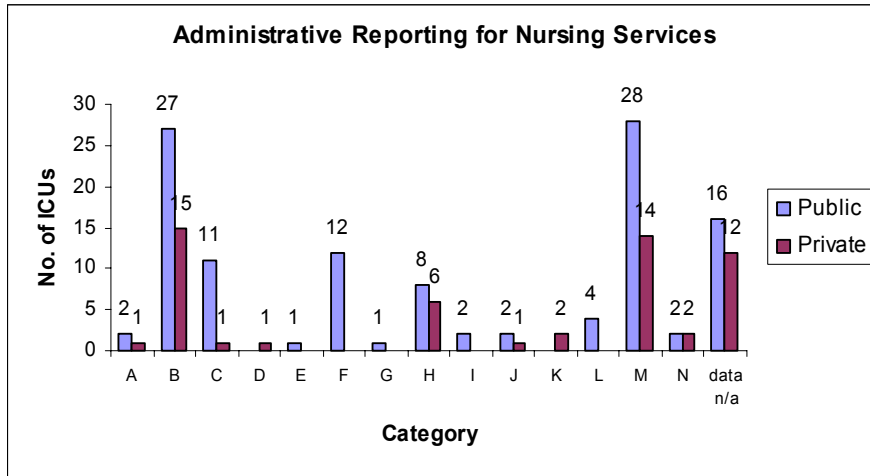
Figure 42: Administrative Reporting for Medical Services



**Category:**

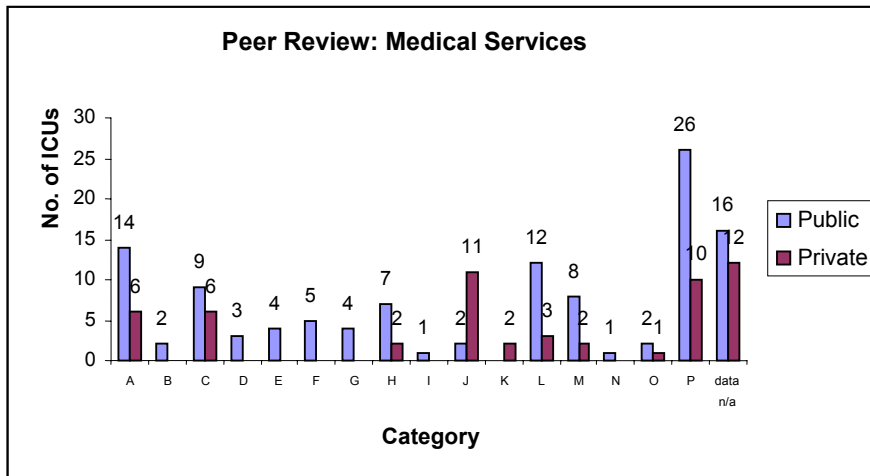
- A: Medical Executive
- B: Nursing Executive
- C: Critical Care Services
- D: Anaesthesia
- E: Anaesthesia & Critical Care
- F: Surgery
- G: Medicine
- H: Clinical Services
- I: Acute Services
- J: Chief Executive Officer
- K: Medical Advisory Committee
- L: Combined Categories
- M: Not Known
- N: Other

Figure 43: Administrative Reporting for Nursing Services



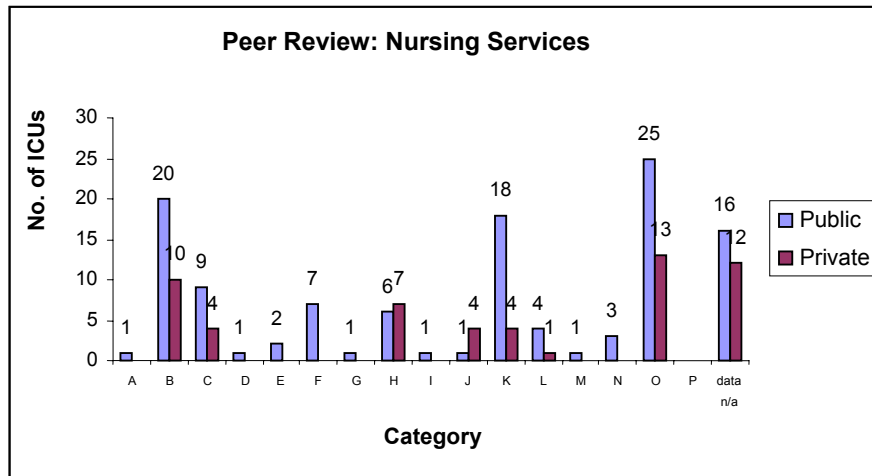
- Category:**
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Chief Executive Officer
  - K: Medical Advisory Committee
  - L: Combined Categories
  - M: Not Known
  - N: Other

Figure 44: Peer Review, Medical Services



- Category:**
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Medical Advisory Committee
  - K: Chief Executive Officer
  - L: Quality Committee
  - M: Mortality & Morbidity Committee
  - N: Combined Categories
  - O: Other
  - P: Not Known

Figure 45: Peer Review, Nursing Services



- Category:**
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Medical Advisory Committee
  - K: Chief Executive Officer
  - L: Quality Committee
  - M: Mortality & Morbidity Committee
  - N: Combined Categories
  - O: Other
  - P - Not Known

## 5.11 Academic Affiliations

ICUs could nominate the university or tertiary sector institutions and the respective departments to which they were affiliated. This item was optional.

Table 90: Academic Affiliations, Medicine

University	No. Affiliations Reported Public Sector	No. Affiliations Reported Private Sector	Affiliated Departments
Adelaide	5	1	<b>Public Sector</b> <ul style="list-style-type: none"> <li>▪ Medicine (48.5%)</li> <li>▪ Surgery (2.9%)</li> <li>▪ Critical Care (1.5%)</li> <li>▪ Anaesthesia (2.9%)</li> <li>▪ Anaesthesia &amp; Critical Care (8.8%)</li> <li>▪ Rural (4.4%)</li> <li>▪ Clinical (8.8%)</li> <li>▪ Other (22.1%)</li> </ul>
Flinders	3	1	
James Cook	3	1	
Melbourne	13	2	
Monash	6	1	
Murdoch	1		
Newcastle	4		
New South Wales	9	2	
Queensland	11	4	
Sydney	15	5	
Tasmania	3		
Western Australia	3		
<b>Total: 12</b>	<b>76</b>	<b>17</b>	<b>Private Sector</b> <ul style="list-style-type: none"> <li>▪ Medicine (47.1%)</li> <li>▪ Surgery (11.8%)</li> <li>▪ Critical Care (5.9%)</li> <li>▪ Other (35.3%)</li> </ul>

Table 91: Academic Affiliations, Nursing

Tertiary Institution / University	No. Affiliations Reported Public Sector ICUs	No. Affiliations Reported Private Sector ICUs	Affiliated Departments
Adelaide	3	1	<p><b>Public Sector</b></p> <ul style="list-style-type: none"> <li>▪ Nursing (37.9%)</li> <li>▪ Health (5.2%)</li> <li>▪ Critical Care (0.9%)</li> <li>▪ Medicine (2.6%)</li> <li>▪ Rural (0.9%)</li> <li>▪ Other (12.9%)</li> <li>▪ Not known (39.7%)</li> </ul> <p><b>Private Sector</b></p> <ul style="list-style-type: none"> <li>▪ Nursing (25.5%)</li> <li>▪ Health (1.8%)</li> <li>▪ Critical Care (3.6%)</li> <li>▪ Not known (9.1%)</li> </ul>
Australian Catholic	5	3	
Canberra	2	1	
Charles Sturt	3	2	
Curtin	1		
Deakin	4	2	
Edith Cowan	2	1	
Flinders	4	1	
Griffith	3	3	
James Cook	3	1	
La Trobe	4		
Melbourne	7	3	
Monash	4		
Newcastle	4		
New England	2		
New South Wales	2	2	
NSW College of Nursing	3		
Northern Territory	1		
Notre Dame		1	
Queensland	2		
Queensland University of Technology	6	4	
Royal Melbourne Institute of Technology	3		
South Australia	3	1	
Southern Cross	3	1	
Southern Queensland	3	1	
Sydney	5	2	
Tasmania	2		
University of Technology Sydney	6	2	
Western Sydney	3	1	
Victoria University of Technology	1		
<b>Total: 30</b>	<b>94</b>	<b>33</b>	

## 5.12 Comparative ARCCCR Data

Table 92: Comparative ARCCCR Data

Item	1997 <sup>4</sup>	1998 <sup>3</sup>	1999/2000	2000/2001
Hospitals	153	148	170	171
ICUs	163	153	170+	171+
Public sector ICUs	112	112	115	116
Private sector ICUs	42	41	55	55
Physical Beds – Public & Private sectors	1,589	1,646	1,912	2,027
Available Beds – Public & Private sectors	1,387	1,420	1,672	1,803
Ventilator Beds – Public & Private sector	1,004	1,047	1,187	1,240
Level 3 ICU Available Beds - Public & Private sectors	664	838	951	998
Level 2 ICU Available Beds – Public & Private sectors	496	423	494	547
Level 1 ICU Available Beds – Public & Private sectors	217	159	227	258
Available Beds/100,000 – Public sector	5.50	5.58	6.02	6.52
Ventilator Beds/100,000 – Public sector	4.20	4.07	4.44	4.51
Available Beds/Specialist FTE – Public sector	4.30	4.60	4.71	5.26
Nurse FTE/Available Bed – Public sector	3.90	3.26	3.21	3.51

Note variances in:

- Time reference periods: 1997 & 1998 calendar year data; 1999/2000, 2000/2001 financial year data.
- Terminology – Specialist FTE (consultant in 1997 data).
- Number of ICUs – now grouped as critical care complexes.

## 6. Findings: New Zealand

The New Zealand findings are focused primarily on data obtained from public sector ICUs (n = 25). Three private sector ICUs also contributed data and an overview of resources and activity is included.

The survey form was completed by:

- 39.3% - director of ICU
- 32.1% - medical and nursing staff
- 14.3% - nursing staff
- 10.7% - medical, nursing and administrative staff
- 3.6% - other / not specified

### 6.1 Distribution of ICU Beds

Beds are categorised as physical, available or ventilator and are defined as:

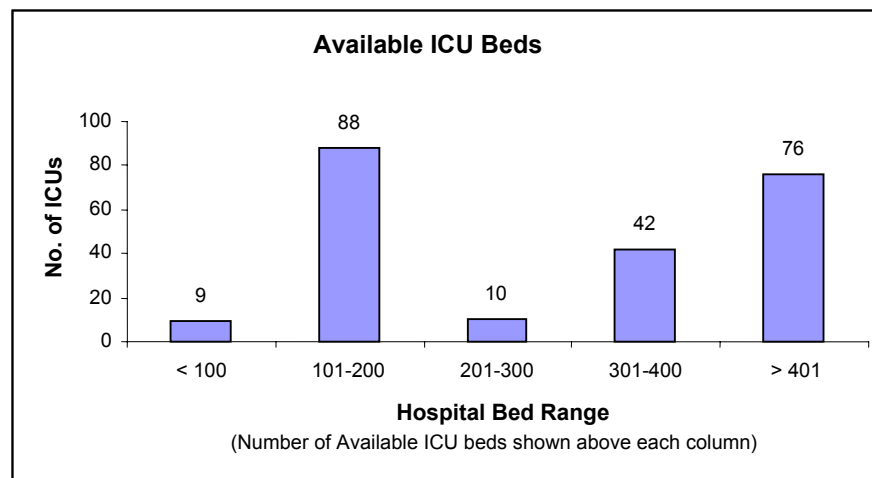
**Physical Bed:** A single patient care location fully configured to ICU standards, it is an actual bed (or bed equivalent), not a bed space.

**Available Bed:** Bed in use or immediately available for use by admitted patients as required. In ICU this refers to a bed with advanced life support capability that is fully staffed and funded.

**Ventilator Bed:** A physical ICU bed plus ventilator.

Distribution of ICU Beds is shown in Figure 46 and Tables 92 and 93.

Figure 46: Available ICU Beds & Hospital Size



There were 84 publicly funded hospitals in 2001 and 25 of these had critical care facilities (29.7%). Available ICU beds comprised 1.8% of public hospital beds (225 of 12,364 beds).<sup>44</sup> Hospital beds may also include psychiatric, aged care and day procedure beds.

Table 93: ICU Bed Distribution

Region	No. ICUs	Physical Beds	Available Beds	Ventilator Beds
North Island	18	192	171	127
South Island	7	64	54	40
<b>New Zealand</b>	<b>25</b>	<b>256</b>	<b>225</b>	<b>167</b>

Total includes: 21 dedicated available HDU beds in 4 ICUs  
 18 available CCU beds  
 18 available cardiothoracic beds

In the North Island there were 68 interchangeable ICU/HDU beds and 24 interchangeable ICU/CCU/HDU beds with a total of 83 interchangeable beds. In the South Island there were 11 interchangeable ICU/HDU beds and 16 interchangeable ICU/CCU/HDU beds with a total of 27 interchangeable beds.

Table 94: Demographic Distribution of ICU Beds

Region	Population*	Physical Beds	Available Beds	Ventilator Beds	Available Beds 100,000	Ventilator Beds 100,000
North Island	2,829,798	192	171	127	6.0	4.4
South Island	906,753	64	54	40	5.9	4.4
<b>New Zealand</b>	<b>3,737,277<sup>a</sup></b>	<b>256</b>	<b>225</b>	<b>167</b>	<b>6.0</b>	<b>4.4</b>

\*Source: Statistics New Zealand 2001 Census <sup>45</sup>

a – includes population of area outside region (Chatham Islands)

Table 95: Distribution of ICU Beds by District Health Boards (includes Quaternary & Super Specialty Services)

District Health Board*	No. ICUs	Population*	Physical Beds	Available Beds	Ventilated Beds	Available Beds / 100,000	Ventilated Beds / 100,000
Auckland	3	367,700	43	36	43	9.8	11.7
Bay of Plenty	2	178,200	17	17	6	9.5	3.3
Canterbury	1	427,100	18	12	18	2.8	4.2
Capital & Coast	1	245,900	16	14	12	5.7	4.8
Counties Manukau	1	375,500	17	12	10	3.2	2.6
Hawkes Bay	1	143,500	11	11	11	7.6	7.6
Hutt	1	131,900	4	4	2	3.0	1.5
Midcentral	1	155,000	8	6	6	3.8	3.8
Nelson-Marlborough	2	122,500	14	14	6	11.4	4.9
Northland	1	140,100	7	7	7	5.0	5.0
Otago	1	170,700	13	10	8	5.8	4.7
South Canterbury	1	52,800	8	7	3	13.4	5.7
Southland	1	103,400	7	7	4	6.7	3.8
Tairāwhiti	1	44,000	7	6	2	13.6	4.5
Taranaki	1	103,000	16	16	3	15.5	2.9
Lakes	1	96,000	6	4	3	4.1	3.1
Waikato	1	317,800	24	24	14	7.5	4.4
Wairarapa	1	38,200	5	5	2	13.1	5.2
Waitemata	1	429,800	6	4	4	0.9	0.9
West Coast	1	30,300	4	4	1	13.3	3.3
Whanganui	1	63,600	5	5	2	7.9	3.1
<b>New Zealand</b>	<b>25</b>	<b>3,737,000</b>	<b>256</b>	<b>225</b>	<b>167</b>	<b>6.0</b>	<b>4.4</b>

\*Source: Ministry of Health *Atlas of New Zealand's District Health Boards*<sup>46</sup>

- The population figures (2001 census data) may vary slightly from those of Statistics New Zealand used elsewhere in the report.
- No assumptions re ICU level, ICU type, or ICU bed categories.
- Auckland District Health Board includes specialty hospitals/ICUs.

## 6.2 ICU Type

Critical care facilities may be classified in a number of ways but in this report the following categories are used:

### **General ICU**

- Medical and surgical care. May incorporate HDU facilities/beds. HDU and ICU beds may be interchangeable.

### **ICU/CCU**

- Combined intensive and coronary care services within a single patient care location. Much variation in bed configurations was apparent from the survey and beds may be interchangeable. May also include HDU facilities/beds.

### **PICU**

- Medical and surgical care. A paediatric patient for the purposes of this survey is one < 16 years of age<sup>10</sup> (however variable upper age range end point - may be < 14 or 15 years of age in some regions). PICUs may also accept neonates (live birth < 28 days old)<sup>10</sup> or patients > 16 years of age.

### **Specialty**

- A specialty service for neuro-intensive care or cardiothoracic intensive care patients. A cardiothoracic ICU has cardiac and thoracic surgery as its primary focus whilst a neuro ICU has a predominantly neurological/neurosurgical focus.

### **HDU**

- An HDU provides an intermediate level of care between intensive care and general ward care.<sup>19</sup> HDU beds may be interchangeable with ICU or CCU beds. For the purposes of this report, only HDU beds managed by critical care services were included.

These critical care categories are quite broad however and do not limit the types of care or services provided to patients. Both adult and paediatric patients may be admitted to any of these ICUs.

Information was sought on the number and type of other special care units at individual hospitals. That is, 'stand-alone' units not managed by the ICU. There were 13 Coronary Care Units (CCUs), 10 neonatal ICUs and 9 HDUs. This information may have been under-reported by a number of respondents.

Table 96: ICU Beds by ICU Type

ICU Type	Physical Beds	Available Beds	Ventilator Beds
General ICU	148	122	113
ICU/CCU	83	81	29
PICU	9	6	9
CTICU	16	16	16
<b>New Zealand</b>	<b>256</b>	<b>225</b>	<b>167</b>

- 48% (n = 12) general ICUs
- 44% (n=11) ICU/CCU
- 8% (n = 2) specialty ICU (includes one PICU and one cardiothoracic ICU)

## ICU Bed Type / Characteristics

### General ICU included:

- Total 122 available beds
- 12 available HDU beds
- 2 available cardiothoracic beds
- Total 46 interchangeable ICU/HDU beds

### ICU/CCU included:

- Total 81 available beds
- Total 58 interchangeable ICU/CCU/HDU beds

### Specialty ICU included:

- Total 22 available beds
- Total 6 interchangeable ICU/HDU beds

Figure 47: ICU Bed Type

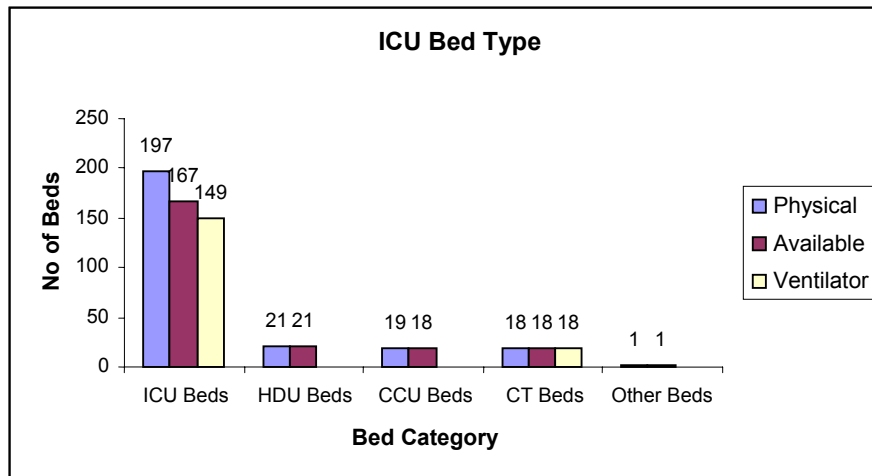


Figure 47 shows bed types as reported by respondents.

### 6.3 ICU Levels

ICU levels support the delineated roles of each health care facility. The attributes of an ICU are determined by the type and number of critically ill patients and the provision of resources, staffing and support services.<sup>9</sup>

All ICU levels in this report are self-determined. An extract of the FICANZCA standards document was included with the survey (see Appendix 3). Despite the application of JFICM standards, there may be little to distinguish between ICU levels in some instances. For example, differentiating between a Level 3 and a Level 2 ICU or a Level 1 and Level 2 can be potentially problematic. Even Level 3 ICUs may be different in terms of patient acuity, outcomes and casemix. Moreover, ICU levels for an individual ICU may vary from year to year.

The ICU levels should be viewed with a degree of caution for a number of reasons. For example, casemix, morbidity and mortality data and severity of illness scores do not form part of the analysis so little is known about patient acuity. Additionally, casemix data may not reflect ICU admission diagnoses, as diagnostic data currently available from the AIHW does not adequately capture ICU admissions. Moreover, the specified time lines in the standards may be difficult to apply in some settings, particularly ICUs located in rural and remote regions.

A small number of ICUs may have over/underestimated the ICU level when objective criteria for infrastructure, throughput, staffing and research activities are applied. Despite objective definitions, respondents may not answer objectively. Political pressures, funding mechanisms, clinical capabilities, research activities and a belief that the standards are flawed are just a few of the reasons why this may occur.

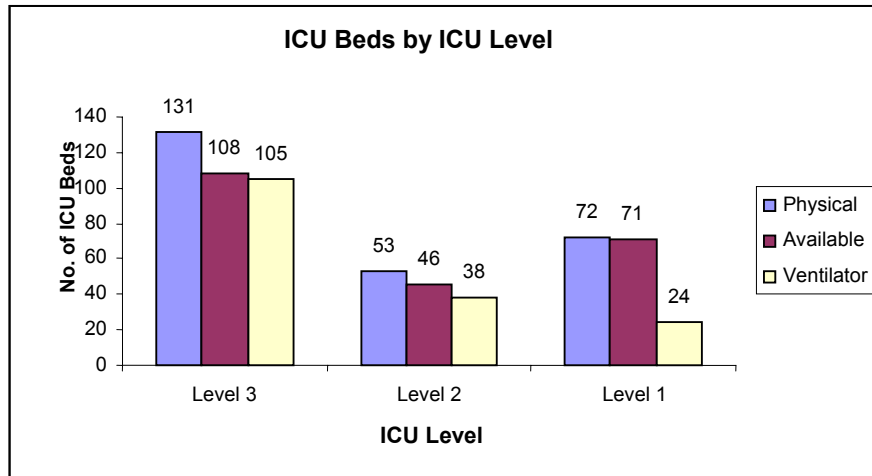
Proportion / Number of ICUs by ICU Level:  
(Specialty ICUs are included in the Level 3 ICU data)

- 32% (n= 8) Level 3
- 28% (n=7) Level 2
- 40% (n=10) Level 1

Table 97: ICU beds by ICU Level

ICU Level	Physical Beds	Available Beds	Ventilator Beds
Level 3	131	108	105
Level 2	53	46	38
Level 1	72	71	24
<b>New Zealand</b>	<b>256</b>	<b>225</b>	<b>167</b>

Figure 48: ICU Beds by ICU Level



### ICU Level / Bed Characteristics

*Level 3 ICU included:*

- Total 108 available beds
- 10 available HDU beds
- 18 available cardiothoracic beds
- Total 24 interchangeable ICU/HDU beds

*Level 2 ICU included:*

- Total 46 available beds
- 3 available CCU beds
- Total 33 interchangeable ICU/CCU/HDU beds

*Level 1 ICU included:*

- Total 71 available beds
- 11 available HDU beds
- 15 available CCU beds
- Total 53 interchangeable ICU/CCU/HDU beds

## 6.4 ICU Activity

Table 98: ICU Admissions

Region	ICU Admissions	HDU Admissions	CCU Admissions
North Island	12,120	2,955	1,798
South Island	3,750	521	2,126
<i>Sub-total</i>	<i>15,870</i>	<i>3,476</i>	<i>3,924</i>
<b>Total</b>		<b>23,270</b>	

All ICUs (n = 25) contributed admission data. Only 2 ICU/CCUs however could supply differentiated admission data so admission data for the other 9 ICU/CCUs was included under ICU admissions.

ICU admissions comprised 3.3% of discharges (all admissions) and 4.5% of discharges (day patients excluded) in public hospitals.<sup>44</sup> These calculations are based on 1998/1999 data as more recent data was not available.

Table 99: ICU Admissions by ICU Type

ICU Type	ICU Admissions	HDU Admissions	CCU Admissions
General ICU	8,903	2,600	-
ICU/CCU	4,726	876	3,924
Specialty <sup>a</sup>	2,241	-	-
<i>Sub-total</i>	<i>15,870</i>	<i>3,476</i>	<i>3,924</i>
<b>Total</b>		<b>23,270</b>	

a - Specialty includes paediatric and cardiothoracic ICUs

Range, mean and median number of admissions.

- ICU admissions: minimum 17; maximum 1,667; mean 621.0; median 498.0
- CCU admissions: minimum 244; maximum 789; mean 490.5; median 394.0
- HDU admissions: minimum 112; maximum 1,822; mean 496.5; median 296.0
- Other admissions: n/a - data from one ICU only
- Total admissions: minimum 370; maximum 3,045; mean 930; median 820.0

Table 100: ICU Admissions by ICU Level

ICU Level	ICU Admissions	HDU Admissions	CCU Admissions
Level 3	8,481	1,822	-
Level 2	3,150	318	1,033
Level 1	4,239	1,336	2,891
<i>Sub-total</i>	<i>15,870</i>	<i>3,476</i>	<i>3,924</i>
<b>Total</b>		<b>23,270</b>	

Table 101: ICU Readmissions

Region	ICU Readmissions	HDU Readmissions	CCU Readmissions
North Island	516	255	14
South Island	58	7	9
<i>Sub-total</i>	<i>574</i>	<i>262</i>	<i>23</i>
<b>Total</b>		<b>859</b>	

Readmission data was received from 14 ICUs (56%).

The readmission to ICU item referred to all ICU readmissions within an episode of care (it is not the same as the ACHS ICU readmission clinical indicator). The definition of a readmission is any second or subsequent admission to the ICU/HDU within the same hospital admission (direct transfers to or from ICU to HDU excluded).

Table 102: ICU Readmissions by ICU Type

ICU Type	ICU Readmissions	HDU Readmissions	CCU Readmissions
General ICU	411	255	-
ICU/CCU	29	7	23
Specialty <sup>a</sup>	134	-	-
<i>Sub-total</i>	<i>574</i>	<i>262</i>	<i>23</i>
<b>Total</b>		<b>859</b>	

a - Specialty includes paediatric and cardiothoracic ICUs

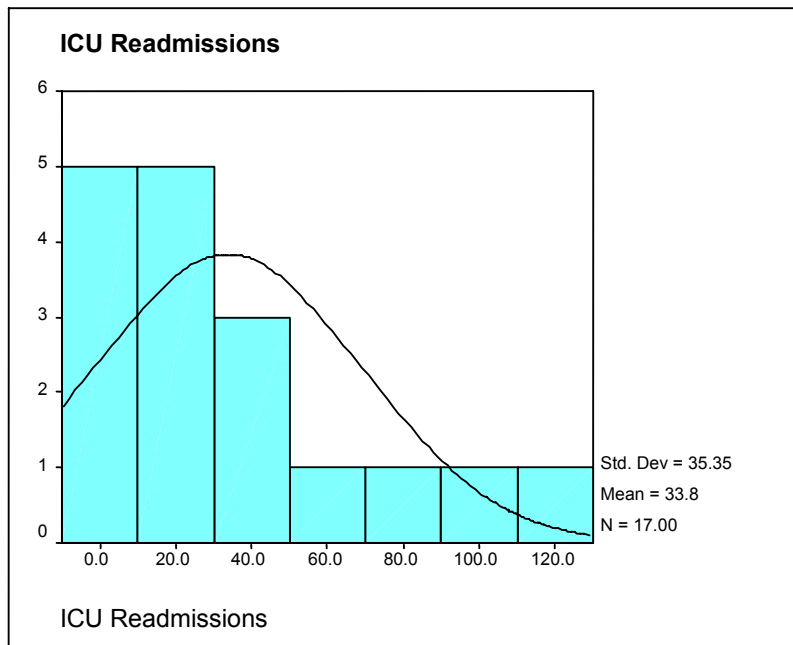
Range, mean and median number of readmissions.

- ICU readmissions: minimum 0; maximum 119; mean 33.7; median 20.0
- CCU readmissions: minimum 9; maximum 14; mean 11.5; median 11.5
- HDU readmissions: minimum 0; maximum 245; mean 65.5; median 8.5
- Other readmissions: nil reported
- Total readmissions: minimum 0; maximum 339; mean 50.5; median 22.0

Table 103: ICU Readmissions by ICU Level

ICU Level	ICU Readmissions	HDU Readmissions	CCU Readmissions
Level 3	444	245	-
Level 2	121	10	-
Level 1	9	7	23
<i>Sub-total</i>	<i>574</i>	<i>262</i>	<i>23</i>
<b>Total</b>		<b>859</b>	

Figure 49: ICU Readmissions



- x axis – no. of readmissions
- y axis – no. of ICUs
- ICU readmissions only, not the total number of readmissions

## ICU Bed Hours/Days

Table 104: ICU Bed Hours/Days

Region	No. ICUs	Bed Hours	No. ICUs	Bed Days
North Island	12/18	573,706	4/18	5,789
South Island	1/7	31,325	3/7	6,465
<b>New Zealand</b>	<b>13/25</b>	<b>605,031</b>	<b>7/18</b>	<b>12,254</b>

Table 105: ICU Bed Hours/Days by ICU Type

ICU Type	No. ICUs	Bed Hours	No. ICUs	Bed Days
General ICU	9/12	455,216	3/12	5,819
ICU/CCU	3/11	100,379	3/11	4,564
Specialty	1/2	49,436	1/2	1,871
<b>New Zealand</b>	<b>13/25</b>	<b>605,031</b>	<b>7/25</b>	<b>12,254</b>

Table 106: ICU Bed Hours/Days by ICU Level

ICU Level	No. ICUs	Bed Hours	No. ICUs	Bed Days
Level 3	6/8	345,010	3/8	5,436
Level 2	4/7	159,642	2/7	2,901
Level 1	3/10	100,379	2/10	3,917
<b>New Zealand</b>	<b>13/25</b>	<b>605,031</b>	<b>7/25</b>	<b>12,254</b>

## Ventilator Hours/Days

Table 107: ICU Ventilator Hours/Days

Region	No. ICUs	Ventilator Hours	No. ICUs	Ventilator Days
North Island	15/18	341,084	3/18	1,493
South Island	4/7	68,634	2/18	820
<b>New Zealand</b>	<b>19/25</b>	<b>409,718</b>	<b>5/18</b>	<b>2,313</b>

Table 108: ICU Ventilator Hours/Days by ICU Type

ICU Type	No. ICUs	Ventilator Hours	No. ICUs	Ventilator Days
General ICU	11/12	290,659	1/12	293
ICU/CCU	7/11	26,054	3/11	893
Specialty	1/2	93,005	1/2	1,127
<b>New Zealand</b>	<b>19/25</b>	<b>409,718</b>	<b>5/16</b>	<b>2,313</b>

Table 109: ICU Ventilator Hours/Days by ICU Level

ICU Level	No. ICUs	Ventilator Hours	No. ICUs	Ventilator Days
Level 3	7/8	304,540	1/8	1,127
Level 2	4/7	75,260	3/7	1,113
Level 1	8/10	29,918	1/10	73
<b>New Zealand</b>	<b>19/25</b>	<b>409,718</b>	<b>5/25</b>	<b>2,313</b>

## Number of Patients Ventilated

Table 110: No. of Patients Ventilated by ICU Type

ICU Type	No. ICUs	No. Ventilated	No. ICUs	No. Invasive Ventilation	No. ICUs	No. Non-Invasive
General ICU	11/12	5,664	10/12	4,384	6/12	287
ICU/CCU	8/11	424	9/11	424	6/11	80
Specialty	2/2	1,790	2/2	1,782	1/2	48
<b>New Zealand</b>	<b>21/25</b>	<b>7,878</b>	<b>21/25</b>	<b>6,590</b>	<b>13/25</b>	<b>415</b>

Table 111: Proportion of Patients Invasively Ventilated by ICU Type

ICU Type	No. ICUs	ICU Admissions	No. Invasive Ventilation	% Admissions Ventilated
General ICU	10/12	9,425	4,384	46.5
ICU/CCU	9/11	2,387	424	17.7
Specialty	2/2	2,241	1,782	79.5
<b>New Zealand</b>	<b>21/25</b>	<b>14,053</b>	<b>6,590</b>	<b>46.8</b>

## Paediatric Admissions

Table 112: Paediatric Admissions

Region	Paediatric Admissions	No. Ventilated Paediatric Patients	No. Transfers	No. Deaths
North Island	1,856	885	87	54
South Island	119	56	7	4
<b>New Zealand</b>	<b>1,975</b>	<b>941</b>	<b>94</b>	<b>58</b>

Table 113: Paediatric Admissions by ICU Type

ICU Type	Paediatric Admissions	No. Ventilated Paediatric Patients	No. Transfers	No. Deaths
General	861	242	50	15
ICU/CCU	161	44	41	3
Specialty <sup>a</sup>	953	655	3	40
<b>New Zealand</b>	<b>1,975</b>	<b>941</b>	<b>94</b>	<b>58</b>

a - Specialty includes paediatric and cardiothoracic ICUs

Table 114: Paediatric Admissions by ICU Level

ICU Level	Paediatric Admissions	No. Ventilated Paediatric Patients	No. Transfers	No. Deaths
Level 3	1,455	832	22	53
Level 2	360	69	32	2
Level 1	160	40	40	3
<b>Total</b>	<b>1,975</b>	<b>941</b>	<b>94</b>	<b>58</b>

### Paediatric admissions:

- 96% of ICUs (n=24) admitted paediatric patients
- 8.4% of all ICU admissions were paediatric admissions
- 48.2% of paediatric patients were admitted to a specialty ICU
- 4.7% of paediatric patients were transferred from an adult ICU to a paediatric ICU
- 5 general ICUs admitted  $\geq 50$  paediatric patients [range 79-227]
- 2.9% unadjusted paediatric mortality overall (4.1% in specialty ICUs)

## Medical Labour Force

Capturing medical labour force data in intensive care settings presents a number of challenges. The data is predominantly focused on full time equivalents (FTE/EFT). The ARCCCR has used the Australian Bureau of Statistics (ABS) standard with an FTE defined as  $\geq 35$  hours per week.<sup>28</sup> As FTE may vary over the course of a year, data for medical FTE is as at 30<sup>th</sup> June 2001. It should be noted that in New Zealand an FTE is defined as  $\geq 30$  hours per week.<sup>47</sup>

An intensivist may be more than one FTE, dependent on the sector and administrative arrangements between ICUs. There may also be additional sessional working arrangements.

An intensivist is defined as a medical practitioner who has specifically trained in intensive care medicine and who has obtained formal certification by completing the requirements of the Joint Faculty of Intensive Care Medicine (JFICM). The survey item required data for 30<sup>th</sup> June 2001 at which time the Faculty of Intensive Care Medicine, Australian and New Zealand College of Anaesthetists (FICANZCA) and the Royal Australasian College of Physicians (RACP) were the accrediting bodies for intensive care training with a specialty qualification recognised by the Joint Specialist Advisory Committee – Intensive Care (NZJSAC-ICM).

Intensive care medicine is a dynamic specialty and the work of an intensivist is quite diverse and not focused solely on direct patient care. The role is a multidimensional one and many intensivists participate in medical emergency teams, retrievals, hyperbaric services, parenteral nutrition services, patient follow-up, professional development, and research and teaching activities. It also includes management and organizational responsibilities and other professional obligations.

'Other specialist' is a medical practitioner with a non-intensive care qualification who is employed in intensive care. Many in the 'other specialist' category have evolved with the specialty of intensive care.

Specialist FTE refers to combined intensivist and other specialist FTE data.

An overview of registrar and resident medical officer FTE is also included.

All ARCCCR medical labour force data is as at 30<sup>th</sup> June 2001.

There were 18 active medical practitioners who cited intensive care as their main employment setting in 2000.<sup>48</sup>

Table 115: Specialist FTE

Region	No. ICUs	Intensivist FTE <sup>a</sup>	Other Specialist FTE <sup>b</sup>	Total FTE
North Island	17/18	20.3	10.8	31.1
South Island	6/7	5.5	3.9	9.4
<b>New Zealand</b>	<b>23/25</b>	<b>25.8</b>	<b>14.7</b>	<b>40.5</b>

a – Intensivist FTE – 36 staff specialists and 4 sessional intensivists

b – Other Specialist FTE – 64 staff specialists and 24 sessional specialists

Table 116: Specialist FTE by ICU Type

ICU Type	No. ICUs	Intensivist FTE <sup>a</sup>	Other Specialist FTE <sup>b</sup>	Total FTE
General ICU	12/12	22.0	9.2	31.2
ICU/CCU	9/11	0.5	3.5	4.0
Specialty	2/2	3.3	2.0	5.3
<b>New Zealand</b>	<b>23/25</b>	<b>25.8</b>	<b>14.7</b>	<b>40.5</b>

Table 117: Specialist FTE by ICU Level

ICU Type	No. ICUs	Intensivist FTE <sup>a</sup>	Other Specialist FTE <sup>b</sup>	Total FTE
Level 3	8/8	22.0	5.1	27.1
Level 2	6/7	3.8	6.9	10.7
Level 1	9/10	0	2.7	2.7
<b>New Zealand</b>	<b>23/25</b>	<b>25.8</b>	<b>14.7</b>	<b>40.5</b>

Table 118: Distribution of Specialists

Region Population*	Intensivist FTE	Other Spec. FTE	Total Spec. FTE	Avail. Beds/ Specialist	Vent. Beds/ Specialist	Specialists/ 100,000	Intensivists/ 100,000
North Island 2,829,798	20.3	10.8	31.1	5.49	4.08	1.09	0.71
South Island 906,753	5.5	3.9	9.4	5.74	4.25	1.03	0.60
<b>New Zealand</b> 3,737,277 <sup>a</sup>	<b>25.8</b>	<b>14.7</b>	<b>40.5</b>	<b>5.55</b>	<b>4.12</b>	<b>1.08</b>	<b>0.69</b>

\*Source: Statistics New Zealand 2001 Census<sup>45</sup>

a – includes population of area outside region (Chatham Islands)

- Refer to Table 92 for number of available and ventilated beds.

Table 119: Specialist FTE Benchmarks, Level 3 ICUs

Region	Total Spec. FTE	Recommended FTE <sup>†</sup>	FTE Gap	Reported FTE Vacancies
North Island	20.0	34.4	14.4	4.6
South Island	7.1	8.8	1.7	0
<b>New Zealand</b>	<b>27.1</b>	<b>43.2</b>	<b>16.1</b>	<b>4.6</b>

\* As recommended by AMWAC<sup>30</sup>

Table 120: Specialist FTE Vacancies

Region	Specialist Total FTE	Reported FTE Vacancies
North Island	31.1	7.8
South Island	9.4	1.0
<b>New Zealand</b>	<b>40.5</b>	<b>8.8</b>

Table 121: Directors of ICU with NZJSAC-ICM Recognised Qualification

ICU Level	No. ICUs	% of ICUs
Level 3	8/8	100.0
Level 2	4/7	57.1
Level 1	0/10	0
<b>New Zealand</b>	<b>25/25</b>	<b>48.0</b>

## Registrar and Resident FTE

Table 122: Registrar and Resident FTE

Region	No. ICUs	NZJSAC-ICM Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
North Island	17/18	9	34	21.2	11
South Island	6/7	2	15	0	8
<b>New Zealand</b>	<b>23/25</b>	<b>11</b>	<b>49</b>	<b>21.2</b>	<b>19</b>

Table 123: Registrar and Resident FTE by ICU Type

ICU Type	No. ICUs	NZJSAC-ICM Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
General ICU	12/12	11	37	10.5	1
ICU/CCU	9/11	0	0	3.0	18
Specialty	2/2	0	12	7.7	0
<b>Total</b>	<b>23/25</b>	<b>11</b>	<b>49</b>	<b>21.2</b>	<b>19</b>

Table 124: Registrar and Resident FTE by ICU Level

ICU Level	No. ICUs	NZJSAC-ICM Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Level 3	8/8	11	47	8.7	0
Level 2	6/7	0	2	9.5	1
Level 1	9/10	0	0	3.0	18
<b>Total</b>	<b>23/25</b>	<b>11</b>	<b>49</b>	<b>21.2</b>	<b>19</b>

There were 7 active registrars employed in intensive care (main employment setting) in 2000.<sup>47</sup> The ARCCCR recorded 11 JSAC-IC Registrar FTE in 2000.<sup>1</sup>

## 6.6 Nurse Labour Force

The term Registered Nurse (RN) refers to a nurse who has completed a three-year training program at certificate level (minimum), and who as defined by the Nurses Act 1977, has their name recorded on one of the Registers of Nurses. Critical care RN Full Time Equivalents (FTE) are shown together with the actual number of RNs in Table 124. A critical care qualification was defined for the purposes of the survey as an award at a minimum of certificate level obtained by successful completion of an accredited critical care program ( $\geq 6$  months duration) at a hospital or tertiary institution.

The ARCCCR uses the ABS standard with an FTE defined as  $\geq 35$  hours worked per week<sup>28</sup> though in New Zealand an FTE is  $\geq 30$  hours per week.<sup>47</sup>

All ARCCCR RN data is as at 30<sup>th</sup> June 2001.

Table 125: RN FTE, No. of RNs & No. with Critical Care Qualification

Region	No. ICUs	RN FTE	No. RNs On Roster	No. Crit. Care Qual.	% RNs Crit. Care Qual.
North Island	18/18	570.1	725	327	45.1
South Island	7/7	135.2	160	81	50.6
<b>New Zealand</b>	<b>25/25</b>	<b>705.3</b>	<b>885</b>	<b>408</b>	<b>46.1</b>

New Zealand workforce statistics for 2001 recorded 1,452 RNs and 6 enrolled nurses as working in intensive care/coronary care.<sup>49</sup> In 2000, there were 1,409 active RNs recorded as working in intensive care/coronary care. A total of 1,262 worked in the public hospital sector, 62 in the private sector and 21 with nursing agencies, whilst the remainder worked in a variety of educational, community and government settings.<sup>50</sup>

Table 126: RN FTE, No. of RNs & No. with Critical Care Qualification by ICU Type

ICU Type	No. ICUs	RN FTE	No. RNs On Roster	No. Crit. Care Qual.	% RNs Crit. Care Qual.
General ICU	12/12	456.7	546	294	53.8
ICU/CCU	11/11	145.7	202	74	36.6
Specialty	2/2	102.9	137	40	29.1
<b>New Zealand</b>	<b>25/25</b>	<b>705.3</b>	<b>885</b>	<b>408</b>	<b>46.1</b>

Table 127: RN FTE, No. of RNs & No. with Critical Care Qualification by ICU Level

ICU Level	No. ICUs	RN FTE	No. RNs On Roster	No. Crit. Care Qual.	% RNs Crit. Care Qual.
Level 3	8/8	415.5	502	239	47.6
Level 2	7/7	157.2	204	99	48.5
Level 1	10/10	132.6	179	70	39.1
<b>New Zealand</b>	<b>25/25</b>	<b>705.3</b>	<b>885</b>	<b>408</b>	<b>46.1</b>

Table 128: RN FTE, Vacancies & Casual Shifts/Week

Region	No. ICUs	RN FTE	RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>	Vacancy Rate (%)
North Island	18/18	570.1	35.9	84.5	5.9
South Island	7/7	135.2	7.1	27.0	4.9
<b>New Zealand</b>	<b>25/25</b>	<b>705.3</b>	<b>43.0</b>	<b>111.5</b>	<b>5.7</b>

a - average number of shifts (≥ 4 hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

Table 129: RN FTE, Vacancies & Casual Shifts/Week by ICU Type

ICU Type	No. ICUs	RN FTE	RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>	Vacancy Rate (%)
General ICU	12/12	456.7	18.1	60.0	3.8
ICU/CCU	11/11	145.7	13.8	35.5	8.6
Specialty	2/2	102.9	11.1	16.0	9.7
<b>New Zealand</b>	<b>25/25</b>	<b>705.3</b>	<b>43.0</b>	<b>111.5</b>	<b>5.7</b>

a - average number of shifts (≥ 4 hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

Table 130: RN FTE, Vacancies & Casual Shifts/Week by ICU Level

ICU Level	No. ICUs	RN FTE	RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>	Vacancy Rate (%)
Level 3	8/8	415.5	28.1	59.0	6.3
Level 2	7/7	157.2	2.6	21.0	1.6
Level 1	10/10	132.6	12.3	31.5	8.4
<b>New Zealand</b>	<b>25/25</b>	<b>705.3</b>	<b>43.0</b>	<b>111.5</b>	<b>5.7</b>

a - average number of shifts (≥ 4 hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

Table 131: RN FTE Distribution

Region Population*	RN FTE/ Available Bed	RN FTE/ Ventilator Bed	RN FTE/ 100,000
North Island 2,829,798	3.3	4.4	20.1
South Island 906,753	2.5	3.3	14.9
<b>New Zealand</b> 3,737,277 <sup>a</sup>	<b>3.1</b>	<b>4.2</b>	<b>18.8</b>

\*Source: Statistics New Zealand 2001 Census<sup>45</sup>

a – includes population of area outside region (Chatham Islands)

Table 132: No. RN Critical Care Students & No. Nurse Educators

Region	No. RNs- Critical Care Courses	Total Hours Nurse Educator(s) (per week)	Mean Hours Nurse Educator (per week)	Median Hours Nurse Educator (per week)
North Island	57	380	21.1	16.0
South Island	13	96	13.7	n/a
<b>New Zealand</b>	<b>70</b>	<b>476</b>	<b>19.0</b>	<b>n/a</b>

Table 133: RN Critical Care Students by ICU Type

ICU Type	No. RN Critical Care Students	% with Fees Subsidised (%)
General ICU	44	79.4
ICU/CCU	18	100.0
Specialty	8	37.5
<b>New Zealand</b>	<b>70</b>	<b>74.2</b>

Table 134: RN Critical Care Students by ICU Level

ICU Level	No. RN Critical Care Students	% with Fees Subsidised
Level 3	38	52.6
Level 2	16	100.0
Level 1	16	100.0
<b>New Zealand</b>	<b>70</b>	<b>74.2</b>

## Estimating Required RN FTE

A number of recommendations and standards have been proposed that include methods for estimation of clinical nursing requirements for intensive care.<sup>9, 25, 27-29, 35-41</sup> These methods are generally derived from standards and policies and typically include factors such as nurse/patient ratios, RN type and qualifications, patient acuity, ICU type and level, and prevailing professional practices.

RN FTE, vacant RN FTE and RN FTE gap by sector and ICU level, to estimate the minimum number of RN FTE required to staff these beds are shown in Tables 79-82. No assumptions were made for occupancy levels, RN skill mix and ICU bed type. The required RN FTE were for clinical, education and management positions in European critical care contexts and were based on the work of Ferdinande et al.<sup>37</sup> The minimum requirements stipulate 6 nurse FTE/Level 3 ICU bed; 4 nurse FTE/Level 2 ICU bed and 2 nurse FTE/Level 1 ICU bed.<sup>37</sup> These simple calculations were performed as an exercise to examine the differences in current supply and demand. Proposed is the minimum number of RN FTE likely to be required.

The required RN FTE projections are less than those proposed by the Audit Commission in England with 6.3 nurses/bed<sup>36</sup>, and in Australia by Williams and Clarke, with 6.7 nurse FTE/ICU bed and 3.89 nurse FTE/HDU bed.<sup>38</sup>

Table 135: Recommended RN FTE for Available Beds by ICU Level

ICU Level	RN FTE	Recommended RN FTE*	RN FTE Gap	No. RN FTE Vacancies	Casual Shifts/Week <sup>a</sup>
Level 3	415.5	648	232.5	12.3	59.0
Level 2	157.2	184	26.8	2.6	21.0
Level 1	132.6	142	9.4	28.1	31.5
<b>New Zealand</b>	<b>705.3</b>	<b>974</b>	<b>268.7</b>	<b>43.0</b>	<b>111.5</b>

\*Source: Ferdinande et al (1997)<sup>37</sup>

a - average number of shifts ( $\geq 4$  hours) per week worked by casually employed Registered Nurses (includes nurse bank / pool / agency / non-rostered overtime shifts).

- Predicated on maintaining a full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix).
- These estimations include clinical, management and education RN FTE positions.

See Table 96 for number of available beds by ICU level.

Table 136: Nurse Unit Manager: % Time (FTE) on Direct Patient Care

ICU Level	0%	1- 25%	26-50%	51-75%	76-100%
Level 3	62.5	12.5	12.5	12.5	-
Level 2	28.6	14.3	28.6	28.6	-
Level 1	30.0	30.0	20.0	10.0	10.0
<b>Total</b>	<b>40.0</b>	<b>20.0</b>	<b>20.0</b>	<b>16.0</b>	<b>4.0</b>

## 6.7 Private Sector ICUs

Data was received from three private sector hospitals that offered critical care services. Two of these ICUs were located on the North Island and one on the South Island. However one of the ICUs did not remain open on a continuous basis. An overview of ICU characteristics and activity is presented below.

<i>No. of ICUs:</i>	3	
<i>ICU Type:</i>	Cardiothoracic	
<i>ICU Level:</i>	1	
<i>Physical Beds:</i>	14	
<i>Available Beds:</i>	14	
<i>Ventilator Beds:</i>	10	
<i>Interchangeable Beds:</i>	2 ICUs each had 5 interchangeable ICU/HDU beds (total 10 beds)	
<i>Total Admissions:</i>	1,177 (included 147 HDU admissions)	
<i>Readmissions:</i>	8 (data from 1 ICU)	
<i>Paediatric Admissions:</i>	5	
<i>Bed Hours:</i>	12,000 hours	] data from 2 ICUs
<i>Ventilator Hours:</i>	2,700 hours	
<i>No. Invasively Ventilated:</i>	549	
<i>Intensivist FTE:</i>	0.5 FTE	] data from 2 ICUs
<i>Other Specialist FTE:</i>	1.0 FTE	
<i>No. sessional staff:</i>	11	
<i>Registrars:</i>	0	
<i>Residents:</i>	5	
<i>RN FTE:</i>	21.4 FTE	
<i>No RNs on roster:</i>	29	
<i>No. Crit. Care Qual:</i>	18	
<i>RN FTE Vacancies:</i>	0	
<i>RN Crit Care Students:</i>	2	
<i>Nurse Educator:</i>	0.2 FTE	
<i>Nurse Unit Manager % of time (FTE) on direct patient care: 10% / 15% / 80%</i>		
<i>Bed Card:</i>	Specialist	
<i>Formal ICU Rounds/day:</i>	1-2	
<i>MET Team:</i>	1 ICU (implemented in 1997)	

## 6.8 Quality Overview

The survey sought responses to questions on a range of quality issues. These included the consultant or unit under which the patient was admitted to ICU; the number of formal rounds per day; the type (if any) of formal post-ICU patient review; severity of illness scoring system utilised; the presence of bedside clinical information systems; the implementation of Medical Emergency Teams (MET) and the year these commenced operation; participation in clinical trials; the number of publications; criteria to restrict access to ICU; the number and type of treatment protocols; and, ICU audit processes.

Figure 50: ICU Bed Card

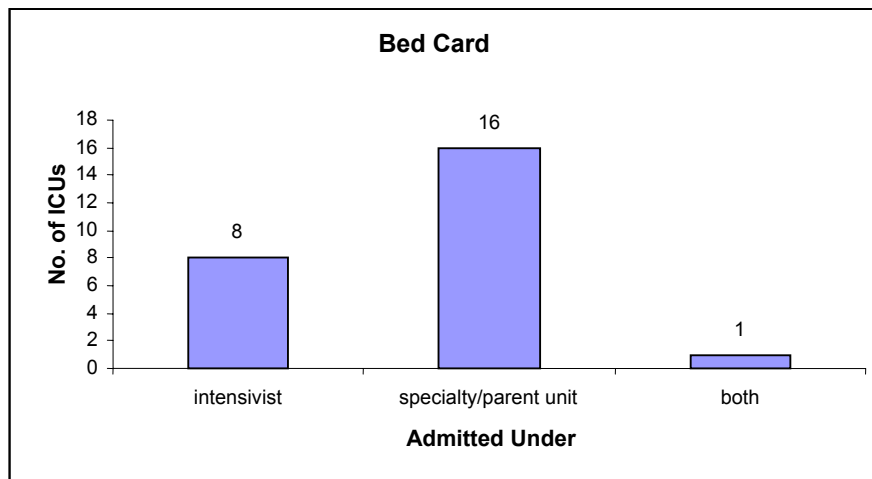


Figure 51: No. Formal Rounds/Day by ICU Consultant

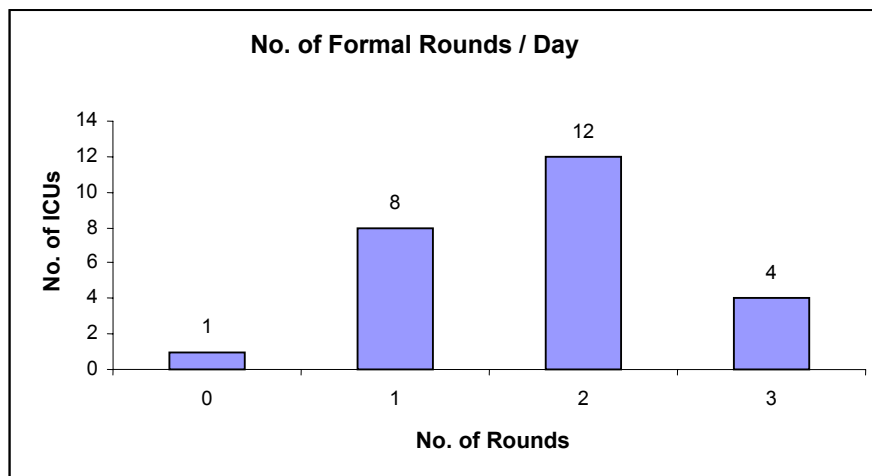


Figure 52: Formal Post-ICU Review

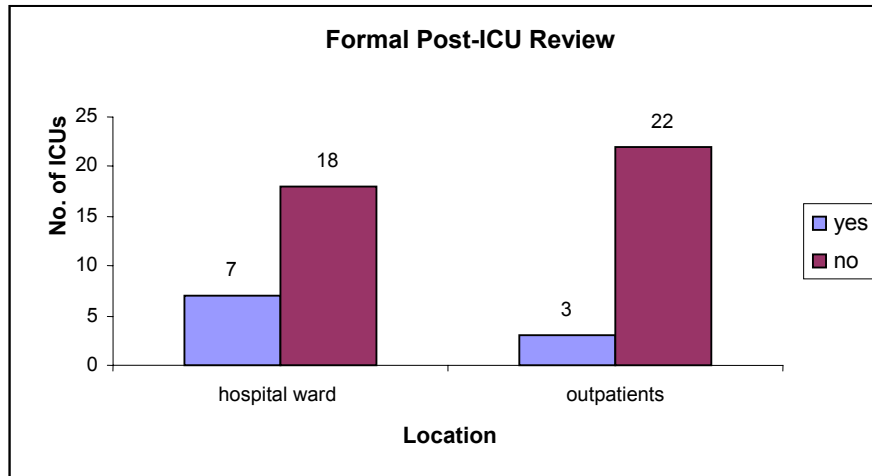
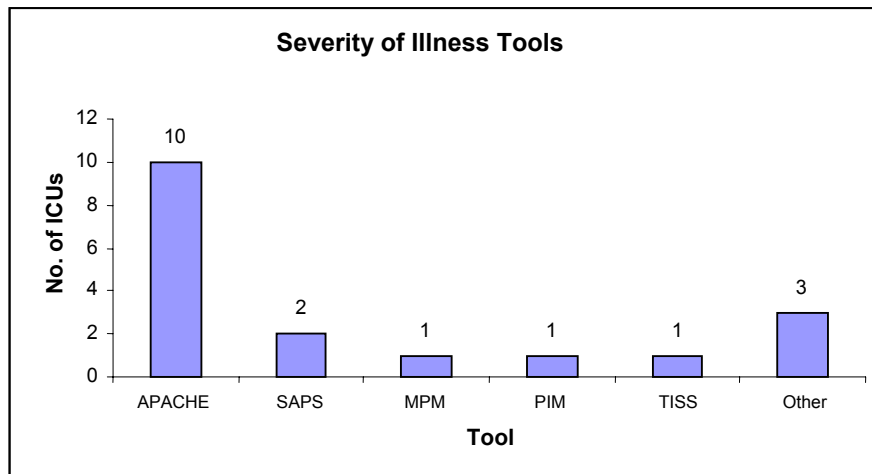


Figure 53: Severity of Illness Scoring Systems



Other included injury/trauma and Tu scoring systems.

- Only three sites stated that the ICU utilized a bedside clinical information system.
- 2 general ICUs and one specialty ICU indicated the formation of a MET Team and these had been established during 1991, 1995 and 2000.
- 11 ICUs participated in ICU clinical trials

Figure 54: No. of Publications

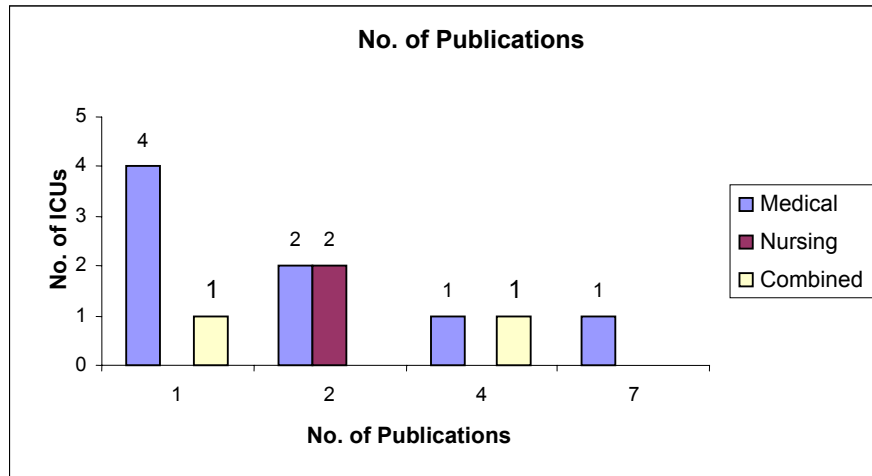
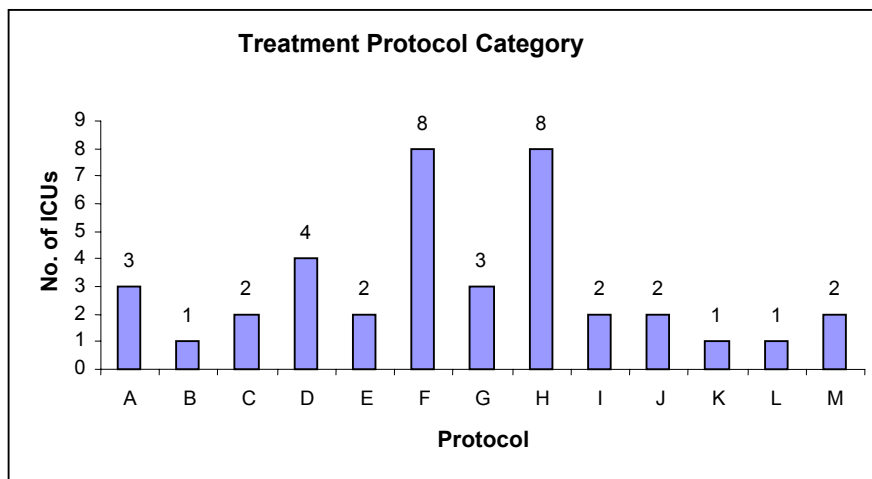


Figure 55: Treatment Protocol Category



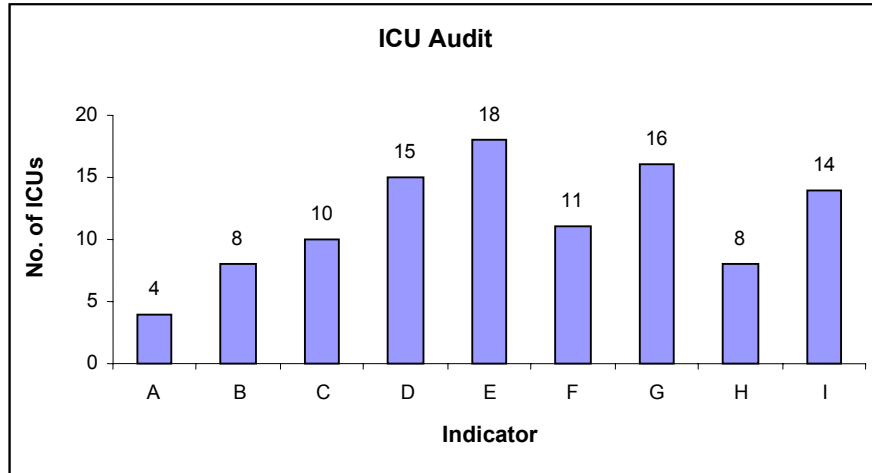
**Protocol:**

- A: Admission / Discharge
- B: Resuscitation
- C: Airway Management
- D: Ventilation
- E: Lines
- F: Drugs
- G: Renal Replacement Therapy
- H: Medical Conditions
- I: Sedation / Pain / Paralysis
- J: Enteral / Parenteral Nutrition
- K: Brain Death /Organ Donation
- L: Equipment
- M: Other

16 ICUs stated that treatment protocols were utilised, the use of protocols in 3 ICUs was unknown, and 6 ICUs had no protocols in place.

Six ICUs indicated the number of protocols: 1-20 protocols, 4 ICUs (16%); 21-40 protocols, 2 ICUs (8%). Two ICUs had not reviewed any protocols during 2000/2001, 6 ICUs had reviewed  $\leq 10$  protocols and 1 ICU had reviewed 13 protocols.

Figure 56: ICU Audit



*Indicators:*

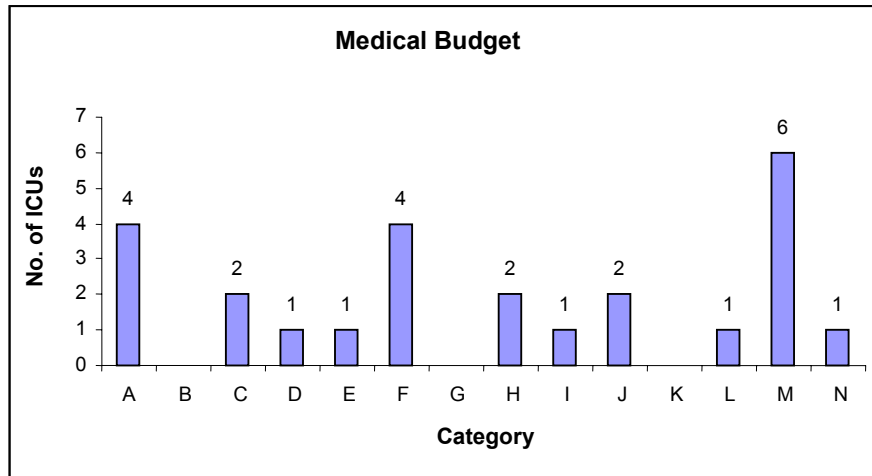
- A: Out-of-hours discharge
- B: Refusal of appropriate admission
- C: Nosocomial pneumonia
- D: Line sepsis
- E: ICU outcome
- F: Hospital outcome
- G: ICU length of stay
- H: Australian Council on Healthcare Standards (ACHS) Clinical Indicators
- I: Patient / Family Satisfaction

## 6.9 ICU Organisational Overview

21 ICUs indicated that the ICU was a separate department/cost centre, 2 ICUs were not separate departments/cost centres and for 2 ICUs it was either not stated or not known.

The following figures (57-62) indicate the division/department to which the ICU directly reports or is accountable to:

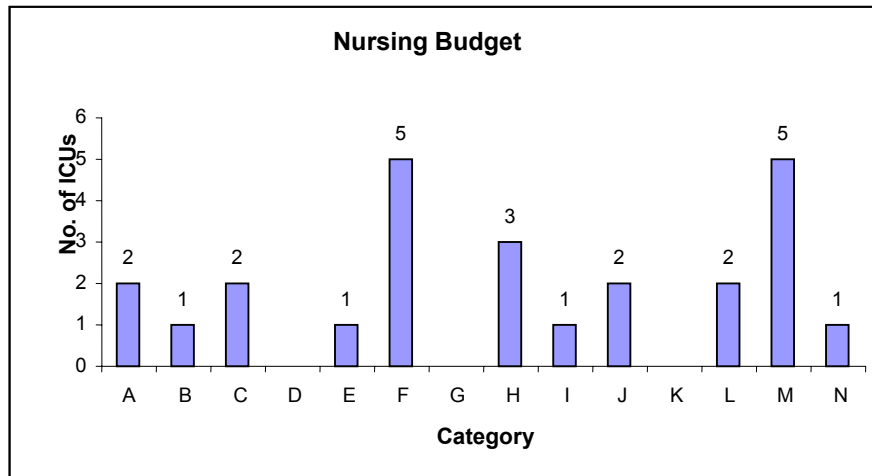
Figure 57: Medical Budget



**Category:**

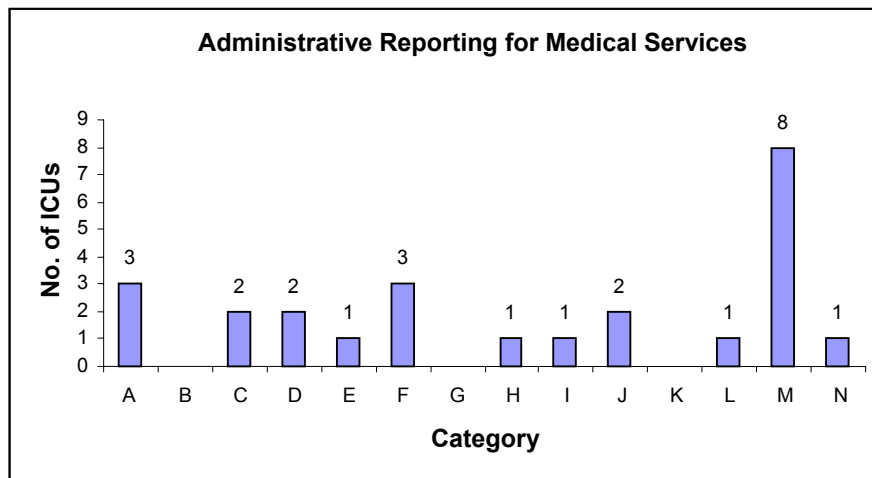
- A: Medical Executive
- B: Nursing Executive
- C: Critical Care Services
- D: Anaesthesia
- E: Anaesthesia & Critical Care
- F: Surgery
- G: Medicine
- H: Clinical Services
- I: Acute Services
- J: Chief Executive Officer
- K: Finance
- L: Combined Categories
- M: Not Known
- N: Other

Figure 58: Nursing Budget



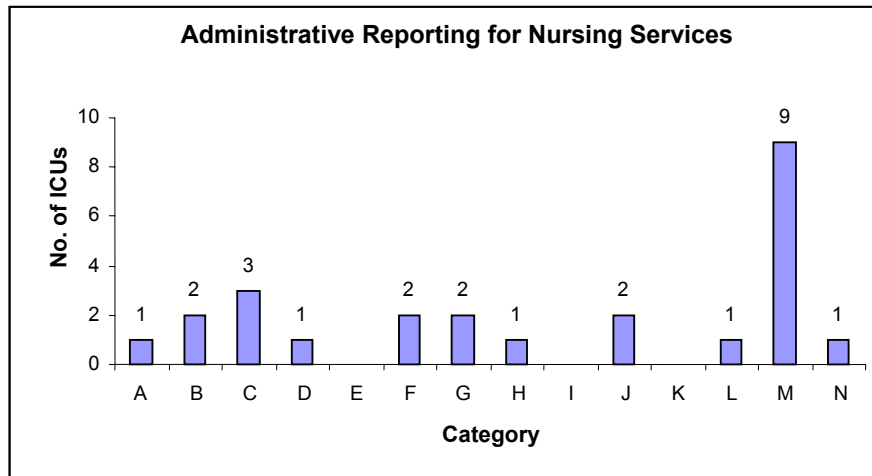
- Category:
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Chief Executive Officer
  - K: Finance
  - L: Combined Categories
  - M: Not Known
  - N: Other

Figure 59: Administrative Reporting for Medical Services



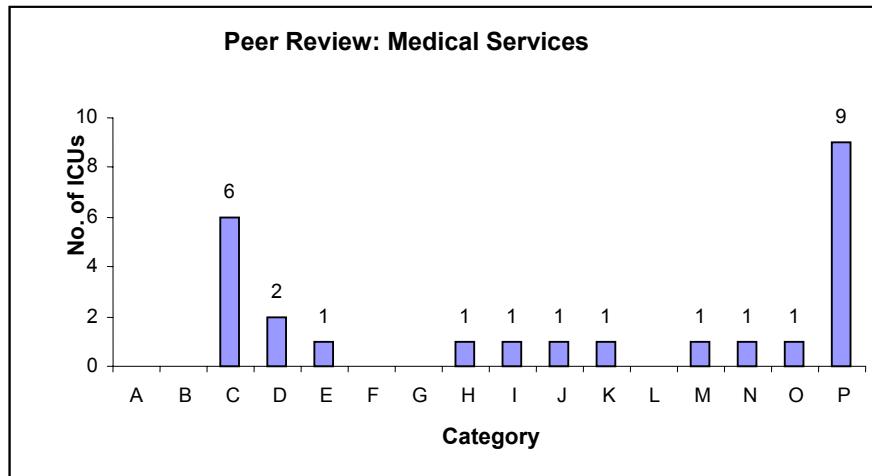
- Category:*
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Chief Executive Officer
  - K: Medical Advisory Committee
  - L: Combined Categories
  - M: Not Known
  - N: Other

Figure 60: Administrative Reporting for Nursing Services



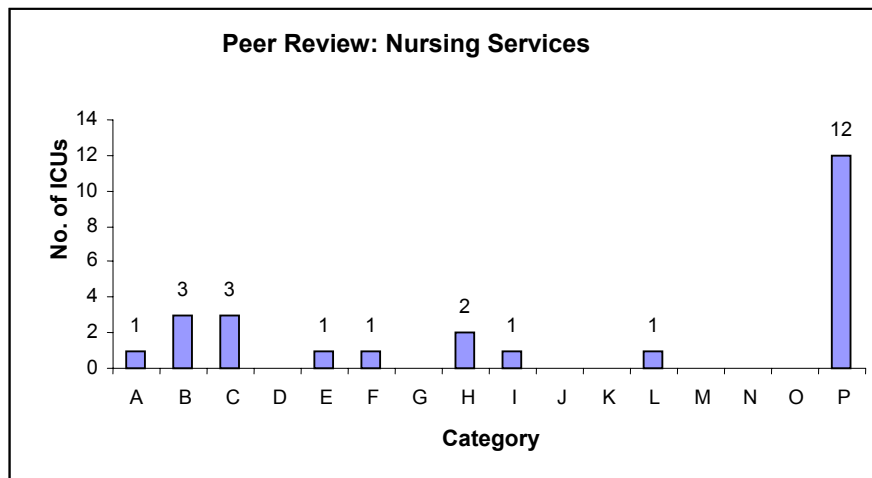
- Category:**
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Chief Executive Officer
  - K: Medical Advisory Committee
  - L: Combined Categories
  - M: Not Known
  - N: Other

Figure 61: Peer Review, Medical Services



- Category:**
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Medical Advisory Committee
  - K: Chief Executive Officer
  - L: Quality Committee
  - M: Mortality & Morbidity Committee
  - N: Combined Categories
  - O: Other
  - P: Not Known

Figure 62: Peer Review, Nursing Services



- Category:**
- A: Medical Executive
  - B: Nursing Executive
  - C: Critical Care Services
  - D: Anaesthesia
  - E: Anaesthesia & Critical Care
  - F: Surgery
  - G: Medicine
  - H: Clinical Services
  - I: Acute Services
  - J: Medical Advisory Committee
  - K: Chief Executive Officer
  - L: Quality Committee
  - M: Mortality & Morbidity Committee
  - N: Combined Categories
  - O: Other
  - P: Not Known

## 6.10 Academic Affiliations

ICUs could nominate the university or tertiary sector institutions and the respective departments to which they were affiliated. This item was optional.

Table 137: Academic Affiliations, Medicine

University	No. Affiliations Reported	Affiliated Departments
Auckland	3	<ul style="list-style-type: none"> <li>▪ Medicine (14.3%)</li> <li>▪ Surgery (14.34%)</li> <li>▪ Critical Care (14.3%)</li> <li>▪ Anaesthesia (16%)</li> </ul>
Otago	3	
Wellington	1	
<b>Total: 3</b>	<b>7</b>	

Table 138: Academic Affiliations, Nursing

Tertiary Institution /University	No. Affiliations Reported	Affiliated Departments
Auckland	2	<ul style="list-style-type: none"> <li>▪ Nursing (75%)</li> <li>▪ Critical Care (12.5%)</li> <li>▪ Not known (12.5%)</li> </ul>
Auckland University of Technology	1	
Eastern Institute of Technology	1	
Massey	1	
Otago Polytechnic	1	
Victoria	2	
<b>Total: 5</b>	<b>8</b>	

## 6.11 Comparative ARCCCR Data

Table 139: Comparative ARCCCR Data

Item	1997 <sup>4</sup>	1998 <sup>3</sup>	1999/2000	2000/2001
Hospitals	25	24	26	28
ICUs	25	23	26+	28
Public sector ICUs	21	23	25	25
Private sector ICUs	n/a	n/a	1	3
Physical Beds – Public sector	198	225	261	256
Available Beds – Public sector	155	177	228	225
Ventilator Beds – Public sector	127	154	173	167
Level 3 ICU Available Beds - Public sector	80	74	100	108
Level 2 ICU Available Beds – Public sector	62	77	96	46
Level 1 ICU Available Beds – Public sector	13	26	32	71
Available Beds/100,000 – Public sector	4.30	4.66	5.95	6.02
Ventilator Beds/100,000 – Public sector	3.50	4.06	4.51	4.46
Available Beds/Specialist FTE – Public sector	3.90	3.09	4.08	5.55
Nurse FTE/Available Bed – Public sector	3.60	3.26	3.05	3.13

Note variances in:

- Time reference periods: 1997 & 1998 calendar year data; 1999/2000 financial year data.
- Terminology – Specialist (consultant in 1997 data).
- Number of ICUs – now grouped as critical care complexes.

## 7. JFICM – Accredited ICUs for Training in Intensive Care

The Joint Faculty of Intensive Care Medicine (JFICM) promulgates guidelines for ICUs that seek accreditation for training in intensive care medicine.<sup>51</sup>

Duration of core training is restricted according to the classification of the ICU by the JFICM.<sup>51</sup>

### **C24: Unrestricted core training**

- May spend whole of core training in unit
- Major/tertiary hospitals
- High case load, diverse case mix, adequate severity of illness
- Trainees must spend one year in an ICU with C24 classification
- 500 admissions per annum
- minimum six available beds

### **C12: Twelve months core training**

- Case load & case mix adequate
- Inadequate for trainee to spend whole of core training in such an ICU
- Necessary for trainee to spend period of training in other ICU to gain specific experience
- 500 admissions per annum
- minimum six available beds

### **C6: Six months core training**

- Case load, case mix, supervision or facilities are limited
- Designed to encourage rotations
- Not more than one period of C6 training in a given ICU is allowed during core training
- 350 admissions per annum
- minimum six available beds

### **S3: Three months core training in specific circumstances**

- Allows trainee to gain specific clinical exposure.
- Only one period of S3 training is allowed during core training
- Other services such as retrieval / hyperbaric units etc may be considered
- 350 admissions per annum
- minimum six available beds

### **Number of ICUs / ICU Level / Hospital Sector**

- 65 ICUs in Australia (n = 57) and New Zealand (n = 8)  
[C24: 28; C12: 17; C6: 16; S3: 4]
- 59 Level III ICUs; 6 Level II ICUs

- C24 Level III public sector: n = 28
- C12 Level III public sector: n = 15
- C12 Level III private sector n = 1
- C12 Level II public sector: n = 1
- C6 Level III public sector: n = 9
- C6 Level III private sector: n = 3
- C6 Level II public sector: n = 4
- S3 Level III private sector: n = 3
- S3 Level II private sector: n = 1

*ICU Type:*

- 54 - General ICUs
- 2 - ICU / CCU
- 1 - Cardiothoracic ICU
- 8 - PICUs

*ICU Location:*

- 49 - capital city
- 7 - metropolitan
- 1 - rural
- 8 - New Zealand (not classified)

*Accessibility / Remoteness Index Australia (ARIA):*

- 55 - highly accessible
- 2 - accessible
- 8 - New Zealand (not classified)

*Service Centre (Population) Category:*

- 48 - > 250,000
- 8 - 48,000 to 249,999
- 1 - 5,000 to 17,999
- 8 - New Zealand (not classified)

*Table 140: ICU Bed Stock (includes HDU / CCU / other beds)*

<i>Classification</i>	<i>Physical Beds</i>	<i>Available Beds</i>	<i>Ventilator Beds</i>
C24 (n=28)	667	545	489
C12 (n=17)	228	192	177
C6 (n=16)	195	172	154
S3 (n=4)	43	43	35
<b>Total (n=65)</b>	<b>1,133</b>	<b>952</b>	<b>855</b>

C24: 9 minimum no. available beds; 35 maximum no. available beds  
18.46 mean no. available beds; 18 median no. available beds

C12: 5 minimum no. available beds; 16 maximum no. available beds  
11.29 mean no. available beds; 12 median no. available beds

C6: 6 minimum no. available beds; 23 maximum no. available beds  
10.75 mean no. available beds; 10 median no. available beds

S3: 10 minimum no. available beds; 12 maximum no. available beds  
10.75 mean no. available beds; 10.5 median no. available beds

- One C12 unit had less than the minimum six available beds

Table 141: Admission Data

Classification	ICU Admissions	CCU Admissions <sup>a</sup>	HDU Admissions	Other Admissions <sup>b</sup>	Total Admissions
C24 <sup>c</sup>	28,212	-	5,089	6,736	40,037
C12	11,920	-	685	678	13,283
C6 <sup>d</sup>	9,746	588	555	1,836	12,725
S3	2,853	-	842	-	3,695
<b>Total</b>	<b>52,731</b>	<b>588</b>	<b>7,171</b>	<b>9,250</b>	<b>69,740</b>

a - combined ICU/CCU (2 ICUs)

b - other admissions – where multiple ICUs e.g. neuro ICU / cardiac ICU

c - one C24 unit did not provide admission data – (1,132 ICU/HDU admissions reported in 1999/2000)

d - one C6 unit provided six months admission data only

C24: 620 minimum no. ICU admissions; 2,069 maximum no. of ICU admissions  
1,044.89 mean no. ICU admissions; 942 median no. ICU admissions

C12: 432 minimum no. ICU admissions; 1,191 maximum no. of ICU admissions  
701.18 mean no. ICU admissions; 639 median no. ICU admissions

C6: 190 minimum no. ICU admissions; 1,667 maximum no. of ICU admissions  
609.12 mean no. ICU admissions; 514 median no. ICU admissions

S3: 355 minimum no. ICU admissions; 856 maximum no. of ICU admissions  
713.25 mean no. ICU admissions; 821 median no. ICU admissions

- Four C12 ICUs had less than 500 ICU admissions in 2000/2001
- Two C6 ICUs had less than 350 admissions in 2000/2001

Table 142: ICU Bed Hours /Days

Classification	Bed Hours	Bed Days
C24 <sup>a</sup>	517,071.0	95,379.8
C12 <sup>b</sup>	338,394.0	17,682.4
C6 <sup>c</sup>	306,770.2	18,710.7
S3	89,607.0	3,739.0
<b>Total</b>	<b>1,251,842.2</b>	<b>135,511.9</b>

a - data not reported by 2 C24 units

b - data not reported by 3 C12 units

c - data not reported by 3 C6 units

Table 143: ICU Ventilator Hours /Days

<i>Classification</i>	<i>Ventilator Hours</i>	<i>Ventilator Days</i>
C24 <sup>a</sup>	841,755	34,947
C12 <sup>b</sup>	221,434	4,918
C6 <sup>c</sup>	278,969	5,823
S3 <sup>d</sup>	36,187	1,905
<b>Total</b>	<b>1,378,345</b>	<b>47,593</b>

a – data not reported by 3 C24 units  
b – data not reported by 4 C12 units  
c – data not reported by 2 C6 units (one unit six months data only)  
d – data not reported by 1 S3 unit

Table 144: No. of Patients Ventilated

<i>Classification</i>	<i>Number Ventilated</i>	<i>Number Invasive Ventilation</i>
C24	24,134 <sup>a</sup>	18,498 <sup>b</sup>
C12	4,977 <sup>c</sup>	4,194 <sup>d</sup>
C6	8,137 <sup>e</sup>	5,827 <sup>f</sup>
S3	1,394 <sup>g</sup>	868 <sup>h</sup>
<b>Total</b>	<b>38,642</b>	<b>29,387</b>

a - data not reported by 3 C24 units  
b - data not reported by 6 C24 units  
c - data not reported by 4 C12 units  
d - data not reported by 6 C12 units  
e - data not reported by 1 C6 unit (one unit six months data only)  
f - data not reported by 2 C 6units (one unit six months data only)  
g - data not reported by 1 S3 unit  
h - data not reported by 2 S3 units

Table 145: Specialist FTE & Vacancies

<i>Classification</i>	<i>Intensivist FTE</i>	<i>Other Specialist FTE</i>	<i>FTE Vacancies</i>
C24	138.7	3.2	4.7
C12	50.0	3.1	6.4
C6 <sup>a</sup>	24.2	6.4	2.0
S3	5.0	0	0
<b>Total</b>	<b>217.9</b>	<b>12.7</b>	<b>13.1</b>

a – data not reported by 2 sites for intensivist FTE

Table 146: Registrar FTE

<i>Classification</i>	<i>JSAC-IC Registrar FTE</i>	<i>Other Registrar FTE</i>
C24	76.0	170.9
C12	19.0	66.5
C6	11.0	58.9
S3	0	14.0
<b>Total</b>	<b>106.0</b>	<b>310.3</b>

Table 147: RN FTE, Vacancies & Casual Shifts/Week

<i>Classification</i>	<i>RN FTE</i>	<i>RN FTE Vacancies</i>	<i>Casual Shifts/Week<sup>a</sup></i>
C24	2,236.58	216.83	748.81
C12	808.52	76.66	254.50
C6	694.48	58.76	246.00
S3	97.12	16.68	146.20
<b>Total</b>	<b>3,836.70</b>	<b>368.93</b>	<b>1,395.51</b>

a - average number of shifts per week worked by casually employed Registered Nurses (includes nurse bank / pool / non-rostered overtime shifts).

Table 148: RN FTE, No. of RNs, & No. with Critical Care Qualification

<i>Classification</i>	<i>RN FTE</i>	<i>RN's On Roster</i>	<i>RN's with Critical Care Qualification</i>	<i>% Qualified</i>
C24	2,236.58	2,759	1,501	54.4
C12	808.52	952	455	47.7
C6	694.48	898	412	45.8
S3	97.12	120	58	48.3
<b>Total</b>	<b>3,836.7</b>	<b>4,729</b>	<b>2,426</b>	<b>51.3</b>

Table 149: RN Critical Care Students and Proportion with Subsidised Fees

<i>Classification</i>	<i>RN Critical Care Students</i>	<i>No. with Fees Subsidised</i>	<i>% Subsidised</i>
C24	315	158	50.1
C12	85	41	48.2
C6	68	40	58.8
S3	19	13	68.4
<b>Total</b>	<b>487</b>	<b>252</b>	<b>51.7</b>

## 8.0 Conclusion

Changing consumer expectations, together with an ageing population are implicated in the increasing demand for health care services. This report has highlighted the increased utilisation of intensive care services in 2000/2001. The composition of those services in terms of bed capacity, bed type and distribution has been outlined and an overview of geographic and demographic dimensions has also been provided.

Whilst understanding of bed type and patient type, particularly in relation to the intensive care/high dependency care dichotomy is not comprehensively understood at present and further research is required, this report has built on information contained in previous reports to improve our knowledge of these elements.

The human resource dimension is a key component of critical care service provision. It seems that many ICUs face significant challenges on a daily basis to ensure appropriate numbers of adequately trained staff are available to provide safe and effective patient care. Urgent action is required to address medical and nursing staff shortages to ensure sustainable critical care service provision for the present and for the future.

Emerging evidence points to the benefits of intensivist led care.<sup>52-56</sup>

- improved patient outcomes
- ↓ mortality
- ↓ complications
- ↓ ICU / hospital length of stay
- ↓ resource use / costs (shorter duration of mechanical ventilation; less laboratory / x-ray tests; less blood products; fewer consultations; lower pharmacy costs; less procedures).

The nature of critical care services means that many intensivists have extended hours of work with a significant on-call commitment. Safe working hour campaigns are underway in Australia, Europe and the United States of America.<sup>57-60</sup> However the implementation of safe working hours has implications for intensivist professional life and for critical care service provision.

Critical care services are a team effort and intensivist led care is reliant on sufficient numbers of appropriately qualified nursing, allied health and ancillary health care workers. The emphasis is on providing quality, cost-effective care to enhance patient outcomes.

Initiatives to support staff, promote new models of care and to strengthen resources are being undertaken in a number of jurisdictions and are to be commended.

The *Review of Intensive Care Activity and Resources 2000/2001* aims to contribute to our understanding of the distribution and attributes of critical care resources and service provision in Australia and New Zealand intensive care units for the 2000/2001 financial year.

Research into the provision, delivery and outcomes of critical care services is an ongoing process.

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# APPENDICES

## **Appendix 1: Glossary as sent with survey:**

<i>Available (Open) Bed</i>	Bed in use or immediately available for use by admitted patients as required. In ICU this refers to a bed with advanced life support capability that is fully staffed and funded. As bed status may vary, state average number of beds for year 2000/2001.
<i>Bed Days (Patient Days)</i>	The total number of days for all patients who were admitted to the ICU for an episode of care. Calculated as the difference between the separation date and admission date. Same day patients are allocated a length of stay of one day.
<i>Career Medical Officer</i>	Also known as a hospital medical officer (HMO) in some states. A non-specialist medical practitioner employed by the institution to assist in the care of patients under specialist supervision.
<i>Critical Care Qualification</i>	An award at a minimum of certificate level obtained by successful completion of an accredited critical care education program ( $\geq 6$ months duration) at a hospital or tertiary institution.
<i>Full Time Equivalent</i>	(FTE/EFT) The number of paid hours expressed as a ratio of the agreed or award hours for a full time employee ( $\geq 35$ hours per week of paid employment). For positions rotating between institutions (intensivist / registrar / resident) report only the FTE applicable to that site.
<i>High Dependency Unit (Step Down Unit)</i>	A discrete unit within the hospital, able to supply critical care expertise at less intensive resource levels, providing a level of care that falls between the general ward level and the intensive care unit.
<i>Intensive Care Specialist (Intensivist)</i>	A medical practitioner who has been specifically trained in intensive care medicine. Intensive care specialists are formally certified in intensive care by completing the training requirements of FICANZCA or the RACP (qualification recognised by JSAC-IC).
<i>Interchangeable Bed</i>	An available critical care bed that may be utilised as an intensive care / high dependency / coronary care bed as required.
<i>JSAC-IC / NZJSAC-ICM</i>	Joint Specialist Advisory Committee – Intensive Care. A joint committee of FICANZCA and the RACP. The JSAC-IC supervises intensive care trainees and makes recommendations for specialist recognition to the Australian Medical Council / Medical Council of New Zealand.
<i>Mechanical Ventilation</i>	Continuous ventilatory support by means of a mechanical device that moves gases into/from a patient's lungs to augment/replace respiratory effort.
<i>Medical Emergency Team</i>	Medical and nursing staff skilled in resuscitation who respond to at-risk patients exhibiting specific clinical criteria to prevent further deterioration.
<i>Out-of-Hours Discharge</i>	A patient discharge from the ICU that occurs between 2200 and 0700 hours.
<i>Paediatric Patient</i>	A patient < 16 years of age.
<i>Physical Bed</i>	A single patient care location fully configured to ICU standards, it is an actual bed, not a bed space.
<i>Post-registration Course</i>	An accredited tertiary-level course undertaken post-initial nurse registration that is at certificate level (minimum) or above.
<i>Readmission</i>	Any second or subsequent admission to ICU/HDU within the same hospital admission (exclude direct transfers to or from ICU to HDU). Readmission includes all readmissions, it is not equivalent to the ACHS indicator $\leq 48$ hours.
<i>Refusal of Appropriate Admission to ICU</i>	Patient requiring ICU services and for whom those services / resources could not be provided by that hospital at a particular time. This excludes patients for whom a specialty service (eg neuro-intensive care) could not be provided at that hospital.

<i>Registered Nurse (Australia)</i>	A nurse who is on the register maintained by the State or Territory nurses board or nursing council to practise nursing in that State or Territory.
<i>Registered Nurse (New Zealand)</i>	A registered nurse is defined by the Nurses Act 1977 as a nurse whose name is recorded on one of the Registers of Nurses.
<i>Resident Medical Officer</i>	A medical practitioner undergoing further training in a hospital after completing an internship but who has not commenced a recognised general practice or specialist practice training program.
<i>Separation(s)</i>	The process by which an admitted patient completes an episode of care (when an inpatient leaves a hospital through discharge, transfer or death). A separation may be formal or statistical. The latter may occur when a patient transfers from an acute to a chronic health care facility operated by the same institution. (Exclude where possible, day cases, endoscopies, same day dialysis, chronic/rehabilitation patients).
<i>Special Care Unit</i>	Units other than those managed by ICU: coronary care (CCU), neonatal intensive care (NICU), and other high dependency units e.g. neuro, respiratory, spinal.
<i>Specialist (non-ICU)</i>	A medical practitioner with a qualification awarded by, or which equates to that awarded by, the relevant specialist training college.
<i>Treatment Protocols</i>	An agreed unit-based method / process of care that reduces the variability inherent in clinical practice. Treatment protocols may be multidisciplinary and either evidence-based or based on local expert opinion.
<i>Ventilator Bed</i>	A physical ICU bed plus ventilator.
<i>Ventilation</i>	The process of respiratory support: <i>Invasive</i> - whereby a patient is intubated (oral / nasal / tracheostomy) and mechanically ventilated. <i>Non-invasive</i> – ventilatory support such as CPAP/BiPAP.
<i>Ventilator Hours</i>	The number of hours a patient is intubated (oral/nasal/tracheostomy) and ventilated but not weaned from invasive mechanical ventilatory support.
<i>Weaning Time</i>	The last time a patient received mechanical ventilation excluding physiotherapy related interventions.

**Abbreviations sent with survey:**

ACHS	Australian Council on Healthcare Standards
BiPAP	Bi-level Positive Airway Pressure
CPAP	Continuous Positive Airway Pressure
FICANZCA	Faculty of Intensive Care, Australian and New Zealand College of Anaesthetists
FTE (EFT)	Full Time Equivalent
HDU	High Dependency Unit
HECS	Higher Education Contribution Scheme
ICU	Intensive Care Unit
ICU/CCU	Combined Intensive Care / Coronary Care Unit / High Dependency Unit
JSAC-IC / NZJSAC-ICM	Joint Specialist Advisory Committee – Intensive Care

ARCCCR Survey February 2002



## Appendix 2: ANZICS Research Centre for Critical Care Resources

### Critical Care Resource Survey: 2000 – 2001 Financial Year (1/7/2000 – 30/6/2001)

Please complete all details, place in the pre-addressed envelope and submit by **29<sup>th</sup> March 2002**. Refer to the enclosed documentation for abbreviations and glossary with data definitions.

*Tick one box only unless otherwise specified. Please write clearly. Retain a copy of the completed survey form.*

<p><b>1. Hospital Name:</b> _____</p> <p><b>2. Number of Hospital Beds:</b> _____ <i>(average available beds)</i></p> <p><b>3. Number of Hospital Separations:</b> _____ <i>(refer to glossary)</i></p>
---

<p><b>4. Hospital Type:</b></p> <p><input type="checkbox"/> Public Hospital</p> <p><input type="checkbox"/> Private Hospital</p> <p><input type="checkbox"/> Other <i>(specify type)</i> _____</p> <p><b>5. ICU Type:</b></p> <p><input type="checkbox"/> General ICU (combined medical / surgical)</p> <p><input type="checkbox"/> ICU/CCU (combined intensive care / coronary care / high dependency unit)</p> <p><input type="checkbox"/> Cardiothoracic ICU</p> <p><input type="checkbox"/> Paediatric ICU</p> <p><input type="checkbox"/> High Dependency Unit / Step Down / Special Care Unit</p> <p><input type="checkbox"/> Other <i>(specify type)</i> _____</p> <p><b>6. Number &amp; Type of other special care units in the hospital:</b> <i>(not managed by ICU - refer to glossary)</i></p> <p>_____</p> <p>_____</p> <p><b>7. Organisational Overview:</b> <i>(complete enclosed chart, see page 5)</i></p>
--

<p><b>8. Functional ICU Level:</b> <i>(refer to FICANZCA guidelines)</i></p> <p><input type="checkbox"/> Level 3</p> <p><input type="checkbox"/> Level 2</p> <p><input type="checkbox"/> Level 1 <i>(short term ventilation only)</i></p> <p><input type="checkbox"/> High Dependency Unit / Step Down / Special Care Unit <i>(no ventilatory capacity)</i></p>
---

**9. Number of Critical Care Beds:** *As bed status may vary state average number of beds for year 2000/2001  
List usual number of beds in each category*

	General Intensive Care	Cardiothoracic ICU*	High Dependency**	Coronary Care***	Other	Total Beds
Physical Beds						
Available Beds						
Ventilator Beds						

\* Separate Cardiothoracic ICU \*\* HDU beds managed by the ICU \*\*\* Combined ICU/CCUs

**10. Number of Interchangeable Critical Care Beds:**

Nil

\_\_\_\_\_ ICU / HDU

\_\_\_\_\_ ICU / CCU

\_\_\_\_\_ Other (please specify)

**11. Critical Care Admission Data: 2000/2001** (AORTIC users refer to enclosed documentation)

Admissions – all admissions including readmissions

Readmissions – all readmissions including multiple readmissions for the same episode of care

	General ICU	HDU	CCU	Other ICU*	Total
Admissions					
Readmissions					

\* eg cardiothoracic ICU

**All admissions:**

\_\_\_\_\_ Number of ventilated patients: Invasive \_\_\_\_\_ Non-invasive \_\_\_\_\_  
(a patient may score in both categories; refer to glossary)

\_\_\_\_\_ Number of Ventilator Hours (preferred option) **or** \_\_\_\_\_ Number of Ventilator Days

\_\_\_\_\_ Number of ICU Bed Hours (preferred option) **or** \_\_\_\_\_ Number of ICU Bed Days

**Paediatric Admissions:**

\_\_\_\_\_ Number of patients < 16 years of age (included in total above)

\_\_\_\_\_ Number of ventilated patients < 16 years of age (included in total above)

\_\_\_\_\_ Number of patients < 16 years of age transferred to a paediatric ICU

\_\_\_\_\_ Number of deaths < 16 years of age

**12. Senior Medical Staff Profile as at 30/6/01:**

- \_\_\_\_\_ Number of intensive care specialist FTE\*
- \_\_\_\_\_ Number of salaried intensive care specialists on roster\*
- \_\_\_\_\_ Number of sessional intensive care specialists on roster\*
- \_\_\_\_\_ Number of non-intensive care specialist FTE
- \_\_\_\_\_ Number of salaried non-intensive care specialists on roster
- \_\_\_\_\_ Number of sessional non-intensive care specialists on roster
- \_\_\_\_\_ Number of vacant specialist FTE (position(s) funded but unfilled)

**13.** Does the ICU director hold an intensive care specialist qualification\*?  Yes  No

\* (fulfils criteria for JSAC-IC / NZJSAC-ICM specialist recognition)

**14. Registrar Profile as at 30/6/01:**

- \_\_\_\_\_ Number of Registrar FTE in JSAC-IC training program
- \_\_\_\_\_ Number of Registrar FTE (not in JSAC-IC training program)

**15. Resident / House Officer / Career Medical Officer Staffing in ICU as at 30/6/01:**

- \_\_\_\_\_ Number of FTE (dedicated ICU staff only)
- \_\_\_\_\_ Number of FTE (ICU / general hospital – provides non-emergency services outside ICU)

**16. Registered Nurse (RN) Staffing Profile as at 30/6/01:**

- \_\_\_\_\_ Number of RN FTE (permanent / rostered positions)
- \_\_\_\_\_ Number of RNs on roster (permanent positions)
- \_\_\_\_\_ Average number of shifts ( $\geq 4$  hours) per week worked by casually employed RNs  
(include nurse bank / pool / agency / non-rostered overtime shifts)
- \_\_\_\_\_ Number of vacant RN FTE position(s) funded but unfilled
- \_\_\_\_\_ Number of permanently employed RNs with a critical care qualification
- \_\_\_\_\_ Number of rostered hours per week of ICU nurse educator(s)  
(includes clinical / lectures on site but not at university / other educational facility)
- \_\_\_\_\_ Number of post-registration critical care course students
- \_\_\_\_\_ Number of critical care students with course/HECS fees subsidised by hospital / ICU
- Nurse Unit Manager \_\_\_\_\_ % time (FTE) on direct patient care

**17. Quality Overview of ICU for 2000/2001:** (tick / circle / list all applicable items) [refer to glossary]

- a) Patient admitted under the bed card of:  Intensivist  Specialty / Parent Unit
- b) \_\_\_\_\_ Number of formal rounds per day conducted by ICU consultant
- c) Formal process of patient review post-ICU discharge: Hospital Ward **yes / no** Outpatients **yes / no**
- d) List Severity of Illness Scoring Tools used: \_\_\_\_\_
- e) Bedside clinical information system: **yes / no**
- f) \_\_\_/\_\_\_/\_\_\_ date Medical Emergency Team became operational  not applicable
- g) Unit participation in ICU clinical trials: **yes / no**
- h) Number of publications 2000/2001 (books/chapters/articles/abstracts): \_\_\_\_\_ Medical \_\_\_\_\_ Nursing  
*count each publication once only where multiple authors* \_\_\_\_\_ Combined Medical / Nursing
- i) Criteria to restrict access to ICU:\* **yes / no**
- j) Treatment protocols:\* **yes / no** Number \_\_\_\_\_ Number reviewed (2000/2001) \_\_\_\_\_

\* List (i) access criteria & (j) treatment protocols on page 6 (Optional)

**Audit of:**

- k) Out-of-Hours discharge (between 2200 & 0700 hours): **yes / no**
- l) Refusal of appropriate admission to ICU: **yes / no**
- m) Infection rates: Nosocomial pneumonia: **yes / no** Line sepsis: **yes / no**
- n) Patient Outcomes: ICU Outcome: **yes / no** Hospital Outcome: **yes / no**
- o) ICU Length of Stay: **yes / no**
- p) ACHS ICU clinical indicators: **yes / no**
- q) Patient / Family satisfaction: **yes / no**

**18. This survey has been completed by** (tick all that apply):

- ICU Director  Medical Staff  Nursing Staff  Administrative / Clerical Staff  Other

**19. Contact Details:**

Name of ICU Director: \_\_\_\_\_

e-mail address: \_\_\_\_\_

ICU Telephone Number: \_\_\_\_\_

ICU Fax Number: \_\_\_\_\_

**Thank you for completing the survey - Please return by 29<sup>th</sup> March 2002**

Please direct any queries to:

Dr Therese Anderson  
Project Officer – ANZICS Research Centre for Critical Care Resources  
233 Rathdowne Street CARLTON VIC 3053  
Tel: 61 3 9639 8819 Fax: 61 3 9662 3922  
e-mail: therese.anderson@anzics.com.au

### 7: Organisational Overview

- Is the ICU a separate department / cost centre?  Yes  No
- State the division / department / service to which the ICU directly reports / is accountable in the boxes below:

<b>Budget</b>
Medical _____
Nursing _____

<b>Peer Review Activities</b>
Medical _____
Nursing _____



<b>Service Delivery</b>
Medical _____
Nursing _____

<b>Academic Affiliation(s)</b>	
Medical: University _____	Department _____
Nursing: University(s) _____	Department(s) _____

**Q17. (i) List Criteria to Restrict Access to ICU**

*(eg age; co-morbidities; expected survival; quality of life; disseminated cancer; psychiatric)*

- \_\_\_\_\_
- \_\_\_\_\_
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**Q17. (j) List Treatment Protocols**

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- \_\_\_\_\_

## ANZICS Adult Patient Database



### How to find the information you need to complete the ARCCCR survey in AORTIC and A2A (Access to Aortic)

Question 11 of the ARCCCR survey requires some data that is collected in AORTIC. The information is available from the A2A program.

1. The total number of admissions is found in A2A reports
2. Start A2A
3. Click Reports
4. Type in survey dates ie start date 01/07/2000 and end date 30/6/2001
5. Click select report
6. Click activity preview
7. This will show on screen the numbers admitted per month
8. Total these for both six month periods and complete as admissions total
9. Using the arrow buttons ( | ◀ ◻ ▶ | ) located at the bottom left hand corner of the A2A window select the ▶ button and proceed toward the end of the report. You will see a page titled "nature of admissions." Add the emergency and elective ICU admissions. The total represents the number to complete the box general ICU.
10. Using the ▶ button go to the end of the report on this page or back one page (select by using the ◀ button) you will see the readmissions numbers.
11. The number of invasive ventilated patients appears by clicking the ◀ button again.
12. To answer the hours item select close (on the menu bar in the middle or the lower X in the top right of the window.)
13. You should now be at the blue screen asking for the report you want. Click on stay preview. Using the ◀ ▶ buttons advance one page at a time until you get to occupied bed days. Total these and fill in as number of ICU bed days.
14. The next screen (use ▶ button) should show number of ventilated days. Total and complete these as number of ventilator days.

NB 1: Ventilator information will only be present if this is completed in AORTIC. This can be done on the interventions tab of the ICU admission as intubation / extubation. These parameters represent the start and end of ventilation.

NB 2: Non-invasive ventilation is not kept as a separate data item in AORTIC. However, if you have set this up to be collected at your hospital using the custom fields and have *YourHospital* A2A then you can design a custom search for this field. *YourHospital* A2A is a customisable version of A2A that was installed at site visits.

NB 3: The breakdown of the admitted population by age is not specifically reported by A2A. However, if your data has been sent for the period to the Adult Patient Database as a download, this information can be provided to the ARCCCR if you write "see SAS" on survey form.

This information is provided to assist with the ARCCCR survey items related to ICU activity.

If you are using AORTIC but do not have access to A2A it can be downloaded from the ANZICS website at [www.anzics.com.au/admc](http://www.anzics.com.au/admc). Follow the prompts from the main index: adult database-software. You need either Access 2000 or Access 97. Documentation for the installation of A2A is also included.

Any questions about accessing the information from AORTIC or A2A, should be directed to Carol George at ANZICS APD on (03) 9662-4533 after Monday 25/2/02. Contact Therese Anderson on (03) 9639 8819 for general questions about the survey.

PB: Feb/02

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233 Rathdowne Street CARLTON Vic 3053 Australia

Tel: (61 3) 9662 4533 Fax (61 3) 9662 3922

website: <http://www.anzics.com.au>

ABN 81 057 619 986

## Appendix 3:

### The Following is an Extract from the Faculty of Intensive Care, Australian and New Zealand College of Anaesthetists, Policy Document IC-1 (1997) “Minimum Standards for Intensive Care Units”

#### INTRODUCTION

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 conditions. Such conditions should be compatible with recovery and have the potential for an acceptable future quality of life. An ICU provides special expertise and facilities for the support of vital functions, and utilises the skills of medical, nursing and other staff experienced in the management of these problems.

The concentration of staff and equipment to care for these critically ill patients in one area of the hospital encourages efficient use of expertise and limited resources. The concept of a general ICU, rather than separate specialised units such as medical, respiratory and surgical has developed in Australasia. This is because the skills and resources necessary to care for the critically ill are common, and most efficiently concentrated in one area. 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 (eg. neurosurgical, post-operative cardiothoracic area). Neonatal and Paediatric Intensive Care Units are preferably separate from general ICU's. Coronary care patients and children are sometimes managed in a general ICU.

Within each Unit, policies should be available for the admission criteria of patients as well as protocols for transferring and retrieving patients.

#### LEVELS OF INTENSIVE CARE UNITS

The level of intensive care available should support the delineated role of the particular hospital. The role of a particular ICU will vary, depending on staffing, facilities and support services as well as the type and number of patients it has to manage.

##### 1. LEVEL III ADULT INTENSIVE CARE UNIT

A Level III ICU is a tertiary referral unit for intensive care patients and should be capable of providing the highest level of care including complex multi-system life support for an indefinite period. It must be capable of providing mechanical ventilation, extra-corporeal renal support services and invasive cardiovascular monitoring for an indefinite period. It should have extensive backup laboratory and clinical service facilities. All patients admitted to the Unit must be referred for management to the attending intensive care specialist.

A Level III ICU should be a self-contained area, with easy access to the emergency department, operating theatres and organ imaging. It should have:

- 1.1 Defined admission, discharge and referral policies.
- 1.2 At least six staffed and equipped beds.
- 1.3 More than 350 mechanically ventilated patients per annum.
- 1.4 A medical director who is recognised by the Joint Specialist Advisory Committee in Intensive Care (JSAC-IC) as a specialist in intensive care. The medical director must have a clinical practice predominantly in intensive care medicine.
- 1.5 Sufficient supporting specialist(s) so that consultant support is always available to the medical staff in the Unit. There should 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; all attending specialists in the Unit should be recognised by the JSAC-IC as specialists in intensive care.
- 1.6 At least one of the supporting specialists exclusively rostered to the Unit (or to more than one Unit in the same building) at all times. During normal working hours this specialist must be predominantly present in the Unit, and at all other times be able to proceed immediately to it.
- 1.7 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.
- 1.8 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.
- 1.9 A nurse in charge of the Unit with a post registration qualification in intensive care or in the clinical speciality of the Unit.

- 1.10 The majority of nursing staff must have a post registration qualification in intensive care or in the specialty of the Unit.
- 1.11 All nursing staff in the Unit responsible for direct patient care should be registered nurses.
- 1.12 A nurse educator and formal nursing educational programme.
- 1.13 24 hour access to pharmacy, pathology, operating theatres and tertiary level imaging services, and appropriate access to physiotherapy and other allied health services.
- 1.14 Suitable infection control and isolation procedures and facilities including ideally one wash basin per bed, and at least one isolation room with controllable air flow.
- 1.15 Formal audit and review of its activities and outcomes.
- 1.16 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.
- 1.17 Educational programmes for medical staff.
- 1.18 Adequate office space.
- 1.19 An active research programme.
- 1.20 An orientation programme for new staff.

## 2. LEVEL II ADULT 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 other delineated roles, eg. general medicine, surgery, trauma management, neurosurgery, vascular surgery, etc. It should be capable of providing mechanical ventilation, extracorporeal renal support services and invasive cardiovascular monitoring for at least several days. All patients admitted to the Unit must be referred for management to the attending intensive care specialist.

A Level II ICU should be a self-contained area with easy access to the emergency department, operating theatres and organ imaging. It should have:

- 2.1 Defined admission, discharge and referral policies.
- 2.2 A medical director recognised by the JSAC-IC as a specialist in intensive care. The medical director must have a clinical practice predominantly in intensive care medicine.
- 2.3 At least one other specialist recognised by JSAC-IC as a specialist in intensive care.
- 2.4 The Unit needs 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.
- 2.5 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience exclusively rostered to the Unit and immediately available at all times.
- 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.
- 2.7 All nursing staff responsible for direct patient care being registered nurses and the majority of nursing staff having a post registration qualification in intensive care or in the clinical specialty of the Unit.
- 2.8 Nursing staff : patient ratio of 1:1 for all ventilated and other critically ill patients; the capacity to provide greater than 1:1 nursing for selected patients: some patients may require less than 1:1 nursing.
- 2.9 Access to a nurse educator.
- 2.10 Educational programmes for medical and nursing staff.
- 2.11 An orientation programme for new staff.
- 2.12 Formal audit and review of its activities and outcomes.
- 2.13 Suitable infection control and isolation procedures and facilities including ideally one wash basin per bed, and at least one isolation room with controllable airflow.
- 2.14 24 hour access to pharmacy, pathology, operating theatres, basic imaging services and appropriate access to physiotherapy and other allied health services.
- 2.15 Support staff as appropriate, eg. biomedical engineer, clerical staff.
- 2.16 Adequate office space.

### 3. LEVEL I ADULT INTENSIVE CARE UNIT

A Level I ICU should be capable of providing immediate resuscitative management for the critically ill, short term cardio-respiratory support, and 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.

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.

A Level I ICU should be a self-contained area with easy access to the emergency department, operating theatres and organ imaging. It should have:

- 3.1 Defined admission, discharge and referral policies.
- 3.2 A medical director who is recognised by JSAC-IC as a specialist in intensive care.
- 3.3 Consultant support always available.
- 3.4 At least one registered medical practitioner who is available to the Unit at all times.
- 3.5 A nurse in charge of the Unit who has a post registration qualification in intensive care or in the clinical specialty of the Unit.
- 3.6 All nursing staff of the Unit responsible for direct patient care being registered nurses; and the majority must have a post registration qualification in intensive care or in the clinical specialty of the Unit.
- 3.7 A nursing staff : patient ratio of 1:1 for all critically ill patients.
- 3.8 A minimum of two registered nurses present in the Unit at all times when there is a patient admitted to the Unit.
- 3.9 Educational programmes for both medical and nursing staff.
- 3.10 An orientation programme for new staff.
- 3.11 Audit of its activities and their outcome.
- 3.12 24 hour access to pharmacy, pathology, operating theatres and basic imaging services and appropriate access to physiotherapy and other allied health services.
- 3.13 Support services, eg. technical, clerical.
- 3.14 Adequate office space.

#### 4. PAEDIATRIC INTENSIVE CARE UNIT

A Paediatric Intensive Care Unit must be a separate area in the hospital capable of providing complex, multi-system life support for an indefinite period. It should have easy access to the Emergency Department, Operating Theatres and Organ Imaging. It must be capable of providing mechanical ventilation, extracorporeal renal support services and invasive cardiovascular monitoring for an indefinite period to infants and children less than 16 years of age. It must be a tertiary referral centre for children needing intensive care and have extensive backup laboratory and clinical services facilities to support this tertiary role. All patients admitted to the Unit must be referred for management to the attending intensive care specialist.

A Paediatric Intensive Care Unit should have the following:

- 4.1 Defined admission and discharge policies.
- 4.2 A medical director who is recognised by the JSAC-IC as a specialist in intensive care.
- 4.3 Sufficient supporting specialists so that consultant support is always available to the medical staff in the Unit. There should 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.
- 4.4 At least one attending specialist who is predominantly present during normal working hours and who is exclusively rostered and able to proceed immediately to the Unit at all times.
- 4.5 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience who is in the hospital, predominantly present in the Unit and exclusively rostered to the Unit at all times.
- 4.6 A nurse in charge of the Unit holding a post-registration qualification in intensive care or in the clinical specialty of the Unit.
- 4.7 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: some patients may require less than 1:1 nursing.
- 4.8 The majority of nursing staff should have a post-registration qualification in intensive care or in the specialty of the Unit.
- 4.9 At least one nurse with a post-registration qualification in paediatric intensive care on duty in the Unit at all times.
- 4.10 A nurse educator and formal nursing education program.
- 4.11 Twenty four hour access to pharmacy, pathology, operating theatres and tertiary level imaging services and appropriate access to physiotherapy and other allied health services.
- 4.12 Suitable infection control and isolation policies and facilities including ideally one wash basin per bed, and at least one isolation room with controllable air flow.
- 4.13 Formal audit and review of its activities and outcomes.
- 4.14 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.
- 4.15 Active medical and nursing education programmes in the Unit that are relevant to the specialised facilities of the Unit.
- 4.16 Adequate office space.
- 4.17 An active research program.
- 4.18 An orientation program for new staff.

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The complete document may be found at <http://www.fic.anzca.edu.au>

## Appendix 4: Modified Geographic Region Classification

### 1. Capital Cities

**Australia:** Sydney, Melbourne, Brisbane, Perth, Adelaide, Hobart, Darwin, Canberra

### 2. Metropolitan Centres

- *Urban centres with a population  $\geq 100,000$*

**Australia:** Gosford-Central Coast, Newcastle, Wollongong, Queanbeyan, Geelong, Gold Coast-Tweed Heads, Townsville-Thuringowa

### 3. Rural Centres

- **Rural centres with a population between 10,000 and 99,999.**

**NSW:** Albury-Wodonga, Armidale, Ballina, Bathurst, Broken Hill, Casino, Coffs Harbour, Dubbo, Lismore, Echuca-Moama, Forster-Tuncurry, Goulburn, Grafton, Griffith, Lithgow, Moree Plains, Muswellbrook, Nowra-Bomaderry, Orange, Port Macquarie, Singleton, Tamworth, Taree, Wagga Wagga

**VIC:** Bairnsdale, Ballarat, Bendigo, Colac, Echuca-Moama, Horsham, Mildura, Moe-Yallourn, Morwell, Ocean Grove-Barwon Heads, Portland, Sale, Shepparton-Mooroopna, Traralgon, Wangaratta, Warrnambool

**QLD:** Bundaberg, Cairns, Caloundra, Gladstone, Gympie, Hervey Bay, Mackay, Maroochydore-Mooloolaba, Maryborough, Nambour, Rockhampton, Tewantin-Noosa, Toowoomba, Warwick

**SA:** Mount Gambier, Murray Bridge, Port Augusta, Port Lincoln, Port Pirie, Whyalla

**WA:** Albany, Bunbury, Geraldton, Mandurah

**TAS:** Burnie-Somerset, Devonport, Launceston

### 4. Remote Centres

Alice Springs, Mount Isa

*Adapted from:*

Department of Primary Industries and Energy and Department of Health and Family Services (1994)  
Rural, Remote and Metropolitan Areas Classification in Australian Institute of Health & Welfare (1999)  
*Medical Labour Force 1997*. AIHW catalogue No. HWL 13, AIHW, Canberra (p75).

## Appendix 5:

### Hospitals Surveyed

#### New South Wales

Albury Base Hospital  
Armidale Hospital  
Auburn Hospital  
Bankstown-Lidcombe Hospital  
Bathurst Base Hospital  
Blacktown Hospital  
Brisbane Waters Private Hospital  
Broken Hill Base Hospital  
Calvary Hospital Wagga Wagga  
Campbelltown Hospital  
Canterbury Hospital  
Children's Hospital at Westmead  
Coffs Harbour Base Hospital  
Concord Repatriation General Hospital  
Dalcross Private Hospital  
Dubbo Base Hospital  
Fairfield Hospital  
Gosford Hospital  
Goulburn Base Hospital  
Grafton Base Hospital  
Griffith Base Hospital  
Hawkesbury District Health Service  
Hills Private Hospital  
Hornsby Ku-ring-gai Hospital  
Illawarra Private Hospital  
John Hunter Hospital  
Kempsey District Hospital  
Lake Macquarie Private Hospital  
Lingard Private Hospital  
Lismore Base Hospital  
Liverpool Hospital  
Manly Hospital  
Manning Base Hospital  
Mater Hospital North Sydney  
Mona Vale Hospital  
Mount Druitt Hospital  
Nepean Hospital  
Newcastle Mater Misericordiae Hospital  
North Gosford Private Hospital  
North Shore Private Hospital  
Orange Base Hospital  
Port Macquarie Base Hospital  
Prince of Wales Hospital  
Prince of Wales Private Hospital  
Royal North Shore Hospital  
Royal Prince Alfred Hospital  
Ryde Hospital  
Shoalhaven District Memorial Hospital  
St George Hospital  
St George Private Hospital  
St Luke's Private Hospital  
St Vincent's Hospital  
St Vincent's Private Hospital  
Strathfield Private Hospital  
Sutherland Hospital  
Sydney Adventist Hospital  
Sydney Children's Hospital  
Tamworth Base Hospital  
Tweed Heads Hospital  
Wagga Wagga Base Hospital  
Westmead Hospital  
Westmead Private Hospital  
Wollongong Hospital

#### Victoria

Alfred Hospital  
Austin & Repatriation Medical Centre  
Ballarat Health Services  
Barwon Health  
Bendigo Health Care Group  
Box Hill Hospital  
Cabrini Hospital  
Central Gippsland Health Service  
Dandenong Hospital  
Epworth Hospital  
Frankston Hospital  
Freemasons Hospital  
Geelong Private Hospital  
Goulburn Valley Health  
Hamilton Base Hospital  
John Fawkner Private Hospital  
Knox Private Hospital  
Latrobe Regional Hospital  
Maroondah Hospital  
Melbourne Private Hospital  
Mildura Base Hospital  
Monash Medical Centre  
Northern Hospital  
Peter McCallum Cancer Institute  
Royal Children's Hospital  
Royal Melbourne Hospital  
South Eastern Private Hospital  
South West Healthcare – Warrnambool  
St John of God Healthcare Ballarat  
St John of God Healthcare Geelong  
St Vincent's Hospital  
St Vincent's & Mercy Private Hospital  
Sunshine Hospital  
Valley Private Hospital  
Wangaratta District Base Hospital  
Warringal Private Hospital  
Western Hospital  
Wimmera Health Care Group

#### Australian Capital Territory

Calvary Health Care ACT  
Canberra Hospital  
John James Memorial Hospital  
National Capital Private Hospital

#### Tasmania

Calvary Hospital Hobart  
Launceston General Hospital  
Mersey Community Hospital  
North West Regional Hospital  
Royal Hobart Hospital

## Queensland

Allamanda Private Hospital  
Bundaberg Base Hospital  
Cairns Base Hospital  
Calvary Hospital  
Gladstone Hospital  
Gold Coast Hospital  
Greenslopes Private Hospital  
Hervey Bay Hospital  
Holy Spirit Hospital  
Ipswich Hospital  
John Flynn Private Hospital  
Logan Hospital  
Mackay Base Hospital  
Maryborough Hospital  
Mater Adults Hospital  
Mater Children's Hospital  
Mater Misericordiae Private Hospital  
Mater Misericordiae Private Hospital Townsville  
Mount Isa Base Hospital  
Nambour General Hospital  
Pindara Private Hospital  
Prince Charles Hospital  
Princess Alexandra Hospital  
Queen Elizabeth II Jubilee Hospital  
Redcliffe Hospital  
Rockhampton Hospital  
Royal Brisbane Hospital  
Royal Children's Hospital  
St Andrews Toowoomba Hospital  
St Andrews War Memorial Hospital  
Sunnybank Private Hospital  
Toowoomba Base Hospital  
Townsville General Hospital  
Wesley Hospital

## South Australia

Ashford Hospital  
Burnside War Memorial Hospital  
Calvary Hospital Adelaide  
Flinders Medical Centre  
Flinders Private Hospital  
Lyll McEwin Health Service  
Memorial Hospital  
Modbury Public Hospital  
Mount Gambier Hospital  
Port Augusta Hospital  
Queen Elizabeth Hospital  
Repatriation General Hospital  
Royal Adelaide Hospital  
St Andrews Hospital  
Wakefield Hospital  
Whyalla Hospital  
Women's & Children's Hospital

## Western Australia

Albany Regional Hospital  
Bunbury Regional Hospital  
Fremantle Hospital  
Hollywood Private Hospital  
Joondalup Health Campus  
Mount Hospital  
Princess Margaret Hospital for Children  
Royal Perth Hospital  
St John of God Health Care Murdoch  
St John of God Health Care Subiaco  
Sir Charles Gairdner Hospital

## Northern Territory

Alice Springs Hospital  
Royal Darwin Hospital

## New Zealand

Auckland Hospital  
Christchurch Hospital  
Dunedin Hospital  
Gisborne Hospital  
Green Lane Hospital  
Grey Hospital  
Hawkes Bay Regional Hospital  
Hutt Hospital  
Masterton Hospital  
Mercy Hospital & Health Services  
Middlemore Hospital  
Nelson Hospital  
North Shore Hospital  
Palmerston North Hospital  
Rotorua Hospital  
Southern Cross Hospital  
Southland Hospital  
Starship Children's Hospital  
Taranaki Base Hospital  
Tauranga Hospital  
Timaru Hospital  
Waikato Hospital  
Wairau Hospital  
Wakefield Hospital  
Wanganui Hospital  
Wellington Hospital  
Whakatane Hospital  
Whangarei Hospital