



AUSTRALIAN AND NEW ZEALAND
INTENSIVE CARE SOCIETY

Review of Intensive Care Resources & Activity 2002 - 2003

Tracey Higlett, Nicole Bishop, Graeme K Hart & Peter Hicks.

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 publication 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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Enquiries or comments on this publication should be directed to:

Research Manager,
ANZICS Research Centre for Critical Care Resources
10 levers Terrace, CARLTON, Victoria, 3053, Australia.
Tel: (61 3) 9340 3433
Fax: (61 3) 9340 3499

E-mail: anzics@anzics.com.au
<http://www.anzics.com.au>

FOREWORD

I am very pleased to present and commend to you the *Review of Intensive Care Resources and Activity 2002/2003* by the ANZICS Research Centre for Critical Care Resources. This is another chapter in almost a decade of outstanding achievement by Graeme Hart and his co-workers over the years, including Karen Warnecke, Kay Steed, Therese Anderson and Tracey Higlett, Nicole Bishop, and Peter Hicks. The past and on-going membership of the ANZICS Database Management Committee has worked hard to apply and lobby successfully for ongoing funding through the Australian Health Ministers Advisory Committee (AHMAC) and should be congratulated.

The ANZICS Board should also be recognised for its vision, continued encouragement and support over that time for the then ANZICS ICU Registry to continue its annual forays into establishing the “how much, what, where and by whom” parameters of our specialty. The ANZICS Executive Officers/ CEO and support staff have also played a key role in providing infrastructure and support for these efforts. We are also most grateful to the many different professionals who are involved in collecting and collating the relevant data in the contributing hospitals. Most importantly we need to thank and recognise the Society Membership whose continuing diligence and support really makes this possible and worthwhile.

This is the fifth major Review to be produced by the ARCCCR. Each Review offers more information presented in an increasingly sophisticated and informative fashion. The standard and quality of data established by the ANZICS Intensive Care Unit Registry Report of 1998 (Australian and NZ data of 1997 & 1996 respectively) was already very high. Hence, we are able to use the “core” data pertaining to ICU beds and activity with confidence in order to look back and thus to the future. Newer information on the medical and then nursing work-force is also accumulating significant longevity. The new to this review information on ICU Safety and Quality activities is intriguing and hopefully the beginning of another continuing and developing limb of the survey. The financial information is the most challenging yet collected, both in terms of its sensitivity, provision, interpretation, and presentation. It is awaited with great interest and will no doubt give us directions and encouragement for future estimations. To know and understand about ourselves and our activities is the first step in shaping and determining the future of our profession and our specialty. This Review is a vital asset and instrument for that task.



David Fraenkel
President
Australian and New Zealand Intensive Care Society

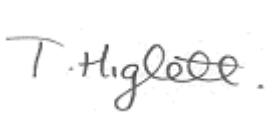
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The ANZICS Research Centre for Critical Care Resources (ARCCCR) is once again grateful to intensive care communities throughout Australasia for collecting, collating and submitting data. This report is evidence of their combined efforts to better understand the processes of critical care service provision.

The Australian and New Zealand Intensive Care Society (ANZICS) have been supportive of the ARCCCR. Thanks are extended to the ANZICS Board of Directors, to members of the ANZICS Database Management Committee and to our colleagues who are always ready to read a draft or comment on aspects of the report as required. Dr Therese Anderson's work in the earlier years of the survey is gratefully acknowledged.

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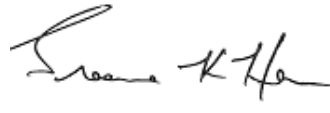
ANZICS Research Centre for Critical Care Resources



Tracey Higlett



Nicole Bishop



Graeme K Hart



Peter Hicks

Author Affiliations:

Tracey Higlett BSc, RN, MPH
Research Manager, ANZICS Research Centre for Critical Care Resources/Clinical Trials Group

Nicole Bishop BA, PGrad Dip (Psychology) GradDip (Adol Health & Welfare)
Research Officer, ANZICS Research Centre for Critical Care Resources/Clinical Trials Group

Graeme K Hart MBBS, FANZCA, FJFICM
Chair, ANZICS Database Management Committee
Deputy Director, Department of Intensive Care, Austin & Repatriation Medical Centre
Director, Intensive Care, Warringal Private Hospital

Peter Hicks MBChB, FANZCA, FJFICM
Co-Chair, ANZICS Research Centre for Critical Care Resources
Medical Director, Intensive Care Services, Wellington Hospital
Medical Director, LifeFlight Trust Wellington

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ABBREVIATIONS

ABS	Australian Bureau of Statistics	JSAC-IC	Joint Specialist Advisory Committee – Intensive Care
ACCCN	Australian College of Critical Care Nurses	LOS	Length of Stay
ACEM	Australasian College for Emergency Medicine	MET	Medical Emergency Team
ACHS	Australian Council on Healthcare Standards	MJCICM	Multidisciplinary Joint Committee of Intensive Care Medicine
ACT	Australian Capital Territory	MOH	Ministry of Health (New Zealand)
ADMC	ANZICS Database Management Committee	MPM	Mortality Probability Model
AHMAC	Australian Health Ministers' Advisory Council	n	number
AHWAC	Australian Health Workforce Advisory Committee	n/a	not applicable / not available
AIHW	Australian Institute of Health and Welfare	No.	Number
AMA	Australian Medical Association	NSW	New South Wales
AMWAC	Australian Medical Workforce Advisory Committee	NT	Northern Territory
ANZCA	Australian and New Zealand College of Anaesthetists	NZ	New Zealand
ANZICS	Australian and New Zealand Intensive Care Society	NZHIS	New Zealand Health Information Service
ANZPIC	Australian and New Zealand Paediatric Intensive Care Registry	NZJSAC-ICM	New Zealand Joint Specialist Advisory Committee – Intensive Care Medicine
APACHE	Acute Physiology and Chronic Health Evaluation	PICU	Paediatric Intensive Care Unit
ARCCCR	ANZICS Research Centre for Critical Care Resources	PIM	Paediatric Index of Mortality
ARIA	Accessibility / Remoteness Index of Australia	PRISM	Paediatric Risk of Mortality Score
BiPAP	Bi-Level Positive Airway Pressure	QLD	Queensland
CCU	Coronary Care Unit	RACP	Royal Australasian College of Physicians
CMO	Career Medical Officer	RMO	Resident Medical Officer
CNE	Clinical Nurse Educator	RN (s)	Registered Nurse (s)
CPAP	Continuous Positive Airway Pressure	RRMA	Rural, Remote & Metropolitan Areas classification
FICANZCA	Faculty of Intensive Care, Australia and New Zealand College of Anaesthetists	SA	South Australia
FTE/EFT	Full Time Equivalent	SAPS	Simplified Acute Physiology Score
HDU	High Dependency Unit	SOFA	Sequential Organ Failure Assessment
ICU (s)	Intensive Care Unit	TAS	Tasmania
ICU/CCU	Combined Intensive Care and Coronary Care Unit	TISS	Therapeutic Intervention Scoring System
ICU/CCU/HDU	Combined Intensive Care, Coronary Care and High Dependency Unit	VIC	Victoria
ICU/HDU	Combined Intensive Care and High Dependency Unit	WA	Western Australia
JFICM	Joint Faculty of Intensive Care Medicine		

SECTION ONE

INTRODUCTION

1. SUMMARY

The *Review of Intensive Care Resources and Activity 2002/2003* details the distribution and attributes of critical care facilities in Australia and New Zealand for the 2002/2003 financial year. The data in this report is derived from an annual survey (Appendix 1) conducted by the Australian and New Zealand Intensive Care Society's (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.
- Financial aspects of providing intensive care

The ARCCCR surveyed 195 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*⁽¹⁾ each ICU was recorded separately.

The data collection, analysis and reporting was undertaken by the ARCCCR. The issues relating to data quality, limitations and missing values are discussed in section 1.6.3 of this report and should be noted when interpreting the results.

The report has five sections. Section One provides an overview of the project. Section Two presents summary data on the Australian findings and Section Three presents summary data on the New Zealand findings. Section Four presents comparative data for the period 1997 to 2002-2003. Section Five contains data pertaining to Australian and New Zealand ICUs that participate in the Joint Faculty of Intensive Care Medicine (JFICM) training programs and concludes the report. The references are followed by the appendices at the end of the document.

This report is an information resource, to be used by various members of the health care community including intensive care clinicians, ancillary and administrative staff, public and private sector health care providers, managers, policy makers, and relevant statutory bodies.

1.1 SUMMARY OF KEY FINDINGS

RESPONSE RATE:

- 95.3% response rate (186 of 195 eligible ICUs). Two hospitals have not provided any data for a number of years. No data from these hospitals has been included in the report.

SURVEY TIME FRAME:

- 2002/2003 financial year with submissions accepted for analysis to 30th November 2004.

NUMBER OF ELIGIBLE HOSPITALS WITH ICU COMPLEXES:

- A total of 167 hospitals in Australia and 27 hospitals in New Zealand
- Of the 167 Australian hospitals, 162 (97%) responded
- Australian respondents: 108 public sector and 54 private sector
- Of the 27 New Zealand hospitals 25 (92.6%) responded
- New Zealand respondents: 23 public sector and 2 private sector

1.2 AUSTRALIAN OVERVIEW

GEOGRAPHIC LOCATION:

- Capital cities: 64.7% (n=108)
- Metropolitan regions: 9.6% (n=16)
- Rural regions: 24.6% (n=41)
- Remote regions: 1.2% (n=2)

ICU TYPE:

- General ICU: 56.3% (n=94)
- ICU/CCU: 36.5% (n=61)
- Paediatric ICU: 4.2% (n=7)
- High Dependency/Stepdown: 1.8% (n=3)
- Other ICU 1.2% (n=2)

ICU LEVEL: (JFICM GUIDELINES – SELF CLASSIFIED)

- Level 3: 40.7% (n=68)
- Level 2: 40.7% (n=68)
- Level 1: 18.6% (n=31)

TOTAL ICU BEDS:

- 2,125 physical beds
- 1,859 available beds
- 1,228 ventilator beds

PUBLIC SECTOR:

- 1,520 physical beds
- 1,274 available beds
- 854 ventilator beds

PRIVATE SECTOR:

- 605 physical beds
- 585 available beds
- 374 ventilator beds

BEDS PER 100,000 POPULATION:

- 9.4 available beds /100,000 and 6.2 ventilator beds /100,000

PUBLIC SECTOR:

- 6.4 available beds /100,000 and 4.3 ventilator beds /100,000

PRIVATE SECTOR:

- 2.9 available beds /100,000 and 1.9 ventilator beds /100,000

BED STOCK:

Note: Assuming no change of non-responding hospitals from the previous year's survey data.

- increased number of available beds – ↑ 35 in public sector; ↑ 91 in private sector since 2001/2002 Overall, available ICU bed stock has increased by 169 in the public sector and 129 in the private sector since 1999/2000.
- increased number of ventilator beds – ↑ 6 in public sector; ↑ 42 in private sector since 2001/2002 Overall, ventilator ICU bed stock has increased by 32 in the public sector and 73 in the private sector since 1999/2000.

MEDICAL LABOUR FORCE

(PUBLIC SECTOR):

- 247.2 intensivist FTE
- 29 other specialist FTE
- 1.2 intensivist FTE /100,000
- 1.4 specialist FTE /100,000
- 4.6 available beds /specialist FTE
- 3.1 ventilator beds /specialist FTE

MEDICAL LABOUR FORCE

(PRIVATE SECTOR):

- 85.4 intensivist FTE
- 13.4 other specialist FTE

MEDICAL LABOUR FORCE:

- 89.4% of specialists working in ICU classify themselves as intensivists as opposed to other specialists. This figure was 84.7% in 2001/2002, 88.6% in 2000/2001 and 78.1% in 1999/2000 within the public sector.
- Modest decrease since last survey in the number of intensivist FTE vacancies: 22.3. (24.1 FTE in 2001/2002, 19.0 FTE 2000/2001, 10.5 FTE in 1999/2000).
- Benchmarks – continuing significant FTE Gap in public sector Level 3 ICUs: 117.2 FTE (124.5 FTE in 2001/2002, 105.6 FTE 2000/2001 94.8 1999/2000).

NURSE LABOUR FORCE

(PUBLIC SECTOR):

- 4,811.5 RN FTE
- 3.8 RN FTE /available beds
- 5.6 RN FTE /ventilator beds

NURSE LABOUR FORCE

(PRIVATE SECTOR):

- 1,046.5 RN FTE
- 1.8 RN FTE /available beds
- 2.8 RN FTE /ventilator beds

NURSING LABOUR FORCE:

- Increased no. of qualified critical care RNs: 4,154 (3,884 in 2001/2002, 3,557 in 2000/2001, 3,529 in 1999/2000)
- Increased no. of RN FTE:, 5,857.9 (5,582.5 in 2001/2002, 5,505.8 in 2000/2001, 5,382.9 in 1999/2000)
- Decreased no. reported RN FTE vacancies: 393.7, (531.1 in 2001/2002, 610.1 in 2000/2001, 484.8 in 1999/2000)

1.3 NEW ZEALAND OVERVIEW

ICU TYPE:

- General ICU: 51.9% (n=14)
- ICU/CCU: 33.3% (n=9)
- Paediatric ICU: 3.7% (n=1)
- High Dependency/Stepdown: 11.1% (n=3)

ICU LEVEL:

- Level 3: 29.6% (n=8)
- Level 2: 33.3% (n=9)
- Level 1: 37% (n=10)

TOTAL ICU BEDS:

- 247 physical beds
- 214 available beds
- 149 ventilator beds

BEDS PER 100,000 POPULATION:

- 5.4 available beds /100,000 and 3.8 ventilator beds /100,000

MEDICAL LABOUR FORCE:

- 45.1 intensivist FTE
- 62.6 Total specialist FTE
- 17.5 other specialist FTE
- 1.2 intensivist FTE /100,000
- 1.6 specialist FTE /100,000
- 3.42 available beds /specialist FTE
- 2.38 ventilator beds /specialist FTE

NURSE LABOUR FORCE:

- 775.7 RN FTE
- 3.6 RN FTE /available bed
- 5.2 RN FTE /ventilator bed

1.4 INTRODUCTION

Critical care is a generic term encompassing a diverse range of acute health care services. Whilst the terms 'critical care' and 'intensive care' are often used interchangeably, 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 (MJCICM):⁽²⁾

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.

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.

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. 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.

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 specific paediatric report.⁽³⁾

1.5 OVERVIEW - ARCCCR

This is the eighth 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 2001/2002*,⁽⁴⁾ *Review of Intensive Care Activity 1999/2000*,⁽¹⁾ *Review of Intensive Care Activity 2000/2001*⁽⁵⁾ *Influenza Pandemic Planning for Intensive Care*,⁽⁶⁾ *ANZICS Intensive Care Survey 1998: An Overview of Australasian Critical Care Resources*,⁽⁷⁾ *Descriptive Analysis of Intensive Care Facilities in Australia and New Zealand*⁽⁸⁾ and *Descriptive Analysis of Quality Characteristics of Australasian Critical Care Facilities*⁽⁹⁾ may be found on the ANZICS website <http://www.anzics.com.au>

Dr Graeme Hart, who has directed its operation and research activities since this time, first established the ARCCCR, formerly known as the ANZICS ICU Registry, in 1993. 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.

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,^(4;6-11) health care literature and other materials held by the ARCCCR facilitated the writing of this report.

1.6 ABOUT THE PROJECT

The information in this report builds on previous studies conducted by the ARCCCR, and 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 1). Data analyses were conducted using *SPSS 12.0.1* and *Microsoft Excel (XP Professional)* software applications.

1.6.1 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 2002/2003 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.
- Obtaining information on ICU budget and expenditure
- Obtaining an overview of quality and audit processes

1.6.2 SURVEY INSTRUMENT/PROJECT TIME FRAME

The survey instrument was compiled by Ms Tracey Higlett and Dr Graeme Hart and reviewed by members of the ANZICS Database Management Committee (ADMC). The Australian College of Critical Care Nurses also submitted questions related to nurse workforce issues. Following minor modifications it was piloted and small amendments were made. A copy of the survey instrument is included as Appendix 1.

The survey instrument comprised eight pages printed double-sided on two sheets of A3 paper. Accompanying the survey was an explanatory letter to a named ICU director, a glossary of key terms (Appendix 2) and an extract on ICU levels from the Joint Faculty of Intensive Care Medicine (JFICM)⁽¹²⁾ (Appendix 3) together with a pre-printed envelope. This was mailed to 168 Australian and 28 New Zealand acute care hospitals in mid-January 2004 for return by 30th April, 2004 with questionnaires accepted until 30th November 2004. Two Australian hospitals have not participated in the survey since prior to 1999 and no data for them has been analysed. This leaves a denominator of 195 hospitals, (167 in Australia, 28 in New Zealand), for which there is some data. 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 and Research Officer.

1.6.3 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 JFICM 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 good quality 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 some 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.

The ARCCCR endeavours to follow definitions (where applicable) listed in the *National Health Data Dictionary*.⁽¹³⁾

In the 2002/2003 and 2001/2002 surveys, the definition of General ICU did not specifically exclude those units classifying themselves as 'General' even though they reported CCU beds. Prior to this time, those units had been reclassified by the ARCCCR Project Manager as ICU/CCU. In future years, the definitions will be more explicit and those units with any designated CCU beds will be asked to classify themselves as ICU/CCU.

For inclusion in this survey, a critical care unit must possess ventilator capability and have the resources to provide continuous care. Continual review of eligible hospitals is undertaken by the ARCCCR. 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 appropriate. When reporting the findings, the ARCCCR takes care to avoid identifying individual units. Therefore, data has been amalgamated for some regions.

SECTION TWO

AUSTRALIA

2. INTRODUCTION

The Australian and New Zealand Intensive Care Society's (ANZICS) Research Centre for Critical Care Resources (ARCCCR) developed the 2002/2003 survey instrument to once again collected data about intensive care resources and activities in Australia and New Zealand. All Australian hospitals with intensive care units were mailed the self-report survey and 162 of the eligible 167 ICUs (108 public and 54 private) listed on the ARCCCR database responded to the survey by November 30th 2004, a 97% response rate. This chapter details the survey findings for intensive care services in Australian States and Territories.

As in previous survey periods, some sites had difficulties completing the survey due to internal clerical and administrative issues. The ARCCCR supports the need for dedicated data collection personnel or resources in units to facilitate the collection of data in a timely, 'clean' manner. Previous reports have also highlighted the lack of resources for intensive care data collection.^(1;5)

2.1 GEOGRAPHIC LOCATIONS

Respondents were asked to identify the geographical location of their ICU. Private sector ICUs are located predominantly in capital cities with 83.9% (n = 47), 8.9% (n = 5) in metropolitan areas and 7.1% (n = 4) in rural areas.

The Rural, Remote and Metropolitan Areas (RRMA) classification was developed in 1994 by the Department of Primary Industries and Energy and the then Department of Human Services and Health, and has been widely used as the framework by which various data sources could be analysed for metropolitan, rural and remote zones.

The ARCCCR uses a modified version of the RRMA classification (Appendix 4). There is currently a major review of the RRMA classification system being undertaken by the Australian Commonwealth Department of Health and Ageing with the first discussion paper released in March 2005.⁽¹⁴⁾ Figures 1 and 2 show the location of public sector units using RRMA.

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).⁽¹⁵⁾ Figure 3 shows the location of public sector ICUs by ARIA classification.

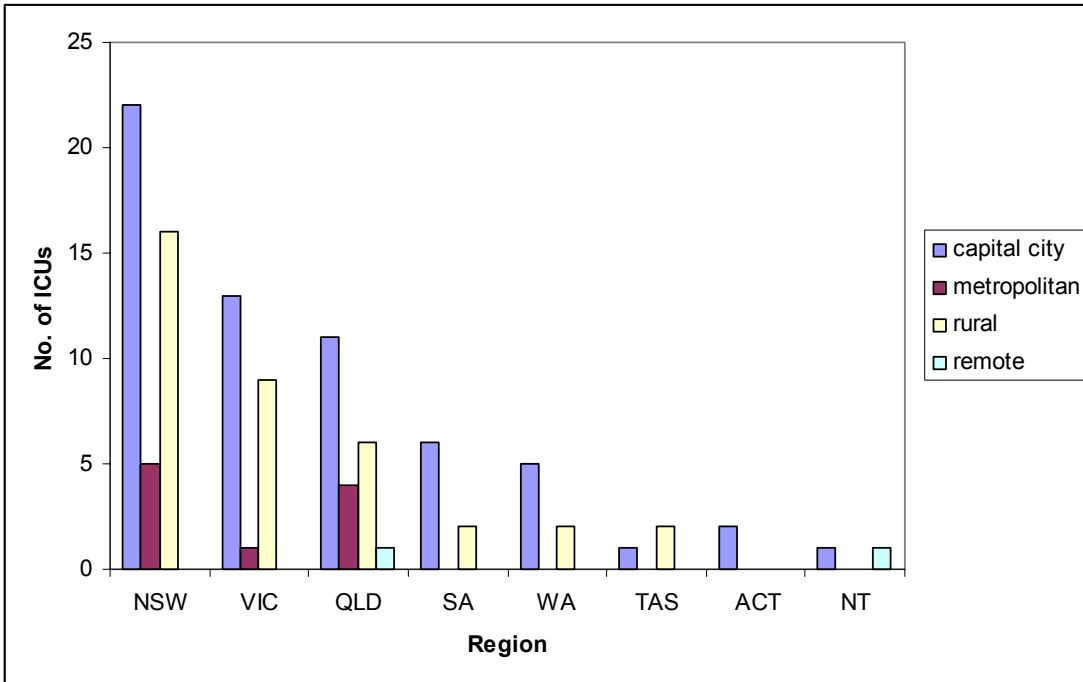


Figure 1. ICU Location, Public Sector by RRMA

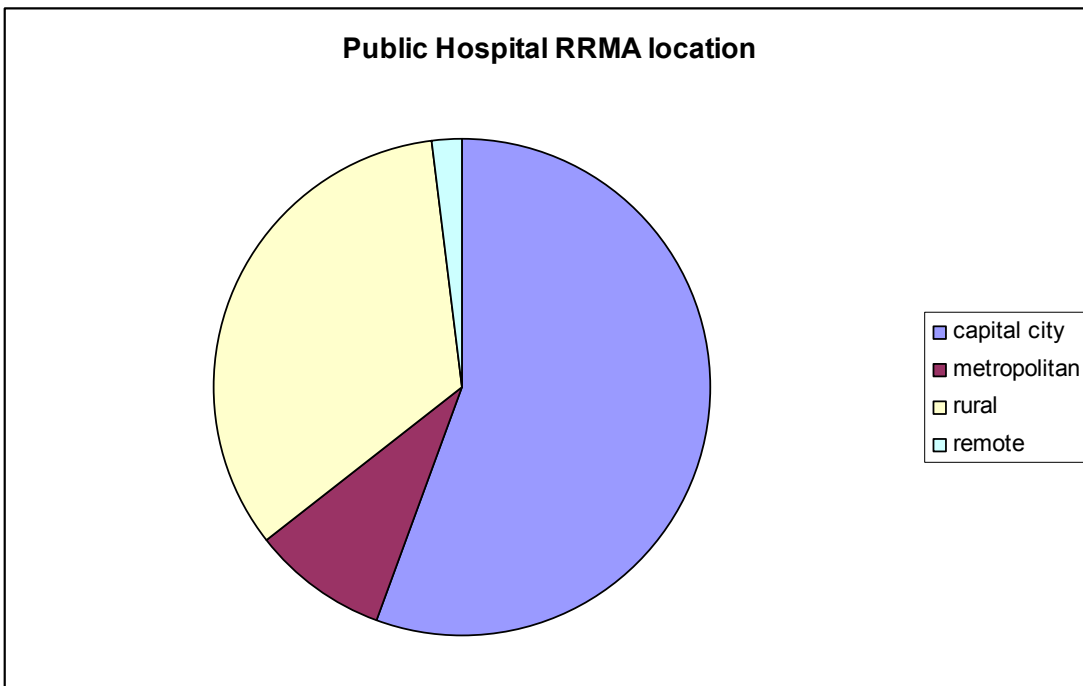


Figure 2. Proportion of Public Sector ICUs by RRMA Location

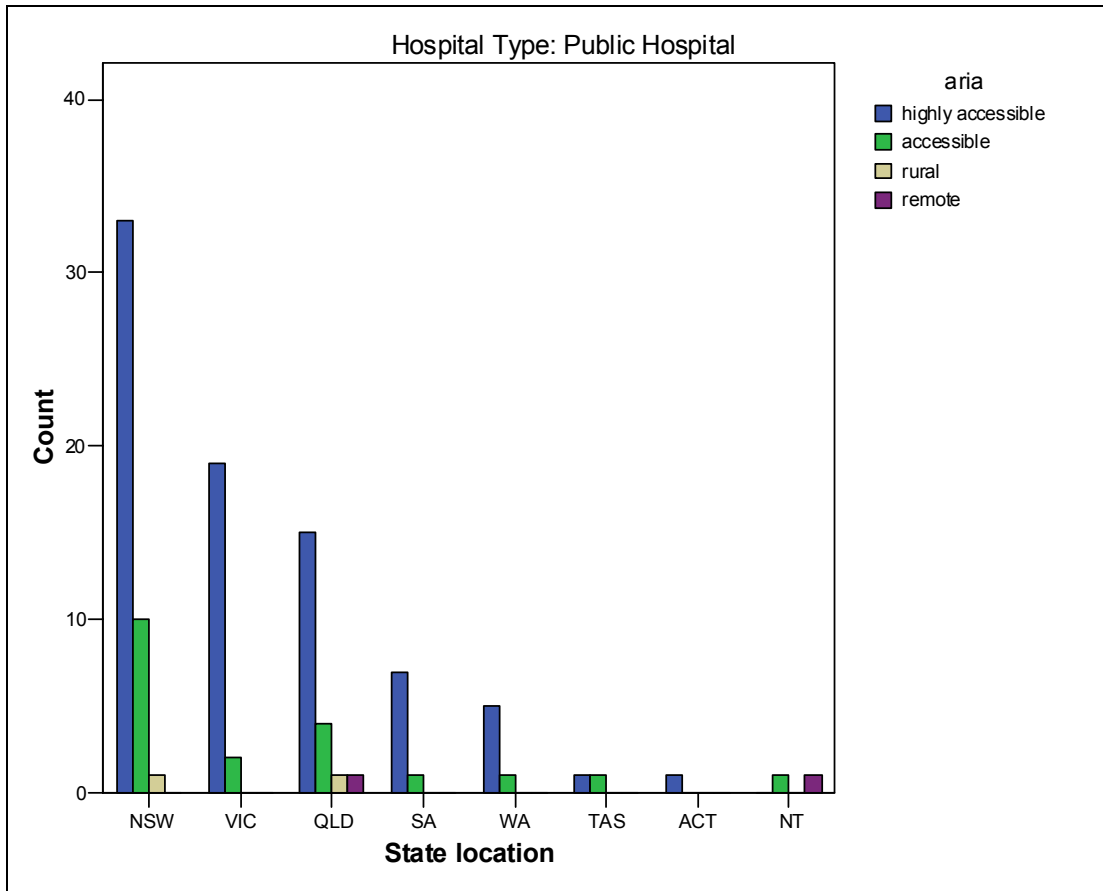


Figure 3. ICU Location, Public Sector by ARIA Classification

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.⁽¹⁵⁾ In the ARIA classification system, a population > 5,000 constitutes a service centre.⁽¹⁵⁾ There is a further classification system that has been based on ARIA and proposed by the National Key Centre for Social Applications of Geographical Information Systems (GISCA). This classification, known as ARIA+ is, like ARIA, based on road distance to service centres.

Service centres classified according to their population but there is an additional category and distances are calculated from the perimeter of the service centre. Tasmania is treated in a different way which means that the relative remoteness of all Tasmania has increased.⁽¹⁵⁾ Population categories are based on 2001 census data (categories have recently been updated by the ARCCCR). Different health care organisations in Australia currently use one or more of these classification systems. For this reason, information is presented by each categorisation method in this report. Figure 4 indicates that 25.8% of ICUs were located in centres with a population of < 48,000. Twenty-seven hospitals reported being located in a population centre of less than 48,000, of these, 15 (55.6%) gave an estimate of their population catchment. The reported population catchments ranged between 22,000 and 270,000.

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

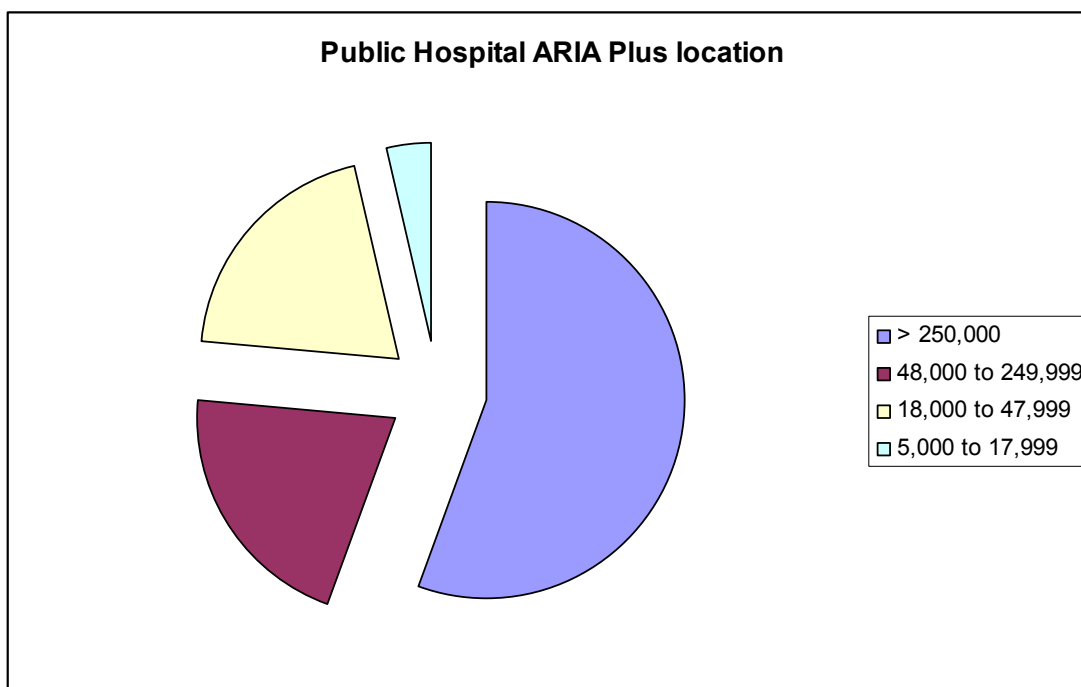


Figure 4. ICU Location, Public Sector by Population Category

The Australian Medical Workforce Advisory Committee (AMWAC) has outlined the requirements for sustainable medical services and a synopsis is included here.⁽¹⁶⁾ 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 centered 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.⁽¹⁷⁾ 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.⁽¹⁷⁾

Survey data was also analysed by state. New South Wales reported 43 public sector hospitals with 43 responding and 17 private sector hospitals with 17 responding. Victoria reported 23 public sector hospitals with all responding and 12 private sector hospitals with 10 responding (81.8 per cent). Queensland reported 22 public sector hospitals with all responding and 13 private sector hospitals with all responding. South Australia reported 6 private sector and 8 public sector hospitals, all hospitals responded. Western Australia reported 7 public sector hospitals with 5 responding (71.4%). All 4 Western Australia Private hospitals responded. Tasmania reported 3 public sector hospitals all of whom responded as did both of the private hospitals. The Australian Capital Territory reported 2 public sector hospitals both of whom responded, and 3 private hospitals with 2 responding (66.7%). The Northern Territory reported 2 public sector hospitals, both responded. Figure 5 shows the distribution of ICUs by ICU Level and population category.

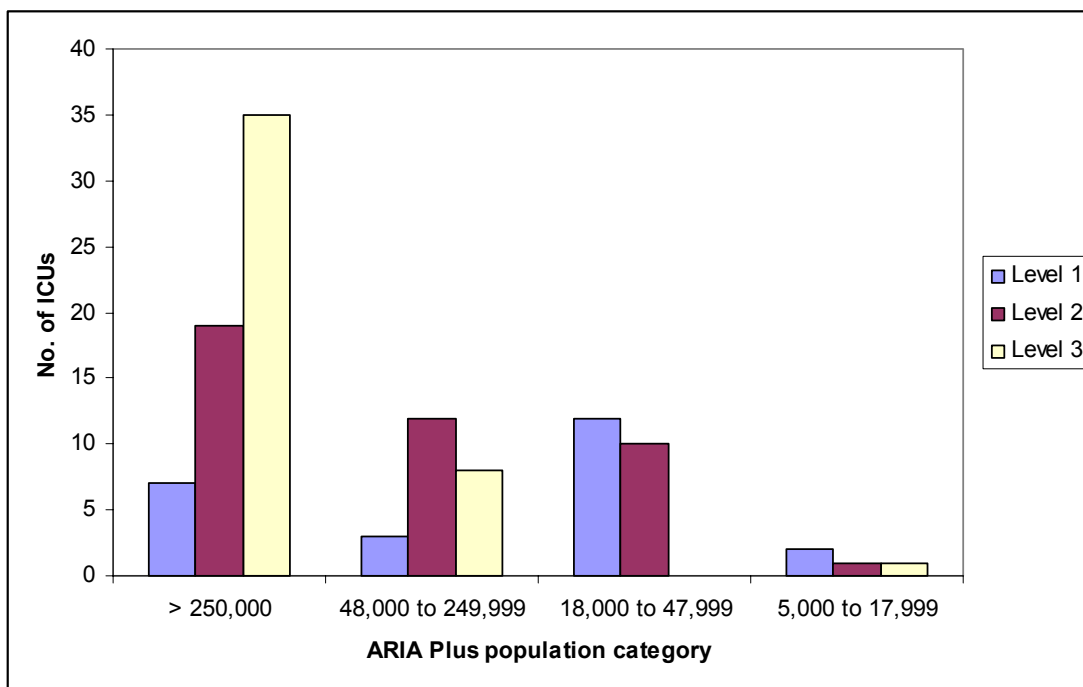


Figure 5. ICU Location, Public Sector by Population Category & ICU Level

2.2 DISTRIBUTION OF ICU SERVICES

Figures 6 and 7 show the location of available ICU beds in public and private hospitals. In the public sector, the majority of available ICU beds are located in hospitals with a bed range over 500.

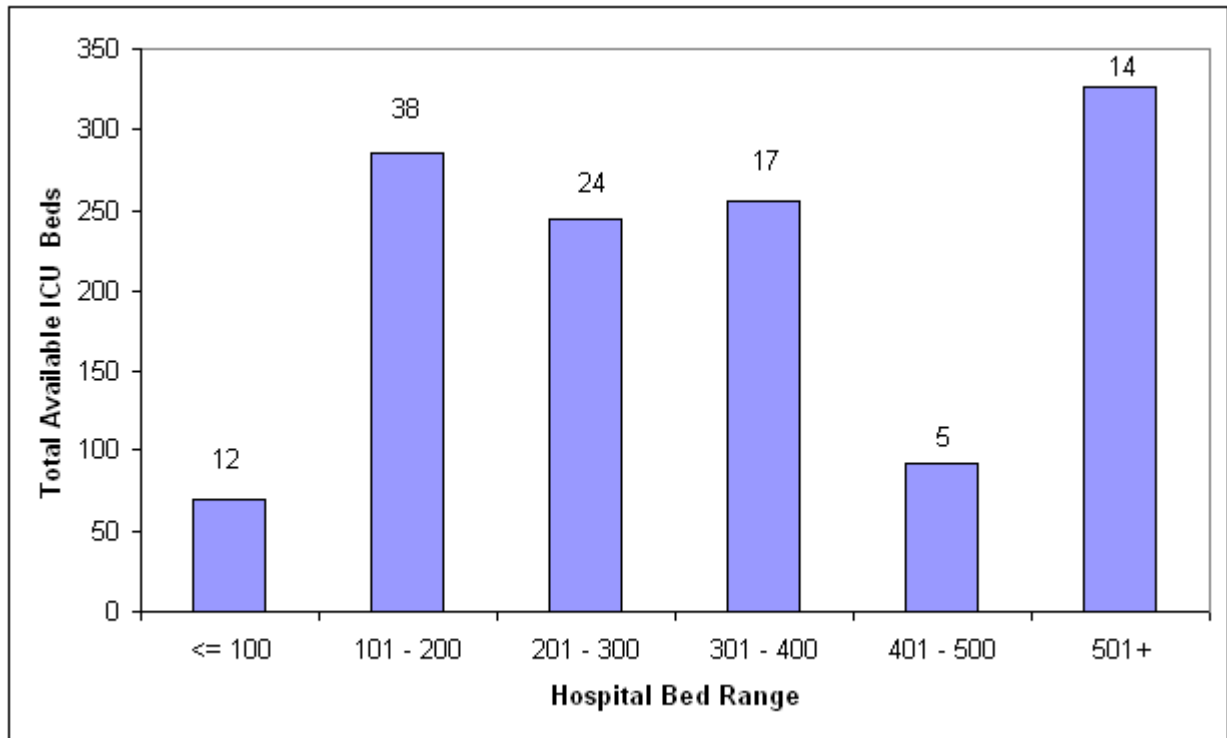


Figure 6. Total Available ICU Beds by Hospital Size, Public Sector

In the private sector, most ICU beds are located in hospitals with a bed range between 101 and 200. Number of units in each category is represented by the figures at the top of each bar chart. 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.

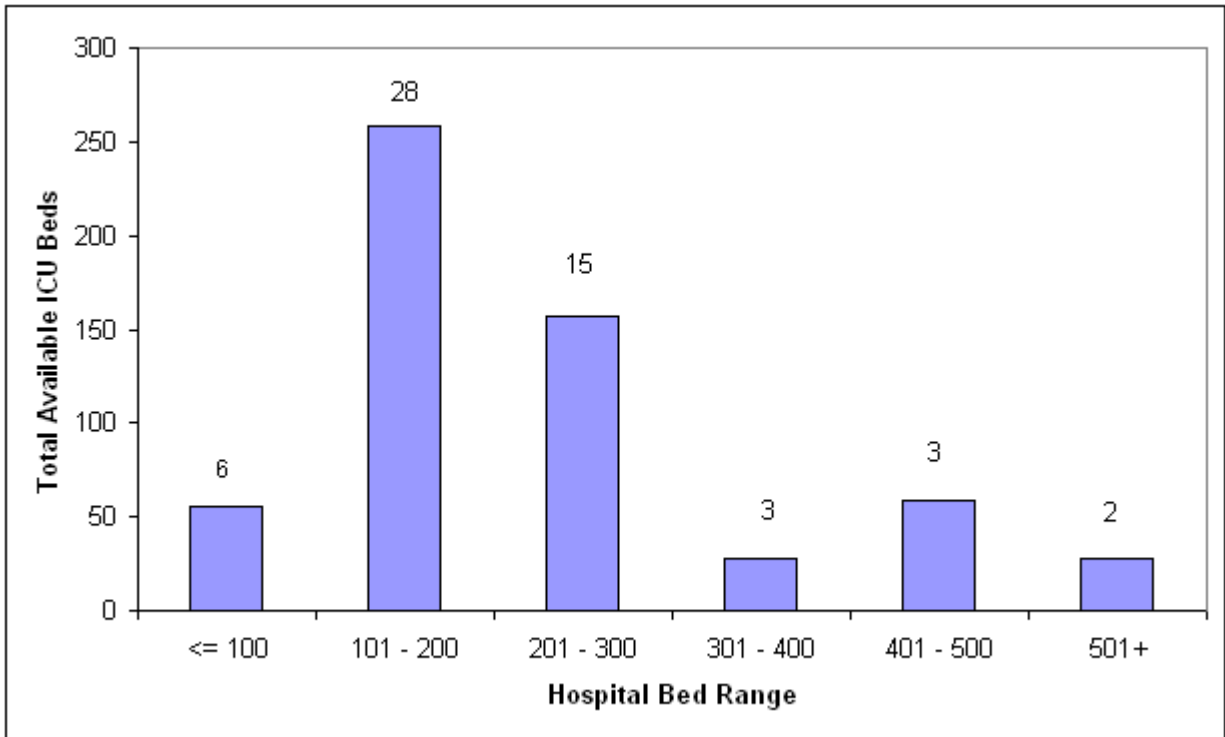


Figure 7. Available ICU Beds by Hospital Size, Private Sector

Table 1 shows the number of public hospitals with intensive care units in each state and compares this to the total number of public acute hospitals.

Table 1. Proportion of Hospitals with ICUs, Public Sector

Region	No. Public Acute Hospitals ⁽¹⁸⁾	No. Hospitals with ICUs	% Public Acute Hospitals with ICUs
NSW	209	43	20.6
VIC	143	23	16.1
QLD	175	22	12.6
SA	79	8	10.1
WA	93	7	7.5
TAS	22	3	13.6
ACT	3	2	66.7
NT	5	2	40.0
Australia	729	110	15.1

There is a slight decrease in the percentage of public acute hospitals with ICUs from the previous survey; 16.0 down to 15.1. In the private sector there is an increase in the proportion of private hospitals that have ICUs. 16.9% in 2001/2002 and 18.9% in 2002/2003.

Table 2 shows the number of private hospitals with intensive care units in each state and compares this to the total number of private hospitals.

Table 2. Proportion of Hospitals with ICUs, Private Sector

Region	No. Public Acute Hospitals ⁽¹⁹⁾	No. Hospitals with ICUs	% Private Hospitals with ICUs
NSW/ACT	87	20	23.0
VIC	88	12	13.6
QLD	54	13	24.1
SA	36	6	16.7
WA	27	4	14.8
TAS	9	2	22.2
Australia	301	57	18.9

Note: Includes private psychiatric hospitals

Table 3 presents information collected on available beds and compares this to the number of public available acute hospital beds. For Tables 4 and 5 most ICUs provided an estimate of hospital bed numbers, where an estimate was not provided the ARCCCR obtained an estimate from the hospital directly. It should also be noted that hospital bed numbers in this section only approximates the actual numbers of hospital beds as the numbers are self reported by ICU directors and not by hospital administration.

Table 3. Total Available ICU beds as Proportion of Available Public Acute Hospital Beds

Region	Total Available ICU Beds	Available Public Acute Hospital Beds ⁽²⁰⁾	Available ICU Beds as % Acute Hospital Beds
NSW	532	16,919	3.1
VIC	245	11,843	2.1
QLD	218	9,404	2.3
SA	123	4,551	2.7
WA	89	4,817	1.9
TAS	31	1,056	2.9
ACT	22	682	3.2
NT	14	569	2.5
Australia	1,274	49,841	2.6

Table 4. Available & Ventilator Beds as Proportion of Public Hospital Beds

Region	Self Reported Hospital Beds for Hospitals with ICUs	Available ICU Beds	Available ICU Beds as % Hospital Beds	Ventilator Beds	Ventilator Beds as % Hospital Beds
NSW	10,864	516	4.8	301	2.8
VIC	5,794	245	4.2	192	3.3
QLD	6,242	218	3.5	155	2.5
SA	2,212	115	5.2	85	3.8
WA	2,421	89	3.7	72	3.0
TAS	883	31	3.5	25	2.8
ACT	675	22	3.3	13	1.9
NT	434	14	3.2	11	2.5
Australia	29,525	1,250	3.9	854	2.8

Note: Only those units that reported numbers of hospital, available and ventilator beds were included in these figures.

Table 5. Available & Ventilator Beds as Proportion of Private Hospital Beds

Region	Hospital Beds*	Available Beds	Available ICU Beds as % Hospital Beds	Ventilator Beds	Ventilator ICU Beds as % Hospital Beds
NSW	2,529	148	5.9	94	3.7
VIC	2,780	123	4.4	92	3.3
QLD	3,096	160	5.2	107	3.5
SA	951	76	8.0	46	4.8
WA	1,231	36	2.9	21	1.7
TAS	451	15	3.3	7	1.6
ACT	332	19	5.7	7	2.1
Australia	11,370	577	5.1	374	3.0

Note: Only those units that reported numbers of hospital, available and ventilator beds were included in these figures.*

Figure 8 shows the distribution of available ICU beds as a proportion of acute hospital beds in the public sector over time (i.e., 1997/1998 to 2002/2003).

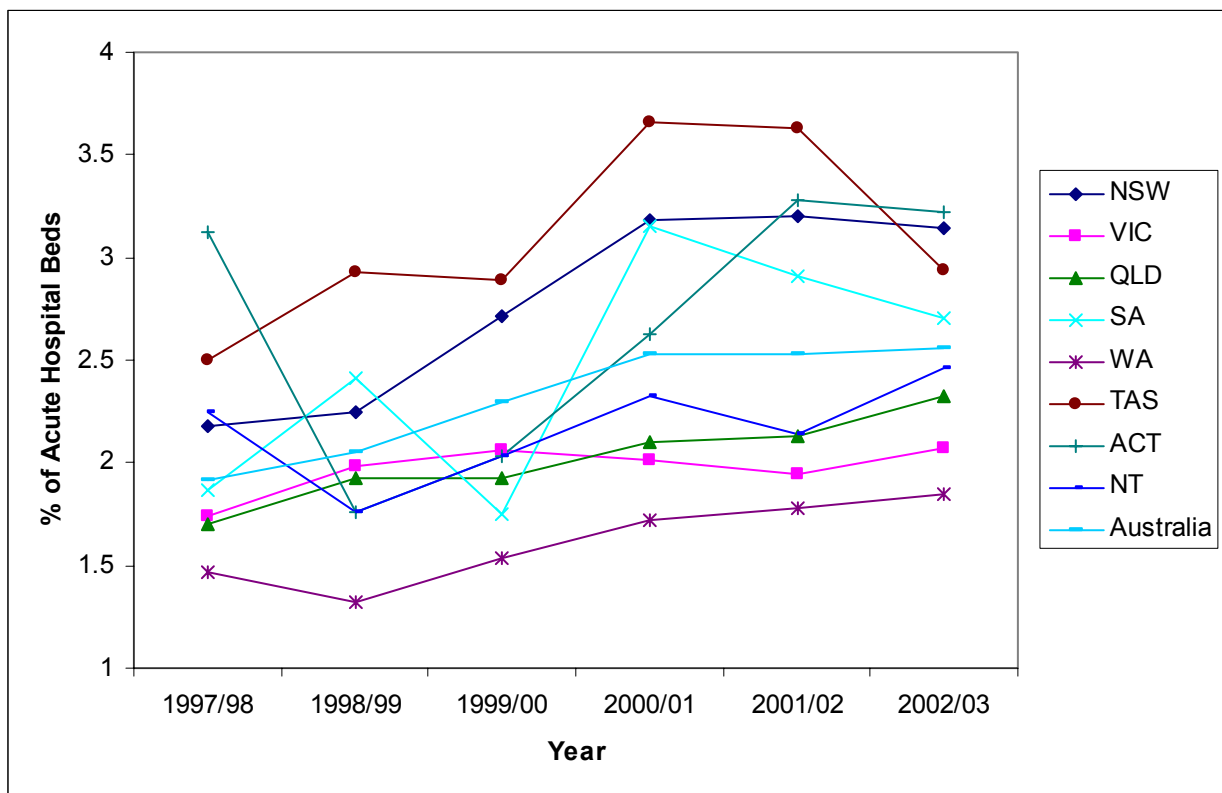


Figure 8. Available ICU Beds as Proportion of Acute Hospital Beds, Public Sector

Source: AIHW

It is important to note that:

- The marked decrease in TAS 2001/2002 – 2002/2003 is due to a reported decrease of 9 beds in Tasmania between the 2 survey periods.
- 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.

2.3 DISTRIBUTION OF ICU BEDS

For the purpose of this survey, intensive care beds are categorised as physical, available or ventilator and are defined as:

PHYSICAL BED: A single patient care location 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. It is a bed (or bed equivalent) configured to intensive care standards and one that is fully staffed and funded.

VENTILATOR BED: A physical intensive care bed plus ventilator.

Physical and Available Beds therefore include HDU / Step-down beds managed by the ICU team. Table 6 examines the numbers of physical, available and ventilator beds by hospital sector and state; Table 7 only includes public sector adult ICUs. There are modest increases in bed numbers overall in the public and private sectors from the preceding year.

Table 6. ICU Bed Distribution Public & Private Sectors (including paediatric)

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Totals
Public									
Physical	624	300	286	123	97	38	34	18	1,520
Available	532	245	218	123	89	31	22	14	1,274
Ventilator	301	192	155	85	72	25	13	11	854
Private									
Physical	165	126	160	76	36	21	21	-	605
Available	156	123	160	76	36	15	19	-	585
Ventilator	94	92	107	46	21	7	7	-	374
Australia									
Physical									2,125
Available									1,859
Ventilator									1,228

Table 7. ICU Bed Distribution of Public & Private Sector, Adult ICUs

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Totals
Public									
Physical	580	276	270	115	87	38	34	18	1,418
Available	507	221	202	115	79	31	22	14	1,191
Ventilator	278	168	139	77	62	25	13	11	773
Private									
Physical	165	126	160	76	36	21	21	-	605
Available	156	123	160	76	36	15	19	-	585
Ventilator	94	92	107	46	21	7	7	-	374
Australia									
Physical									2,023
Available									1,776
Ventilator									1,147

Note: Figures include a number of CCU, HDU and specialist beds managed by ICU. Includes the following PICU beds: 102 physical beds; 83 available beds; 81 ventilator beds.

2.3.1 NON CONTRIBUTING HOSPITALS

As previously discussed, for comparative purposes we have used information from the previous survey 2001-2002⁽¹¹⁾ on the numbers of ICU beds from hospitals that did not respond to this survey 2002-2003. The bed numbers reported by these hospitals in 2001-2002 were:

PUBLIC SECTOR (2 HOSPITALS)	PRIVATE SECTOR (3 HOSPITALS)	TOTAL (5 HOSPITALS)
• Physical beds 13	• Physical beds 23	• Physical beds 36
• Available beds 13	• Available beds 23	• Available beds 36
• Ventilator beds 4	• Ventilator beds 19	• Ventilator beds 23

The following comparisons utilise the data from survey respondents and the data from the previous survey (assuming no change) for non responders to facilitate the comparison between the past two survey periods and the current year.^(4;11) Available beds increased by 35 in the public sector and 91 in the private sector since 2001/2002. Available ICU beds increased by 169 and 129 in the public and private sectors, respectively, since 1999/2000. Ventilator beds increased by of 6 and 42 in the public and private sectors, respectively since 2001/2002. ICU ventilator beds increased by 32 in the public sector and 73 in the private sector since 1999/2000. Particularly in the private sector, this could be due, in part, to improved reporting and better data capture. Table 8 presents comparisons of bed availability over 3 survey periods. Table 9 presents the information collected on available and ventilator beds.

Table 8. Comparisons of Bed Availability by Year

	Available Beds as % of Physical Beds	Ventilator Beds as % of Physical Beds	Ventilator Beds as % of Available Beds
Public Sector			
2002/2003	83.8	56.2	67.0
2001/2002	83.4	57.2	68.5
2000/2001	85.8	59.3	69.1
Public Sector (PICUs excluded)			
2002/2003	84.0	54.5	64.9
2001/2002	84.3	55.6	66.0
2000/2001	87.3	57.9	66.3
Public Sector – PICUs*			
2002/2003	81.4	79.4	97.6
2001/2002	72.7	76.4	105.0
2000/2001	66.3	76.3	115.0
Private Sector			
2002/2003	96.7	61.8	63.9
2001/2002	96.9	65.1	67.2
2000/2001	97.4	66.2	67.9
Public and Private Sectors (PICUs excluded)			
2002/2003	87.8	56.7	64.6
2001/2002	86.9	59.3	68.8
2000/2001	88.9	61.1	68.7

Note: *a number of PICUs 'flex up' to meet service demands; **Source:** 2000/2001 figures^(4;11;11) 2001/2002 figures⁽⁴⁾.

Table 9. Total, Median No. and range of Available & Ventilator Beds

	Available Beds		Ventilator Beds	
	Total Available Beds	Median (min - max)	Total Ventilator Beds	Median (min - max)
Public				
NSW	532	10.0 (2 - 44)	301	5.0 (1 - 24)
VIC	245	8.0 (4 - 25)	192	7.0 (1 - 25)
QLD	218	8.0 (4 - 28)	155	5.0 (2 - 21)
SA	123	11.0 (6 - 41)	85	8.0 (2 - 31)
WA	89	10.0 (5 - 30)	72	10.0 (1 - 22)
TAS	31	11.0 (7 - 13)	25	11.0 (3 - 11)
ACT	22	11.0 (10 - 12)	13	6.5 (3 - 10)
NT	14	7.0 (6 - 8)	11	5.5 (5 - 6)
Private				
NSW	156	8 (4 - 17)	94	6.0 (2 - 11)
VIC	123	10.0 (7 - 15)	92	8.0 (2 - 12)
QLD	160	10.0 (6 - 37)	107	9 (2 - 19)
SA	76	11.5 (9 - 20)	46	8.0 (4 - 12)
WA	36	9.5 (5 - 12)	21	4.5 (4 - 8)
TAS	15	7.5 (4 - 11)	7	3.5 (2 - 5)
ACT	19	6.0 (4 - 9)	7	2.0 (2 - 3)

In the public sector 10 (9.1%) units reported having 5 or less physical beds, 50 (45.5%) units reported between 6 – 10 physical beds, 29 (26.4%) units reported between 11- 20 beds, 21 (19.1%) units reported 21 or more physical beds. In the private sector 5 (8.8%) units reported having 5 or less physical beds, 26 (45.6%) units reported between 6 – 10 physical beds, 25 (43.9%) units reported between 11- 20 beds and only 1 (1.8%) unit reported having greater than 21 physical beds.

Tables 10 to 15 describe the demographic distribution of available and ventilator beds by level and sector for the public and private sectors, respectively.

Table 10. Available Beds by ICU Level

Region	Public Sector			Private Sector		
	Level 3	Level 2	Level 1	Level 3	Level 2	Level 1
NSW	281	167	84	65	68	22
VIC	170	70	5	67	49	7
QLD	131	65	22	121	32	7
SA	87	10	26	33	43	0
WA	66	10	13	10	26	0
TAS	24	7	0	0	11	4
ACT	10	12	0	0	10	9
NT	6	0	8	0	0	0
Australia	775	341	158	296	239	49

Table 11. Proportion of Available & Ventilator Beds by Region and Level and Sector

	Available Beds as % of Physical Beds			Ventilator Beds as % of Available Beds		
	Level 3	Level 2	Level 1	Level 3	Level 2	Level 1
Public						
NSW	81.4	88.6	98.7	76.1	59.3	36.2
VIC	86.9	80.5	100.0	85.2	63.2	20.0
QLD	82.1	73.9	89.6	86.8	68.0	36.7
SA	100.0	100.0	100.0	88.5	40.0	15.4
WA	91.5	100.0	100.0	93.3	100.0	28.7
TAS	84.2	87.9	0.0	92.3	42.9	0.0
ACT	45.5	100.0	0.0	100.0	25.0	0.0
NT	75.0	0.0	80.0	100.0	0.0	62.5
Private						
NSW	100.0	90.8	91.7	84.6	50.7	18.2
VIC	95.7	100.0	100.0	85.7	65.3	28.6
QLD	100.0	100.0	100.0	81.3	39.5	71.4
SA	100.0	100.0	0.0	87.9	49.5	0.0
WA	100.0	100.0	0.0	80.0	59.3	0.0
TAS	0.0	64.7	100.0	0.0	45.5	50.0
ACT	0.0	100.0	81.8	0.0	50.0	22.2
Australia	99.0	94.9	92.5	81.4	78.3	30.6

Table 12. Demographic Distribution of Public Sector Beds

Region	Population	Available Beds	Ventilator Beds	Available Beds /100,000	Ventilator Beds /100,000
NSW	6,686,600	532	301	8.0	4.5
VIC	4,917,400	245	192	5.0	3.9
QLD	3,796,800	218	155	5.7	4.1
SA	1,527,400	123	85	8.1	5.6
WA	1,952,300	89	72	4.6	3.7
TAS	477,100	31	25	6.5	5.2
ACT	322,900	22	13	6.8	4.0
NT	198,400	14	11	7.1	5.6
Australia	19,881,500	1,274	854	6.4	4.3

Table 13. Demographic Distribution of Private Sector Beds

Region	Population ⁽²¹⁾	Available Beds	Ventilator Beds	Available Beds /100,000	Ventilator Beds /100,000
NSW	6,686,600	156	94	2.3	1.4
VIC	4,917,400	123	92	2.5	1.9
QLD	3,796,800	160	107	4.2	2.8
SA	1,527,400	76	46	5.0	3.0
WA	1,952,300	36	21	1.8	1.1
TAS	477,100	-	-	3.1	1.5
ACT	322,900	19	7	5.9	2.2
Australia	19,881,500	1,274	854	6.4	4.3

Table 14. Demographic Distribution of Public & Private Sector Beds

Region	Population ⁽²¹⁾	Available Beds	Ventilator Beds	Available Beds /100,000	Ventilator Beds /100,000
NSW	6,686,600	688	395	10.3	5.9
VIC	4,917,400	368	284	7.5	5.8
QLD	3,796,800	378	262	10.0	6.9
SA	1,527,400	199	131	13.0	8.6
WA	1,952,300	125	93	6.4	4.8
TAS	477,100	46	32	9.6	6.7
ACT	322,900	41	20	12.7	6.2
NT	198,400	14	11	7.1	5.6
Australia	19,881,500	1,859	1,228	9.4	6.2

The number of available beds per 100,000 has increased slightly from the last survey (6.3 to 6.4). The number of ventilator beds per 100,000 is stable.

Table 15. Demographic Distribution of Level 3 Beds, Public Sector

Region	Population ⁽²¹⁾	Available Beds	Ventilator Beds	Available Beds /100,000	Ventilator Beds /100,000
NSW	6,686,600	281	198	4.2	3.0
VIC	4,917,400	170	148	3.5	3.0
QLD	3,796,800	131	107	3.5	2.8
SA	1,527,400	87	77	5.7	5.0
WA	1,952,300	66	58	3.4	3.0
TAS	477,100	24	22	5.0	4.6
ACT	322,900	10	10	3.1	3.1
NT	198,400	6	6	3.0	3.0
Australia	19,881,500	775	626	3.9	3.2

The numbers of ICU beds by different remoteness category measurements (Appendix 4) are presented graphically in Figures 9 and 10.

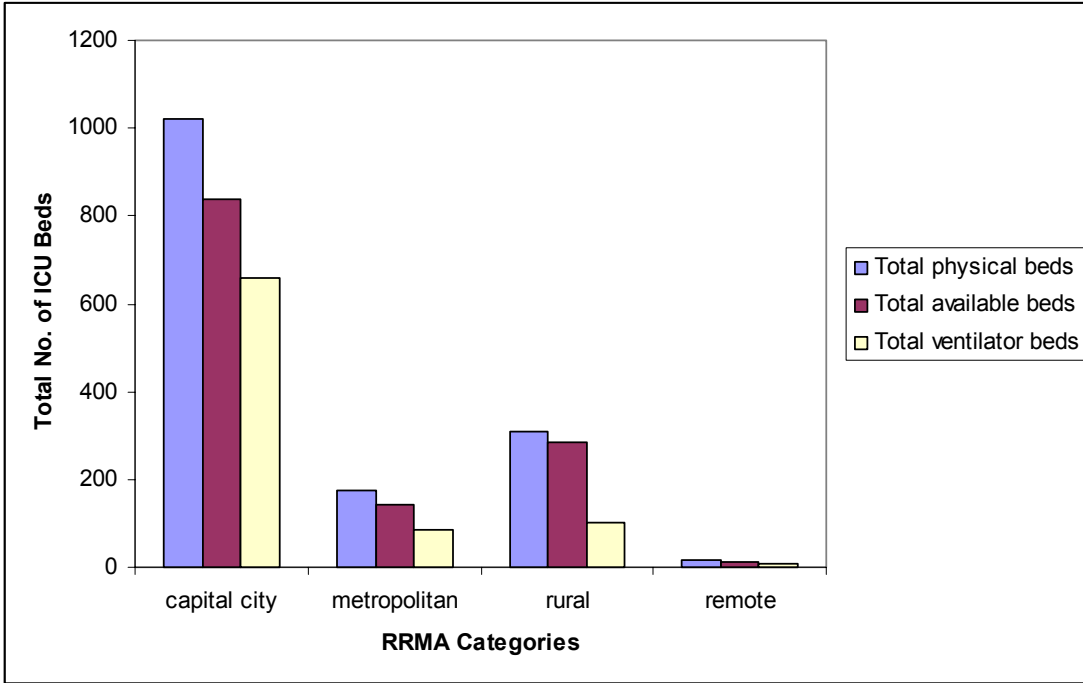


Figure 9. ICU Beds by RRMA Category, Public Sector

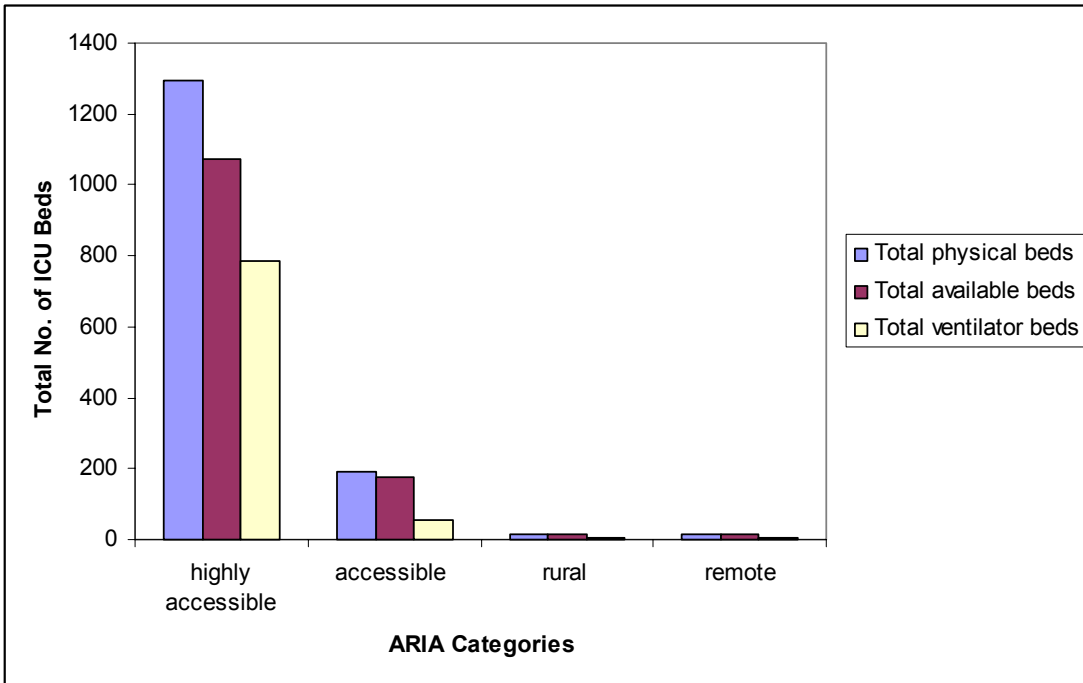


Figure 10. ICU Beds by ARIA Classification, Public Sector

2.4 ICU TYPE

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

GENERAL ICU: Medical and/or surgical care. May incorporate HDU facilities/beds. HDU and ICU beds may be interchangeable. May care for paediatric patients.

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⁽²²⁾ (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.⁽²²⁾

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.⁽²³⁾ HDU beds may be interchangeable with ICU or CCU beds and may also be known as step down beds. For the purposes of this report, only HDU beds managed by critical care services were included.

In the 2002/2003 and 2001/2002 surveys, the definition of General ICU did not specifically exclude those units classifying themselves as 'General' even though they reported CCU beds. Prior to this time, those units had been reclassified by the ARCCCR Project Manager as ICU/CCU. In future years, the definitions will be more explicit and those units with any designated CCU beds will be asked to classify themselves as ICU/CCU.

These critical care categories are quite broad 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.

An analysis of the types of services provided by ICUs indicated that a wide variety of services were offered, with 94 respondents indicating that they provided General ICU services (56.3 per cent), 64 indicating that they provided ICU/CCU/HDU services (38.3 per cent), 7 provided PICU services (4.2 per cent) and 2 provided specialty ICU (neuro-intensive care and cardiothoracic intensive care) services (1.2 per cent).

Available ICU beds in ICU/CCUs comprised 24.3% of the total number of available adult ICU beds in the public sector. In the private sector, available ICU beds for ICU/CCU were 25.1% of the total number of available adult ICU beds.

Figures 11 and 12 graphically represent the different types of ICUs by region and sector.

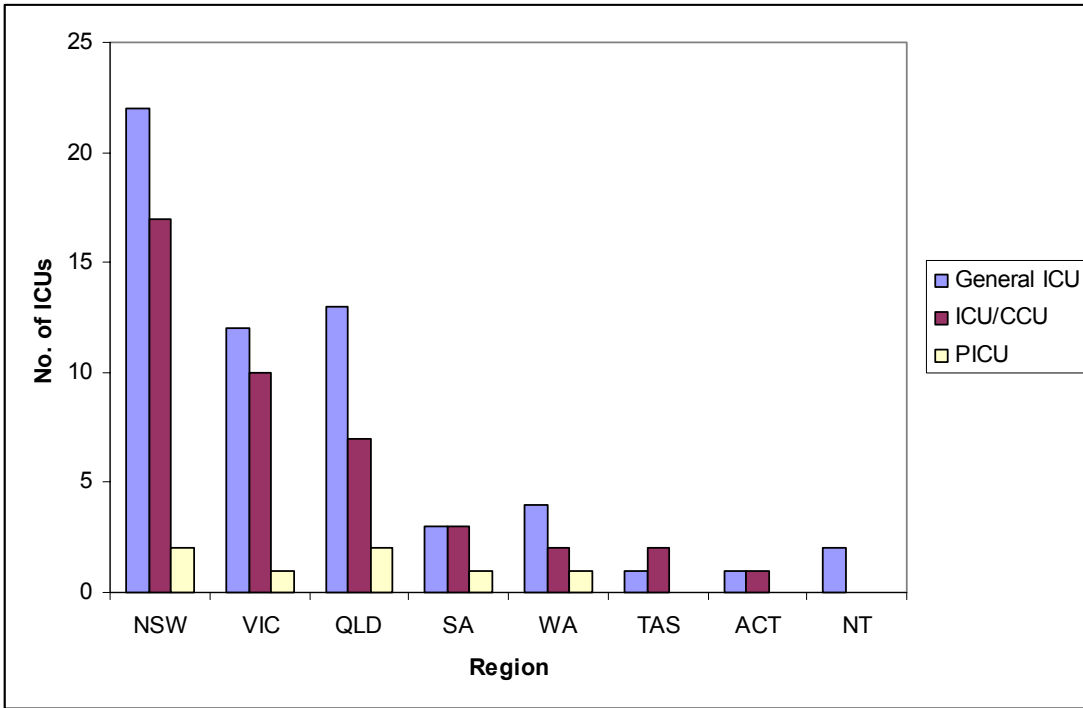


Figure 11. ICU Type by Region, Public Sector

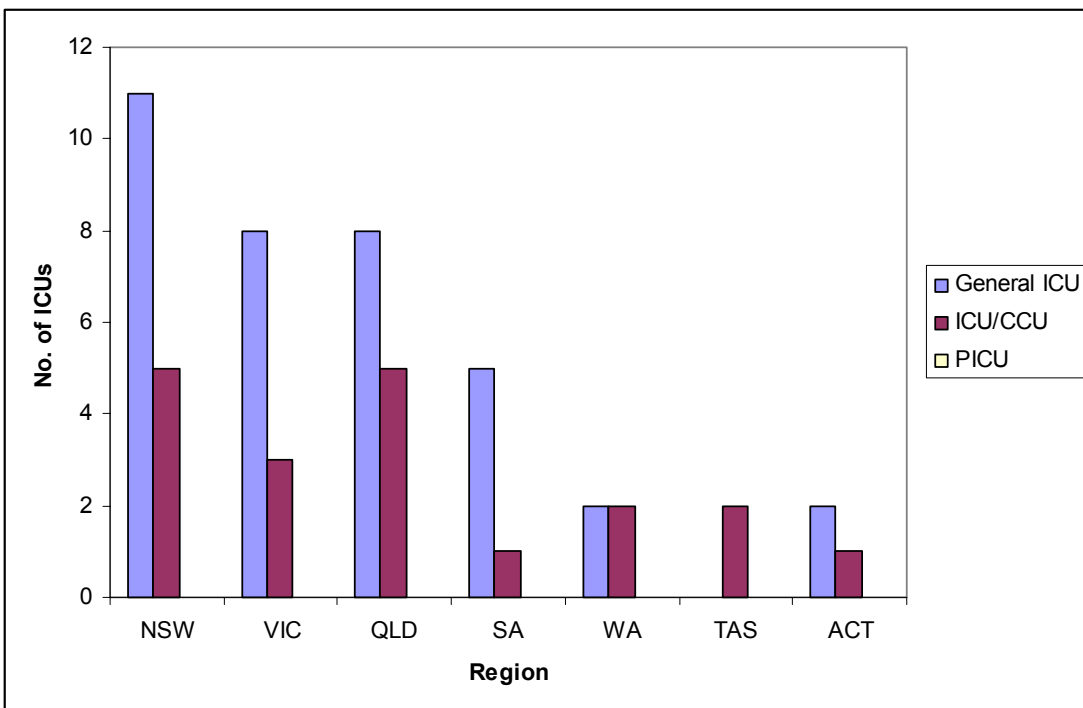


Figure 12. ICU Type by Region, Private Sector

2.4.1 ICU TYPE AND BED CHARACTERISTICS

PUBLIC SECTOR:	PRIVATE SECTOR:
<p>General ICU included:</p> <ul style="list-style-type: none"> • Total 845 available beds • 63 available cardiothoracic beds • 94 available HDU beds • 23 available other beds • 75 available CCU beds <p>ICU/CCU/HDU included:</p> <ul style="list-style-type: none"> • Total 327 available beds • 115 available CCU beds • 30 available HDU beds 	<p>General ICU included:</p> <ul style="list-style-type: none"> • Total 402 available beds • 9 available cardiothoracic beds • 42 available HDU beds • 32 available CCU beds <p>ICU/CCU/HDU included:</p> <ul style="list-style-type: none"> • Total 162 available beds • 47 available CCU beds • 14 available HDU beds

2.5 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. All ICU levels in this report are self-determined. An extract of the JFICM standards document was included with the survey (Appendix 3).⁽¹²⁾ Reference to ICU levels may also be found in the National Health Data Dictionary.⁽²²⁾ 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.⁽²⁴⁾ Despite the application of the 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 problematic. Even Level 3 ICUs may be different in terms of patient acuity, outcomes and casemix. Moreover, the service level of an individual ICU may periodically change with structural re-organisation of network health services. 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 this may occur. Rural and regional sites may have difficulty obtaining intensivists even though the workload may be comparable to metropolitan sites. The majority of respondent ICUs were either a Level 3 or Level 2 unit. A total of 68 Level 3 units comprised 40.7% while 68 Level 2 units comprised 40.7% and 31 Level 1 units comprised 18.6% of units. Figures 13 and 14 depict the number of physical, available and ventilator ICU beds by bed type at each ICU level in the public and private sector.

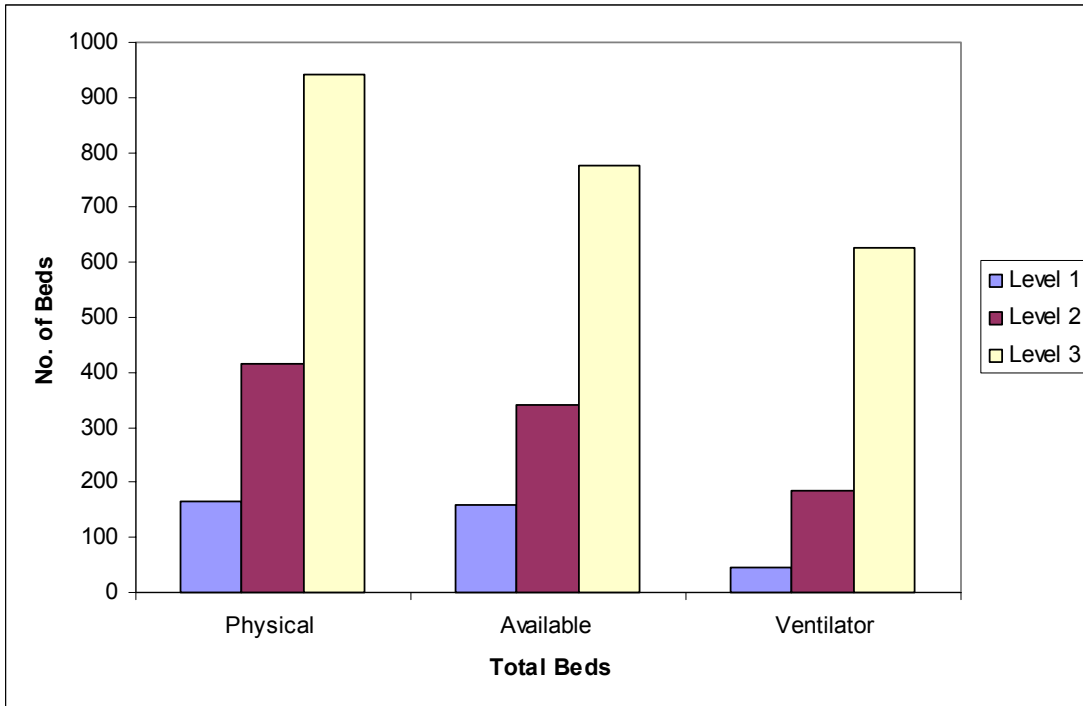


Figure 13. Public Physical, Available and Ventilator ICU Beds by ICU Level

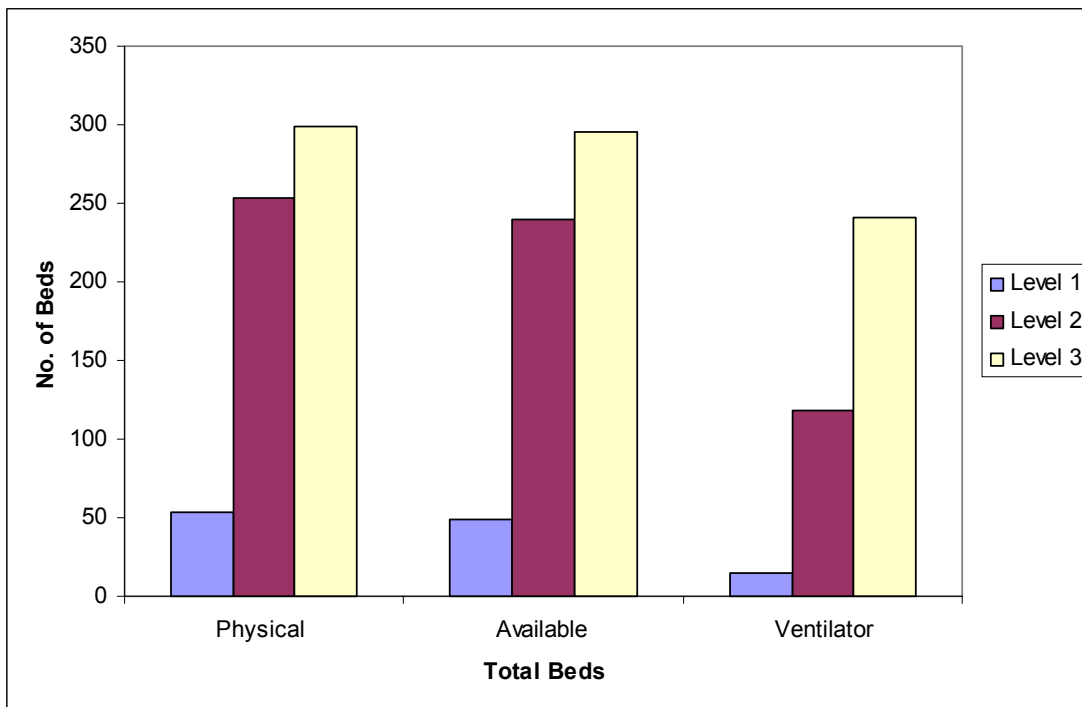


Figure 14. Private Physical, Available and Ventilator ICU Beds by ICU Level

2.5.1 ICU LEVEL/BED CHARACTERISTICS

PUBLIC SECTOR:	PRIVATE SECTOR:
<p>Level 3 ICU includes:</p> <ul style="list-style-type: none"> • Total 775 available beds • 65 available HDU beds • 56 available CCU beds • 63 available cardiothoracic beds • 53 available other beds <p>Level 2 ICU includes:</p> <ul style="list-style-type: none"> • Total 341 available beds • 36 available HDU beds • 89 available CCU beds • 2 available other beds <p>Level 1 ICU includes:</p> <ul style="list-style-type: none"> • Total 158 available beds • 36 available HDU beds • 45 available CCU beds 	<p>Level 3 ICU includes:</p> <ul style="list-style-type: none"> • Total 296 available beds • 8 available HDU beds • 25 available CCU beds • 9 available cardiothoracic beds <p>Level 2 ICU includes:</p> <ul style="list-style-type: none"> • Total 240 available beds • 45 available HDU beds • 47 available CCU beds • 6 available cardiothoracic beds • 6 available other beds <p>Level 1 ICU includes:</p> <ul style="list-style-type: none"> • Total 59 available beds • 7 available HDU beds • 12 available CCU beds

2.6 ICU ACTIVITY

2.6.1 DEFINITIONS OF ICU CARE

Many contemporary definitions of an intensive care patient are reliant on a requirement for mechanical ventilation that has significant limitations given the changing array of treatment modalities used in caring for the critically ill. Mechanical ventilation is 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, however this may be detrimental as it no longer reflects enhanced outcomes for certain subgroups of non-invasively ventilated patients and may perversely influence treatment. Requirement for mechanical ventilation alone is not a marker of critical illness and does not take into account the complexity of care for a significant proportion of non-ventilated 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:⁽²⁵⁾

- 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 II score > 25
- Invasive ventilation
- Invasive therapy – haemodynamic monitoring, inotropes, renal replacement therapy.

In the United Kingdom four levels of patient care have been proposed:^(26;27)

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 include 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 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.⁽²⁶⁾ All acute hospitals that carry out elective surgery must provide Level 2 care.⁽²⁶⁾ Development of definitions for intensive care patients in an Australasian context needs to be undertaken.

2.6.2 ADMISSIONS

Tables 16 to 22 examine ICU admissions and readmissions data in a number of ways. Of the 162 Australian hospitals that responded to the survey only 6 (NSW 4, VIC 2) did not submit admission data. For one VIC private hospital we have had no data re admissions for two survey periods so no data was deemed relevant. For the other 5 hospitals, 2001-2002 data for admissions and readmissions was used.

Table 16. ICU Admissions as a Proportion of all Hospital Admissions

Region	Total ICU Admissions	AIHW All Separations ⁽²⁸⁾	% of ICU Admissions	AIHW Same Day Separations Excluded ⁽²⁹⁾	% of ICU Admissions
Public^a					
NSW	39,464	1,280,367	3.08	727,964	5.42%
VIC	20,106	1,149,404	1.75	524,937	3.83%
QLD	18,207	701,701	2.59	358,272	5.08%
SA	10,079	365,117	2.76	182,996	5.51%
WA	7,679	365,879	2.1	185,085	4.15%
TAS	1,857	79,933	2.32	40,657	4.57%
ACT ^c	2,437	63,743	3.82	27,598	8.83%
NT	1,145	68,149	1.68	29,379	3.90%
<i>Sub-Total</i>	<i>100,974</i>	<i>4,074,293</i>	<i>2.48</i>	<i>2,076,888</i>	<i>4.86%</i>
Private^b					
NSW	10,133	548,615	1.85	257,179	3.94%
VIC	9,138	554,364	1.65	248,155	3.68%
QLD	11,344	466,239	2.43	219,880	5.16%
SA	6,954	179,071	3.88	89,254	7.79%
WA	4,561	251,173	1.82	116,966	3.90%
<i>Sub-Total</i>	<i>42,130</i>	<i>1,999,462</i>	<i>2.11</i>	<i>931,434</i>	<i>4.52%</i>
Australia	143,104	6,073,755	2.36	3,008,322	4.76%

Note: a – public acute hospitals; b – private hospitals excluding free standing day hospital facilities. Figures for TAS NT and ACT have not been published by the AIHW; c - the ACT services areas of southern NSW

Table 17. ICU Admissions by ICU Type, Adult ICUs

ICU Type	ICU Admissions	HDU Admissions	CCU Admissions	Other Admissions	Total Admissions
Public					
General	39,737	7,633	6,453	4,847	58,670
ICU/CCU	14,737	4,961	15,169	55	34,914
<i>Sub-total</i>	<i>54,474</i>	<i>12,594</i>	<i>21,622</i>	<i>4,902</i>	<i>93,584</i>
Median (IQR)	405	246.5 (122.3, 474.3)	401 (266.5, 627)	342 (40.8, 583.8)	786 (571, 1269.8)
Private					
General	21,416	4,519	682	3,490	30,107
ICU/CCU	5,103	1,656	6,882	628	14,269
Specialty	488	-	-	-	488
<i>Sub-total</i>	<i>27,007</i>	<i>6,175</i>	<i>7,564</i>	<i>4,118</i>	<i>44,864</i>
Median (IQR)	457 (231.5, 722)	280.5 (54.5, 557.5)	319.5 (109.5, 502.8)	326 (147, 660)	803 (518, 1066)
Australia	81,481	18,769	29,186	9,020	138,448
Median (IQR)	438 (226,739)	258 (89.5, 478)	399 (252.5, 595.5)	337 (48.5, 588.5)	788 (540, 1150)

Note: Reports of central tendency are data dependent (i.e., for normally distributed data the mean plus standard deviation is reported; for a skewed distribution the median plus 25th and 75th percentile is reported). Data excludes designated HDU/Stepdown units.

Overall, the reported number of admissions has increased from 130,877 in 2001/2002 to 138,448 this year. This in part is due to an apparent increase in the number of private hospital admissions which at least in part, reflects more comprehensive data collection and reporting in this sector.

Table 18. ICU Admissions by ICU Level, Adult ICUs

ICU Type	ICU Admissions	HDU Admissions	CCU Admissions	Other Admissions	Total Admissions
Public					
Level 3	32,957	5,570	4,112	4,751	47,390
Level 2	16,223	4,254	11,955	81	32,505
Level 1	6,033	3,912	5,555	70	15,570
<i>Sub-total</i>	<i>55,213</i>	<i>13,736</i>	<i>21,622</i>	<i>4,902</i>	<i>95,465</i>
Private					
Level 3	18,089	1,695	529	2,602	22,915
Level 2	7,729	4,092	5,487	1,224	18,532
Level 1	1,245	483			
<i>Sub-total</i>	<i>27,063</i>	<i>6,270</i>	<i>7,564</i>	<i>4,217</i>	<i>45,114</i>
Australia	82,276	20,006	29,186	9,119	140,579

2.6.3 READMISSIONS

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 complex within the same hospital admission (direct transfers to or from ICU to HDU excluded).

In 2000-2001⁽¹¹⁾ only 59.1% of ICUs provided data on this Key Performance Indicator. In 2001-2002, 70.9% of hospitals provided data. This year 73.1% provided the data, including 100% of level 3 public ICUs. In Tables 19 and 20 where differentiated, unit based admission/readmission data was not supplied, the admissions/readmissions were included under ICU admissions/readmissions. ICU, HDU and Other readmissions have been combined for the purposes of the calculations in the following tables, CCU readmission rates are presented separately.

Table 19. Readmissions by Sector and ICU Type, Adult ICUs

ICU Type	ICU Readmission Rate [#]	CCU Readmission Rate
Public		
General	4.3	0.7
ICU/CCU	2.5	1.6
Overall	3.8	1.3
Private		
General	1.8	-
ICU/CCU	1.4	-
Australia	1.7	-

Note: [#] Includes readmissions in the ICU, HDU and 'Other' categories

Table 20. Readmission Rates* by Sector and ICU Level, Adult ICUs

ICU Type	% Responded ^a	ICU Readmission Rate [#]	CCU Readmission Rate
Public			
Level 3	75.0	4.9	1.4
Level 2	100.0	2.1	1.3
Level 1	33.3	2.6	1.4
<i>Sub-total</i>	<i>62.5</i>	<i>3.8</i>	<i>1.3</i>
Private			
Level 3	83.3	2.0	0.8
Level 2	57.7	1.2	-
Level 1	57.1	1.7	-
<i>Sub-total</i>	<i>68.4</i>	<i>1.7</i>	<i>-</i>
Australia	73.1	73.1	3.1

Note: **a** – Only those ICUs that provided both ICU admission and readmission data were included. Excludes HDU and 'other' readmissions; **#** Includes readmissions in the ICU, HDU and 'Other' categories; * based only on the public sector and private sector Level 3. Reported numbers of readmissions too small to be reliable in other categories for the private sector

Table 21. Proportion of ICU Patients Readmitted, Adult ICUs

Region	% Responded ^a	ICU Admissions	ICU Readmissions	% Readmissions
Public				
NSW/ACT	67.4	15,160	616	4.1
VIC	72.7	11,429	666	5.8
QLD	75.0	8,113	301	3.7
SA/NT	66.6	6,507	387	6.0
WA	66.6	3,596	107	3.0
TAS	66.6	1,033	53	5.1
<i>Sub-total</i>	<i>70.9</i>	<i>45,838</i>	<i>2,187</i>	<i>5.0</i>
Private				
NSW/ACT	55.0	5,240	140	2.7
VIC	66.7	5,121	176	3.4
QLD	92.3	5,906	148	2.5
SA	50.0	1,411	45	3.2
WA	50.0	1,173	34	2.9
<i>Sub-total</i>	<i>65.5</i>	<i>18,851</i>	<i>543</i>	<i>2.9</i>
Australia	69.0	64,689	2,730	4.2

Note: a – Only those ICUs that provided both ICU admission and readmission data were included. Excludes HDU and 'other' readmissions.

Table 22. Proportion of ICU Patients Readmitted, General ICUs

Region	% Responded ^a	Total ICU Admissions	Total Readmissions	% Readmissions
Public				
NSW/ACT	78.3	11,645	545	4.7
VIC/TAS	92.3	10,057	563	5.6
QLD	92.3	7,291	280	3.8
SA/NT	100.0	4,755	317	6.7
WA	75.0	3,302	105	3.2
<i>Sub-total</i>	<i>86.2</i>	<i>37,050</i>	<i>1,810</i>	<i>4.9</i>
Private				
NSW/ACT	40.0	4,263	102	2.4
VIC	58.3	4,783	169	3.5
QLD	53.8	4,298	113	2.6
SA	50.0	1,411	45	3.2
WA	50.0	1,173	34	2.9
<i>Sub-total</i>	<i>50.4</i>	<i>15,928</i>	<i>463</i>	<i>2.9</i>
Australia	68.3	52,978	2,273	4.3

Note: a – Only those ICUs that provided both ICU admission and readmission data were included

2.6.4 ANZICS ADULT PATIENT DATABASE

Summary data was extracted from the ANZICS Adult Patient Database (APD) and is shown in Table 23.

Table 23. ANZICS Adult Patient Database – 2002/2003 Data*

	Tertiary	Metropolitan	Rural/Regional	Private	All
Episodes of care	32,966	10,096	8,177	15,081	66,320
Mean Age (years)	58.96	59.76	58.02	65.29	60.41
Length of stay (hours) (mean)	45.05	46.56	39.71	40.93	43.63
	41	45.33	40.42	42.5	42
Median length of stay in hours (Range)	(0 – 4575.75)	(0 – 4607.58)	(0 – 7424.17)	(0 – 7310.5)	(0 – 7424.17)
Mean APACHE II score (SD)	16.12 (7.9)	16.84 (9.03)	15.41 (8.45)	13.2 (6.6)	15.48 (7.99)
	73.6	67.6	66.7 (62.6 –	53.5	68.8
APACHE II SMR (95%CI)*	(71.7 – 75.6)	(64.5 – 70.7)	70.9)	(50.0 – 57.1)	(67.4 – 70.3)
Median APACHE II score (range)	15 (0 – 54)	16 (0 – 55)	14 (0 – 54)	12 (0 – 56)	14 (0 – 56)
Mean APACHE III - J score (SD)	52.95 (28.35)	55.42 (30.69)	48 (29.09)	44.7 (22.68)	50.68 (27.88)
	100.4	96.4	104.1	83.4	97.8
APACHE III-J SMR (95%CI)**	(97.6 – 103.2)	(91.7 – 101.3)	(97.8 – 110.7)	(77.9 – 89.0)	(95.7 – 99.9)
Median APACHE III - J score (range)	48 (0 – 210)	51 (0 – 206)	43 (0 – 201)	42 (0 – 187)	46 (0 – 210)

Source: Data extracted by Carol George. ANZICS Adult Patient Database 03/06/05⁽³⁰⁾; *APACHE II SMR Exclusions: Age <16 years, ICU Length of stay < 8 hours, Unknown outcome, Unknown APACHE II diagnosis. ; **APACHE III-J SMR Exclusions: Age <16 years, ICU Length of stay < 4 hours, Unknown outcome, Unknown APACHE III-J diagnosis.

A total of 110 ICUs submitted data to the ANZICS Adult Patient Database (APD) for the 2002/2003 financial year. In the APD dataset, ICUs are classified in a single category as tertiary, metropolitan, rural/regional or private. These terms have a different meaning from similar terms used elsewhere in this report.

There were 66,320 episodes of care (Australia and New Zealand) reported to the APD in 2002/2003, up from 58,049 in 2001/2002,⁽⁴⁾ and 43,790 episodes of care submitted to the APD in 2000/2001.⁽¹¹⁾ The hospital mortality rate (first admissions only) was 14.22%. The ICU mortality rate was 9.06%

2.6.5 ICU BED HOURS/DAYS

Information on admissions relating to ICU bed hours/days was collected. The number of units reporting varied with the percentage of units responding shown in Tables 24 and 25 below.

Table 24. ICU Bed Hours/Days Public & Private Sectors, Adult ICUs

Region	% Responded	Actual Bed Hours	% Responded	Bed Days
Public				
NSW	17.1	395,040	56.1	55,796
VIC	36.4	574,408	36.4	22,723
QLD	25	340,992	35	14,217
SA	71.4	434,340	28.6	8,198
WA	0	-	50	16,074
TAS	66.6	125,342	0	-
ACT	50	22,085	50	3,417
NT	50	54,937	50	1,900
<i>Sub-total</i>	<i>28.2</i>	<i>1,947,144</i>	<i>43.7</i>	<i>122,325</i>
Private				
NSW	11.1	43,666		14,924
VIC/TAS	18.2	52,966		13,578
QLD	30.8	97,876	30.8	6,272
SA	33.3	92,389	50	5,728
WA	25	44,595	25	583
ACT	-	-	66.7	1,848
<i>Sub-total</i>	<i>38.6</i>	<i>331,492</i>	<i>38.6</i>	<i>42,933</i>
Australia	31.9	2,278,636	41.9	165,258

Note: 118/160 adult ICUs (73.8%) submitted data compared to (67.0%) in the 2000-2001. (74 of 103 public adult ICUs, 71.8%; 44 of 57 private ICUs, 77.2%).

Table 25. ICU Bed Hours and Occupancy Public & Private Sectors, Adult ICUs

Region	Total Extrapolated Bed Hours*	Total Available beds	Occupancy Denominator	Occupancy
Public				
NSW	2,369,049	507	4,441,320	53.3
VIC	1,538,132	221	1,935,960	79.5
QLD	1,137,000	202	1,769,520	64.3
SA	631,092	115	1,007,400	62.6
WA#	771,552	79	692,040	>100
TAS	188,201	31	271,560	69.3
ACT	104,093	22	192,720	54.0
NT	100,537	14	122,640	82.0
<i>Sub-total</i>	<i>6,839,656</i>	<i>1,191</i>	<i>10,433,160</i>	<i>465.0</i>
Private				
NSW	992,202	156	1,366,560	72.6
VIC/TAS	555,481	138	1,208,880	46.0
QLD	403,253	160	1,401,600	28.8
SA	275,944	76	665,760	41.4
WA	117,174	36	315,360	37.2
ACT	66,495	19	166,440	40.0
<i>Sub-total</i>	<i>2,410,549</i>	<i>585</i>	<i>5,124,600</i>	<i>34.4</i>
Australia	9,250,205	1,776	15,557,760	499.4

Note: *Assuming hospitals that did not provide bed hours have a similar number of bed hours as those who did submit the data.
#Calculations for WA done on bed days, as no hospital reported bed hours. This has led to an overestimation of occupancy rate in the extrapolation. Note: A number of assumptions have been made in deriving the occupancy figures and some of these may have led to erroneous conclusions.

2.6.6 VENTILATOR HOURS/DAYS

Information on all admissions relating to numbers of ventilated patients and ventilator hours/days was collected.

The number of units reporting was varied in this category so the number of units responding is included in the tables. The survey included a note stating that ventilated patients could be counted in both invasive and non-invasive categories and referred to the glossary for further information. Respondents were encouraged to provide information on ventilator hours as the preferred option over number of ventilator days.

Tables 26 to 29 present the information collected on ventilation, and include an estimated total number of ventilator hours basing ventilator days on 24 hours.

Table 26. ICU Ventilator Hours /Days Public & Private Sectors, Adult ICUs

Region	% Responded	Ventilator Hours	% Responded	Ventilator Days	Total Estimated Ventilator Hours*
Public					
NSW	43.9	252,802	36.6	19,205	575,859
VIC	63.6	403,080	18.2	4,407	633,774
QLD	50.0	257,250	15.0	2,671	514,500
SA	71.4	144,666	-	-	202,613
WA	33.3	111,434	16.7	4,964	334,637
TAS	33.3	24,324	33.3	186	73,045
ACT	50.0	6,118	50.0	1,990	12,236
NT	100.0	50,872	-	-	50,872
<i>Sub-total</i>	<i>51.5</i>	<i>1,250,546</i>	<i>24.3</i>	<i>33,423</i>	<i>2,428,245</i>
Private					
NSW	27.8	26,284	11.8	1,074	94,547
VIC/TAS	69.2	54,234	16.6	1,540	78,373
QLD	61.5	84,851	15.4	1,046	137,969
SA	50.0	21,511	16.7	178	43,022
WA	25.0	20,736	75.0	764	82,944
ACT	33.3	3,650	33.3	125	10,961
<i>Sub-total</i>	<i>47.4</i>	<i>211,266</i>	<i>19.3</i>	<i>4,727</i>	<i>445,709</i>
Australia	50.0	1,461,812	22.5	38,150	2,923,624

Note: *based on an extrapolation from ventilator hours provided.

2.6.7 NUMBER OF PATIENTS VENTILATED

Table 27 examined the number of patients invasively and non-invasively ventilated in all adult ICUs divided by sector and region.

Table 28 examines invasive ventilation and Table 29 examines the ventilation figures for general adult ICUs only.

If the number of ventilated patients was not given the number of invasively ventilated patients was used as the as a minimum number ventilated. For this reason, the number of ventilated patients will be slightly under represented even for responding hospitals.

Table 27. No. of Patients Ventilated, Public & Private Sectors, Adult ICUs

Region	No. ICUs	No. Ventilated	No. ICUs	No. Invasive Ventilation	No. ICUs	No. Non-Invasive
Public						
NSW	37/41	9,132	31/41	6,458	23/41	1648
VIC	19/22	8,366	15/22	5,928	10/22	909
QLD	17/20	4,207	11/20	3,315	11/20	335
SA	7/7	3,319	6/7	1,671	5/6	366
WA	5/6	1,862	4/6	1,138	3/6	59
TAS	3/3	647	2/3	257	2/3	52
ACT	2/2	951	2/2	951	1/2	89
NT	2/2	540	2/2	469	2/2	107
<i>Sub-total</i>	<i>92/103</i>	<i>29,024</i>	<i>73/103</i>	<i>20,187</i>	<i>55/103</i>	<i>3,565</i>
Private						
NSW	12/17	3,004	8/17	1,870	3/17	55
VIC	10/12	3,496	6/12	1,933	6/12	218
QLD	11/13	2,421	11/13	1,771	10/13	166
SA	5/6	1,149	3/6	855	3/6	156
WA	2/4	556	2/4	540	2/4	16
TAS	0/2		0/2		0/2	
ACT	2/3	64	1/3	14	0/3	-
<i>Sub-total</i>	<i>44/57</i>	<i>10,832</i>	<i>32/57</i>	<i>7,091</i>	<i>24/57</i>	<i>656</i>
Australia	136/160	39,856	105/160	27,278	79/160	4,221

Table 28. Proportion of Patients Invasively Ventilated, Adult ICUs

Region	No. ICUs	Total Admissions	No. Invasively Ventilated	% Total Admissions Invasively Ventilated
Public				
NSW	31/41	28,234	6,458	22.9
VIC	15/22	13,614	5,928	43.5
QLD	11/20	8,350	3,315	39.7
SA/NT	6/7	7,668	1,671	21.8
WA	4/4	4,116	1,138	27.7
TAS	2/3	1,262	257	20.4
ACT	2/2	2,437	951	39.0
NT	2/2	1,145	469	41.0
<i>Sub-total</i>	<i>73/103</i>	<i>66,826</i>	<i>20,187</i>	<i>30.2</i>
Private				
NSW	8/17	5,731	1,870	32.6
VIC	7/12	5,737	1,933	33.7
QLD	11/13	6,487	1,771	27.3
SA	3/6	3,888	855	22.0
WA	2/4	1,173	540	46.0
TAS	2/2	1,801	108	6.0
ACT	1/3	346	14	4.1
<i>Sub-total</i>	<i>32/57</i>	<i>25,163</i>	<i>7,091</i>	<i>28.2</i>
Australia	105/160	91,989	27,278	29.7

Note: a – admissions is the total number of ICU and other admissions, from all units with the exclusion of PICUs.

Table 29. Proportion of Patients Invasively Ventilated, General Adult ICUs

Region	% Responded	Admissions ^a	No. Invasively Ventilated	% Admissions invasively Ventilated	% Responded	Admissions ^a	No. Non-Invasively Ventilated	% Admissions Non-Invasively Ventilated
Public								
NSW	72.7	7,607	5,402	71	59.1	6501	1313	20.2
VIC	75	7,617	5,241	68.8	41.7	4417	577	13.1
QLD	61.5	4,433	3,088	69.7	53.8	4775	279	5.8
SA	66.6	1,969	1,378	70	66.7	1969	225	11.4
WA	50	1,382	959	69.4	0	0	0	0.0
ACT	100	940	846	90	100	940	89	9.5
NT	100	934	469	50.2	100	934	107	11.5
<i>Sub-total</i>	<i>69</i>	<i>24,882</i>	<i>17,383</i>	<i>69.9</i>	<i>60.2</i>	<i>19536</i>	<i>2590</i>	<i>13.3</i>
Private								
NSW	60	3,567	1,789	50.2	22.2	1270	42	3.3
VIC	66.6	3,818	1,920	50.3	55.6	2957	177	6.0
QLD	62.5	2,497	896	35.9	62.5	2497	114	4.6
SA	40	924	787	85.2	40	924	106	11.5
WA	100	1,173	540	46	100	1173	16	1.4
<i>Sub-total</i>	<i>58.3</i>	<i>11,979</i>	<i>5,932</i>	<i>49.5</i>	<i>56.1</i>	<i>8821</i>	<i>455</i>	<i>5.2</i>
Australia	64.9	36,861	23,315	63.3	58.1	28,357	3,045	10.7

Note: Included only those with no missing values in either field; a – admissions is the total number of ICU admissions, excluding PICUs, CCUs and all other admissions.

2.7 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. Some units utilize definitions using 14 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.⁽²²⁾

Tables 30 and 31 present the information on all paediatric hospital admissions to an adult ICU (PICUs excluded). Tables 32 and 33 examine data including PICUs and adult ICUs. Specifically, Table 33 presents information on public hospital paediatric admissions.

Table 30. Paediatric Admissions, Public & Private Sector Adult ICUs

Region	% Adult ICUs Reporting Paediatric Admissions	No. Admissions	No. Ventilated Patients	No. Patient Transfers	% Patient Transfers	No. Deaths
Public						
NSW	63.4	395	134	45	11.4	10
VIC	81.8	137	56	19	13.9	3
QLD	85.0	558	117	15	2.7	14
SA	42.9	79	25	11	13.9	2
WA	66.7	28	2	1	3.6	1
TAS	100.0	35	13	5	14.3	3
ACT	100.0	40	24	3	7.5	2
NT	100.0	87	52	17	19.5	3
<i>Sub-total</i>	<i>72.8</i>	<i>1,359</i>	<i>423</i>	<i>116</i>	<i>8.5</i>	<i>38</i>
Private						
NSW	55.6	1	0	0	-	0
VIC	72.7	22	0	2	-	0
QLD	92.3	33	1	1	-	0
SA	50.0	0	0	0	-	0
WA	25.0	1	0	0	-	0
TAS	100.0	41	2	2	-	0
ACT	100.0	3	0	0	-	0
<i>Sub-total</i>	<i>68.4</i>	<i>101</i>	<i>3</i>	<i>5</i>	<i>-</i>	<i>0</i>
Australia	71.3	1,460	426	121	8.3	38

In the current survey 28 adult public sector ICUs (27.2%) and 18 private sector ICUs (31.6%) did not report any paediatric admission data. Additionally, paediatric transfer data is too limited in the private sector to report meaningful transfer rates. Detailed data on paediatric admissions and outcomes for the years 2001/2002 and 2002/2003 has been published by ANZPIC.^(3;31)

Table 31. Paediatric Admissions by ICU Level, Public Sector Adult ICUs

ICU Level	Paediatric Admissions	Number Ventilated	Transfers	No. Deaths
Level 3	913	269	31	34
Level 2	265	102	52	1
Level 1	181	52	33	3
Australia	1,359	423	116	38

Table 32. Paediatric Admissions by ICU Type & level, Public Sector

	Paediatric Admissions	Number Ventilated	Transfers	No. Deaths
ICU Type				
General	1,079	372	68	37
ICU/CCU	244	47	48	1
PICU	5,300	2,643	18	185
HDU	36	-	-	-
ICU Level				
Level 3	6,213	2,912	49	219
Level 2	265	102	52	1
Level 1	181	52	33	3
Australia	6,659	3,066	134	223

2.7.1 VENTILATION, TRANSFERS AND MORTALITY

VENTILATION

- 31.1% of paediatric patients in adult ICUs were ventilated.
- 34.5% of paediatric patients in a general ICU were ventilated.
- 19.3% of paediatric patients in an ICU/CCU were ventilated.
- 49.9% of PICU patients were ventilated.

In the 2001-2002 paediatric intensive care registry report, the proportion of children ventilated in PICUs in 2002 ranges from 31% to 85%.⁽³¹⁾

TRANSFERS

- 6.3% of paediatric patients in a general ICU were transferred.
- 19.7% paediatric patients in an ICU/CCU were transferred.
- 8.5% of paediatric patients in adult ICUs were transferred.

MORTALITY

- Paediatric unadjusted mortality rate was 3.3% in public sector ICUs and there were no reported deaths in private sector ICUs.
- Unadjusted mortality rate for paediatric patients in PICUs was 3.5%.

Data reported by ANZPIC indicates that the mortality rate of children has remained relatively constant over the years 1997-2003. The overall mortality rate for patients admitted to participating ICUs was 3.7%.⁽³¹⁾

Table 33. Paediatric Admissions as Proportion by ICU Level, Public Sector (Adult and Paediatric ICUs)

	All Admissions*	Paediatric Admissions	Paediatric Admissions as % All Admissions
Level 3	41,453	6,213	15
Level 2	20,503	262	1.3
Level 1	5,956	179	3.0
Australia	67,912	6,654	9.8

Note. * Only those hospitals providing paediatric data are included.

Table 34 presents the information collected on PICU bed and ventilation hours. ANZPIC Registry reports a wide variation in the proportion of patients ventilated by unit. Proportion varies from 8.3% to 88.3%.⁽³⁾

For the 7 PICUs in Australia, the bed hours, bed days and ventilator hours and days are presented below. The figures in parentheses represent the percentage of units providing information in each category.

Table 34. PICU Bed Hours/Days & Ventilator Hours/Days

Bed Hours	Bed Days	Ventilator Hours	Ventilator Days
117,115 (28.6%)	13,763 (71.4%)	145,335 (57.1%)	5,066 (42.9%)

2.7.2 PAEDIATRIC ADMISSIONS SUMMARY

Summary paediatric admission data is provided below.

- 71.3% (114/160) of Adult ICUs admitted paediatric patients
- 4.6% of all ICU admissions were paediatric admissions
- 63.1% (65/103) of public sector ICUs admitted ≥ 1 paediatric patient
- 26.3% (15/57) of private sector ICUs admitted ≥ 1 paediatric patient
- 78.4% of paediatric patients were admitted to a paediatric ICU
- 8.3% of paediatric patients were transferred from an adult ICU to a paediatric ICU
- 6 ICUs admitted ≥ 50 paediatric patients (PICUs excluded); Range (1 - 335)
- PICU (5/7 units) readmissions; Median (IQR) was 96 (69, 119).

2.8 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 practice exclusively in the private sector. Accordingly, information presented in section 2.8 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 ≥ 35 hours per week.⁽³²⁾ As FTE may vary over the course of a year, data for medical FTE is as at 30th June 2003. Units were asked to give a variety of information related to their medical workforce.

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). In the past, 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).

In November 2001 the RACP and ANZCA formed the Joint Faculty of Intensive Care Medicine JFICM. In February 2002, the Foundation Fellowship was established comprising 420 foundation fellows who were awarded fellowship of the Joint Faculty of Intensive Care Medicine, Australian and New Zealand College of Anaesthetists and Australasian College of Physicians (FJFICM).

Intensive care medicine is a dynamic specialty and the work of an intensivist is 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, research and teaching activities. The role 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. This category may include anaesthetists, cardiologists, respiratory medicine physicians and emergency department physicians.

Specialist FTE refers to combined intensivist and other specialist FTE data. An overview of registrar and resident medical officer FTE is also included. Table 35 presents the results of intensivist FTE and other specialist FTE by sector and region.

Table 35. Specialist FTE

Region	No. ICUs	Intensivist FTE ^a	Other Specialist FTE ^b	Total Specialist FTE
Public				
NSW	29/43	95.0	12.4	107.6
VIC	16/23	54.6	5.3	59.9
QLD	13/22	37.5	7.3	44.8
SA	6/8	24.2	0.0	24.2
WA	5/7	23.2	0.7	23.9
TAS	1/3	6.7	1.0	7.7
ACT	2/2	5.0	0.0	5.0
NT	1/2	1.0	2.3	3.3
<i>Sub-total</i>	<i>73/110</i>	<i>247.2</i>	<i>29.0</i>	<i>276.4</i>
Private				
NSW	10/17	24.0	1.0	25.0
VIC	10/12	21.1	2.0	23.1
QLD	13/13	20.8	10.4	31.2
SA	6/6	10.0	0.0	10.0
WA	4/4	3.7	0.0	3.7
TAS	0/2			
ACT	2/3	5.8	0.0	5.8
<i>Sub-total</i>	<i>45/57</i>	<i>85.4</i>	<i>13.4</i>	<i>98.8</i>
Australia	118/167	332.6	42.6	375.2

Note: *No. of ICU's providing at least Intensivist FTE data; a - Intensivist FTE numbers are covered by – 313.3 staff intensivists and 220 sessional intensivists; b - Other Specialist FTE – 71.5 staff specialists and 91.5 sessional specialists

Tables 36 to 44 present information collected on the ICU medical workforce from a number of different aspects.

Table 36. Specialist FTE, Public Sector Adult ICUs

	No. ICU	Intensivist FTE	Other Specialist FTE	Total Specialist FTE
NSW	27/41	86.0	12.4	98.4
VIC	15/22	49.3	5.3	54.6
QLD	11/20	32.3	7.1	39.4
SA	5/7	20.8	0.0	20.8
WA	4/6	20.2	0.5	20.7
TAS	2/3	6.7	1.0	7.7
ACT	2/2	5.0	0.0	5.0
NT	1/2	1.0	2.3	3.3
Australia	67/103	221.3	28.6	249.9

Note: *No. of ICU's providing at least Intensivist FTE data

Table 37. Specialist FTE, Public Sector Level 3 Adult ICUs

Region	Intensivist FTE	Specialist FTE	Total Specialist FTE
NSW/ACT	60.0	0.0	60.0
VIC	40.7	0.6	41.3
QLD	23.2	0.0	23.2
SA	18.3	0.0	18.3
WA	17.2	0.5	17.7
TAS	6.7	0.0	6.7
NT	1.0	1.3	2.3
Australia	167.1	2.4	169.5

Note: Data obtained from all Level 3 public sectors adult ICUs

Table 38. Distribution of Specialist FTE by Bed Stock, Public Sector Level 3 Adult ICUs

	Specialist FTE / Available Bed	Specialist FTE / Ventilator Bed	Available Beds / Specialist FTE	Ventilator Beds / Specialist FTE
NSW / ACT	0.2	0.3	4.4	3.1
VIC	0.3	0.3	3.5	3.0
QLD	0.2	0.3	5.0	3.9
SA	0.2	0.2	4.8	4.2
WA	0.3	0.4	3.2	2.7
TAS	0.3	0.3	3.6	3.3
NT	0.4	0.4	2.6	2.6
Australia	0.2	0.3	4.3	3.4

Note: Data from all 37 Level 3 public sector adult ICUs

Table 39. Specialist FTE by ICU Level, Public Sector ICUs (includes PICU data)

ICU Level	NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Total
Level 3	69	46.6	28.6	21.7	20.9	6.7	2.3	195.8
Level 2	34.9	9.3	13.7	1.5	3.0	1.0	0.0	63.4
Level 1	8.5	4.0	2.5	0.0	0.0	0.0	1.0	17
Australia	112.4	59.9	44.8	24.2	23.9	7.7	3.3	276.2

Table 40. Specialist FTE by ICU Type, Public Sector ICUs

ICU Type	NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Total
General ICU	86.5	44.3	30.7	18.3	17.7	3.2	3.3	204.0
ICU/CCU	16.9	10.3	8.7	2.5	3.0	4.5	0.0	45.9
PICU	9.0	5.3	5.4	3.4	3.2	-	-	26.3
Australia	112.4	59.9	44.8	24.2	23.9	7.7	3.3	276.2

Table 41. Distribution of Specialists, Public Sector

Population ⁽²¹⁾	FTE	Other Spec. FTE	Total Spec. FTE	Avail. Beds/ Specialist	Vent. Beds/ Specialist	Specialists/ 100,000	Intensivists/ 100,000
NSW (6,686,600)	95.0	12.6	107.4	4.9	2.8	1.6	1.4
VIC (4,917,400)	54.6	5.3	59.9	4.1	3.2	1.2	1.1
QLD (3,796,800)	37.5	7.3	44.8	4.9	3.5	1.2	1.0
SA (1,527,400)	24.2	0.0	24.2	5.1	3.5	1.6	1.6
WA (1,952,300)	23.2	0.7	23.9	3.7	3.0	1.2	1.2
TAS (477,100)	6.7	1.0	7.7	4.0	3.2	1.6	1.4
ACT (322,900)	5.0	0.0	5.0	4.4	2.6	1.6	1.6
NT (198,400)	1.0	2.3	3.3	4.2	3.3	1.7	0.5
Total (19,881,500)	247.2	29.2	276.2	4.6	3.1	1.4	1.2

Refer back to Table 13 for number of available and ventilated beds. The ACT also provides critical care services to areas of southern NSW.

Table 42. Specialist FTE by Geographic Location, Public Sector (includes PICU data)

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
Capital City	76.0	47.9	25.8	24.2	23.9	3.2	5.0	2.3
Metropolitan	16.4	3.0	12.0	0.0	0.0	0.0	0.0	0.0
Rural / Remote ^a	15.0	9.0	7.0	0.0	0.0	4.5	0.0	1.0
Australia	107.4	59.9	44.8	24.2	23.9	7.7	5.0	3.3

Note: a – The rural and remote categories have been collapsed in the table due to the small number of ICUs.

Table 43. Specialist FTE by ARIA Classification, Public Sector

	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
Highly Accessible	98.5	55.9	36.3	24.2	23.9	6.7	5.0	0.0
Accessible	5.9	4.0	8.5	0.0	0.0	1.0	0.0	2.3
Moderately Accessible	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Remote	3.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Australia	110.4	59.9	44.8	24.2	23.9	7.7	5.0	3.3

Table 44. Specialist FTE by Population Category, Public Sector

Population Category	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
> 250,000	78.4	47.9	29.8	24.2	23.9	0.0	5.0	0.0
48,000 – 249,999	18.8	8.0	7.0	0.0	0.0	6.7	0.0	2.3
18,000 – 47,999	6.2	4.0	5.0	0.0	0.0	1.0	0.0	1.0
5,000 – 17,999	4.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
Australia	107.4	59.9	44.8	24.2	23.9	7.7	5.0	3.3

Table 45 reports various sources of available data that include information on the ICU medical workforce for comparative purposes.

Table 45. Variations in Available Data

	1995	1996	1997	1998	1999/2000	2000/2001	2001/2002	2002/2003
AIHW ^a	174	260	220	232	242 ^e	298 ^d	299 ^{g(33)}	
ARCCCR ^b	90	124.7	260.1	290.5	305.8	297	333.1	348.9 ^f
AMWAC ^c			353					

Note: a - main specialty of practice (number of persons)⁽³⁴⁾; b - specialist FTE; c - Level II and III ICUs (number of persons)⁽³⁵⁾; d - includes only those specialists who described themselves as clinicians; e - includes those listed in intensive care, internal medicine and intensive care anaesthesia; f PICU staff excluded; g There is a mistake in the Queensland figures in the 2002 AIHW report, this figure is calculated assuming no change from the 2001 figures in Queensland.

The AIHW Medical Labour force statistics contain information on the number of specialists training in the various specialties and the percentages of women. The 2000 AIHW statistics⁽³⁴⁾ state there were 126 intensive care specialists in training including those training in Intensive Care - Internal Medicine And Intensive Care – Anaesthesia. In 2001⁽³⁶⁾ there were 94 intensive care specialists in training, of whom (28.6%) are female. This compares favorably to those practicing as ICU specialists in 2001 where the reported percentage of females practicing was 14.0.⁽³⁶⁾ AIHW figures in 2002 show there are 60 Intensive care (internal medicine) specialists in training (19.4% female) and 171 Intensive care (anaesthesia) specialists in training (36% female).

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. The information presented in Table 46 is related to FTE over the past 8 years.

Table 46. Composition of Specialist FTE, Public Sector

	1995	1996	1997	1998	1999/ 2000	2000 2001	2001/ 2002	2002/ 2003
Intensivist FTE					191.4	214	223.9	247.2
Other Specialist FTE					53.6	27.4	41.7	29
Total Specialist FTE	78.2	112.3	210.9	225.9	245	241.4	265.6	276.2
Staff Intensivists on roster						226	252	244
Sessional Intensivists on roster						85	82	85
Total Intensivists on roster					272	311	334	329
Staff 'other specialists' on roster						89	75	60
Sessional 'other specialists' on roster						119	105	81
Total Other Specialists on roster					258	208	180	141
Total specialists on roster					530	519	514	470

OTHER DATA SOURCES

- JFICM (2003): 460 Fellows (352 resident in Australia) ⁽³⁷⁾
- ANZICS (2003): 310 full members, numbers of provisional members unknown at census date ⁽³⁸⁾
- AIHW* (2002): 299 clinicians whose main area of practice is intensive care ⁽³³⁾

* Please note: there is an apparent mistake in the Queensland figures evident in the 2002 AIHW Medical Labour Force data; this figure was calculated assuming no change from the 2001 figures in Queensland.

2.8.1 SPECIALIST VACANCIES

Information was collected on specialist vacancies. The results of this, together with the vacancies reported in the past are presented by region in Table 47. There appears to be a drop in reported vacancies in NSW. Examination of the data reveals that this section was not answered by most hospitals in NSW in this survey period.

Table 47. Reported Specialist FTE Vacancies, Public Sector

Region	2002/2003	2001/2002	2000/2001	1999/2000
NSW	1.8	9.9	8.0	5.0
VIC	2.5	1.6	2.6	1.0
QLD	10.0	6.2	7.0	1.5
SA	1.0	2.0	0.0	0.0
WA	3.0	0.5	1.0	1.0
TAS	1.0	2.4	0.4	1.0
ACT	2.0	0.5	0.0	0.0
NT	1.0	1.0	8.0	5.0
Australia	22.3	24.1	19.0	10.5

The Australian Medical Workforce Advisory Committee in its report on the intensive care workforce proposed ICU specialist benchmarks.⁽³⁵⁾

“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.”⁽³⁵⁾

Some basic extrapolations of the data have been made to explore the implications of applying the AMWAC⁽³⁵⁾ recommended levels of medical staffing for level 3 public hospitals. Figures have been calculated using 5 FTE per 10 beds. These simple calculations were performed as an exercise to examine the differences in current supply and demand. Figures for previous years are presented for comparative purposes in Table 48. The calculations have been made on the reported total of ventilator beds. Had the calculations been done on available beds, the gaps between total FTE currently and total FTE recommended, would have been greater.

Table 49 contains data on public sector FTE benchmarks by RRMA geographical locations.

Table 50 presents further data extrapolations using 4 & 5 FTE per ventilator and available bed for comparative purposes by region. The calculations assume the maintenance of a full complement of available/ventilator beds. There have been no assumptions made re occupancy levels, ICU bed type, casemix or specialist skills mix.

Table 48. Specialist FTE Benchmarks & FTE Gap, Level 3 ICUs, Public Sector

FTEs	NSW/ACT	VIC	QLD	SA	WA	TAS	NT	Australia
2002/2003								
Total								
Specialist FTE	69.0	46.6	28.6	21.7	20.9	6.7	2.3	195.8
Recommended FTE*	104.0	74.0	53.5	38.5	29.0	11.0	3.0	313.0
FTE Gap	35.0	27.4	24.9	16.8	8.1	4.3	0.7	117.2
2001/2002								
Total								
Specialist FTE	63.2	38.5	30.4	22.6	21.7	6.2	2.3	184.8
Recommended FTE*	109.0	69.5	56.0	38.5	29.0	10.5	4.0	316.5
FTE Gap	45.8	31.0	25.6	15.9	7.3	4.3	1.7	131.7
2000/2001								
Total								
Specialist FTE	69.9	42.3	24.3	21.6	18.9	5.2	1.4	183.6
Recommended FTE*	101.2	65.2	43.6	38.8	26.4	10.8	3.2	289.2
FTE Gap	31.3	22.9	19.3	17.2	7.5	5.6	1.8	105.6
1999/2000								
Total								
Specialist FTE	58.9	45.2	30.0	19.7	16.7	4.4	1.9	176.8
Recommended FTE*	84.4	76.4	42.0	33.6	25.6	7.2	2.4	271.6
FTE Gap	25.5	31.2	12.0	13.9	8.9	2.8	0.5	94.8

* Source: As recommended by AMWAC⁽³⁵⁾ (5 FTE/10 ventilator beds)

Table 49. Specialist FTE Benchmarks & FTE Gap, Level 3 ICUs, Public Sector by RRMA

	Capital City	Metro	Rural	Total
2002/2003				
Total	167.4	22.9	5.5	195.8
Specialist FTE				
Recommended FTE*	271.5	33.5	8.0	313.0
FTE Gap	104.1	10.6	3.5	117.2
% of recommended FTE currently filled	61.7	68.4	68.8	62.6
2001/2002				
Total	162.3	17.5	5	184.8
Specialist FTE				
Recommended FTE*	278.0	33.0	5.5	316.5
FTE Gap	115.7	15.5	0.5	131.7
% of recommended FTE currently filled	58.4	53.0	90.9	58.4

* Source: As recommended by AMWAC⁽³⁵⁾ (5 FTE/10 ventilator beds)

Table 50. 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	69.0	46.6	28.6	21.7	20.9	6.7	2.3	195.8
Recommended FTE	116.4	68.0	52.4	34.8	26.4	9.6	2.4	310.0
FTE Gap	47.4	21.4	23.8	13.1	5.5	2.9	0.1	114.2
Reported Vacant FTE	13.0	2.5	3.0	1.0	2.0	1.0	0.0	22.5
5 FTE Specialists/10 Available Beds*								
Total Specialist FTE	69.0	46.6	28.6	21.7	20.9	6.7	2.3	195.8
Recommended FTE	145.5	85.0	65.5	43.5	33.0	12.0	3.0	387.5
FTE Gap	76.5	38.4	36.9	21.8	12.1	5.3	0.7	191.7
Reported Vacant FTE	13.0	2.5	3.0	1.0	2.0	1.0	0.0	22.5
4 FTE Specialists/10 Available Beds*								
Total Specialist FTE	69.0	46.6	28.6	21.7	20.9	6.7	2.3	195.8
Recommended FTE	83.2	59.2	42.8	30.8	23.2	8.8	2.4	250.4
FTE Gap	14.2	12.6	14.2	9.1	2.3	2.1	0.1	54.6
Reported Vacant FTE	13.0	2.5	3.0	1.0	2.0	1.0	0.0	22.5
4 FTE Specialists/10 Available Beds*								
Total Specialist FTE	69.0	46.6	28.6	21.7	20.9	6.7	2.3	195.8
Recommended FTE	104.0	74.0	53.5	38.5	29.0	11.0	3.0	313.0
FTE Gap	35.0	27.4	24.9	16.8	8.1	4.3	0.7	117.2
Reported Vacant FTE	13.0	2.5	3.0	1.0	2.0	1.0	0.0	22.5

Source: As recommended by AMWAC⁽³⁵⁾

2.8.2 ICU DIRECTOR QUALIFICATIONS

Units were asked to indicate whether or not the director held an intensive care specialist qualification. The results, by region, hospital level and sector are presented in Table 51.

Table 51. ICU Directors with a JSAC-IC Recognised Qualification

	Public Sector			Private Sector		
	Level 3 No. (%)	Level 2 No. (%)	Level 1 No. (%)	Level 3 No. (%)	Level 2 No. (%)	Level 1 No. (%)
NSW	13/13 (100)	8/17 (47)	2/13 (15.4)	5/7 (71.4)	6/8 (75)	2/3 (67)
VIC	9/11 (81.8)	3/11 (27.3)	0/1 (0)	5/5 (100)	3/5 (60)	1/1 (100)
QLD	8/8 (100)	5/10 (50)	0/4 (0)	8/8 (100)	4/4 (100)	0/1 (0)
SA	4/4 (100)	1/1 (100)	0/3 (0)	3/3 (100)	2/3 (67)	-
WA	4/4 (100)	1/1 (100)	0/2 (0)	1/1 (100)	3/3 (100)	-
TAS	2/2 (100)	0/1 (0)	-	1/1 (100)	1/1 (100)	-
ACT	1/1 (100)	0/1 (0)	-	-	2/2 (100)	0/1 (0)
NT	1/1 (100)	-	0/1 (0)	-	-	-
Australia	42/44 (95.5)	18/42 (42.9)	2/24 (8.3)	23/25 (92)	21/26 (80.8)	3/6 (50)

2.8.3 REGISTRARS AND RESIDENTS FTE

The survey requested an ICU Registrar and Resident profile as at 30/6/03.

Tables 52 to 57 present the results of those items. JSAC-IC Registrar FTE refers to the number of Registrar FTE in the training program. Registrar FTE refers to those not in the training program. The Joint Faculty of Intensive Care Medicine (JFICM) was formed in early 2002. The JFICM is introducing a revised training program for trainees registered from the 2004 hospital year.

The Joint Faculty of Intensive Care Medicine has provided numbers of 'active' registered ICU trainees in Australia by year (census in May of each year). 2002: 216, 2003: 309 trainees.⁽⁴⁰⁾ Resident FTE relates to dedicated ICU staff only and other resident FTE relates to those residents who work in ICU and the general hospital – providing non-emergency services outside ICU.

Table 52. Registrar & Resident FTE by Sector & Region

Region	% Responding*	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Public					
NSW	62.8	45	90.0	79.6	21.5
VIC	73.9	28	81.5	54.5	8.5
QLD	77.3	18	70.0	8.0	8.5
SA	50.0	14	15.8	6.3	0.0
WA	71.4	8	16.5	19.0	0.3
TAS	67.0	3	5.0	7.0	0.0
ACT	100.0	5	7.5	3.0	0.0
NT	100.0	2	4.0	5.0	0.0
<i>Sub-total</i>	<i>69.1</i>	<i>123</i>	<i>290.3</i>	<i>182.4</i>	<i>38.8</i>
Private					
NSW	61.1	2	16.0	20.0	24.7
VIC/TAS	63.6	8	24.8	17.6	0.0
QLD	92.3	0	18.0	47.2	8.0
SA	100.0	0	4.0	13.3	6.0
WA	100.0	0	0.0	15.0	0.0
TAS	50.0	0	0.0	0.5	0.5
ACT	67.0	0	2.0	0.0	9.4
<i>Sub-total</i>	<i>72.9</i>	<i>10</i>	<i>64.8</i>	<i>113.6</i>	<i>34.6</i>
Australia	70.4	133	355.1	296.0	73.4

Note. *A response was obtained in at least one of the categories in the table.

Table 53. Registrar & Resident FTE by ICU Level, Public Sector

ICU Level	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Level 3	114.0	220.0	122.5	14.5
Level 2	9.0	56.3	52.2	14.8
Level 1	0.0	7.0	1.0	4.0
Australia	123.0	283.3	175.7	33.3

Table 54. Registrar & Resident FTE by ICU Type, Public Sector

ICU Level	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
General	116.0	218.5	135.4	14.5
ICU/CCU	1.0	21.8	40.3	16.8
PICU	6.0	43.0	0.0	0.0
Australia	123.0	283.3	175.7	31.3

It is of interest that all ICU trainees are located in the capital city and metropolitan areas. Although rural/remote training rotations have not been specifically addressed, recent debate regarding alternate programs for provision of critical care services in the rural community may have a future impact on this distribution.⁽⁴¹⁾

Table 55. Registrar & Resident FTE by Geographic Location, Public Sector

ICU Level	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Capital City	110	236.3	130.8	16.3
Metropolitan	12	36	12.5	0.5
Rural	1	9	31.4	16.5
Remote	0	2	1	1
Australia	123	283.3	175.7	33.3

Table 56. Registrar & Resident FTE by ARIA Classification, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
Highly Accessible	117.0	269.3	165.3	24.3
Accessible	6.0	8.0	9.4	5.0
Moderately Accessible	0.0	4.0	0.0	4.0
Remote	0.0	2.0	1.0	0.0
Australia	123.0	283.3	175.7	33.3

Table 57. Registrar & Resident FTE by Population Category, Public Sector

	JSAC-IC Registrar FTE	Registrar FTE	Resident FTE	Other Resident FTE
> 250,000	108.0	239.3	123.3	16.8
48,000-249,999	15.0	38.0	43.0	5.5
18,000-47,999	0.0	2.0	9.4	9.0
5,000-17,999	0.0	4.0	0.0	2.0
Australia	123.0	283.3	175.7	33.3

2.9 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 practice nursing in that State or Territory.⁽⁴²⁾ For the purposes of the survey a critical care qualification was defined as an award at a minimum of certificate level obtained by successful completion of an accredited critical care program (≥ 6 months duration) at a hospital or tertiary institution.

The ARCCCR uses the ABS standard with an FTE defined as ≥ 35 hours worked per week.²⁸ All ARCCCR RN data is as at 30th June 2003 unless otherwise specified. Table 58 presents the information collected on the numbers of RN FTE, numbers of RNs on the roster and numbers with critical care qualifications by region. RN FTE as presented in the following tables was to include all nursing staff (e.g., educators, nurse unit managers (NUMS), Liaison nurses and students). The actual number of nurses (headcount) was to include the same group of nurses. All units have responded to each question unless otherwise stated.

Table 58. RN FTE, No. of RNs & No. with Critical Care Qualification by Sector & Region

Region (% Responded)	RN FTE	No. RNs on Roster	No. Crit Care Qual	% RNs Crit Care Qual
Public				
NSW (93.0)	1,702.8	1,892	953	50.4
VIC (95.7)	1,160.2	1,591	1,255	78.8
QLD (100)	908.1	1,114	507	44.0
SA (87.5)	455.2	552	266	45.5
WA (100)	325.6	386	208	53.9
TAS (100)	106.9	160	99	61.9
ACT (100)	84.3	104	48	46.2
NT (100)	68.3	85	36	42.4
<i>Sub-total (95.5)</i>	<i>4,811.5</i>	<i>5,884</i>	<i>3,372</i>	<i>52.9</i>
Private				
NSW (94.1)	253.8	280	183	65.4
VIC (83.3)	244.0	405	236	58.3
QLD (84.6)	291.7	376	181	48.1
SA (100)	137.0	202	75	37.1
WA (100)	80.1	97	65	67.0
TAS (100)	23.4	50	27	54.0
ACT (66.7)	16.5	28	15	53.6
<i>Sub-total (89.5)</i>	<i>1,046.5</i>	<i>1,438</i>	<i>782</i>	<i>54.8</i>
Australia (93.4)	5,857.9	5,857.9	4,154.0	53.8

Two large city hospitals were unable to provide RN information (one in VIC and one in NSW) so information was used from the 2001/2002 survey.

2.9.1 ENROLLED NURSES

For the first time in the 2002/2003 survey a number of questions were included to examine the extent of enrolled nurses working in intensive care settings.

An enrolled nurse is defined in the Nurses and Midwives Act 1991. Legislation is in place to restrict the scope of practice for enrolled nurses which requires they work under the supervision of a medical practitioner or a registered nurse. In part, the Australian Nursing Council describes the enrolled nurse scope as follows:

“The enrolled nurse is an associate to the registered nurse who demonstrates competence in the provision of patient centered care as specified by the registered authority’s license to practice, education, preparation and context of care.”^(43;44)

Table 59 and 60 explore the extent of full time work for both RNs and ENs. Work force statistics show that in 2001 there were 42,054 clinical enrolled nurses working in Australia with 174 (0.4%) working in critical/intensive care.⁽⁴⁵⁾

Table 59. RN FTE, No. of RNs & No. with Critical Care Qualification by Sector & Region

Region (% Responded)	No. RNs on Roster	RNs working full time	% RNs working full time	No. ENs on Roster	ENs working full time	% ENs working full time
Public						
NSW (93.0)	1,892	1,073	57%	11	4	36%
VIC (95.7)	1,591	434	27%	5	2	40%
QLD (100)	1,114	392	35%	22	16	73%
SA (87.5)	552	243	44%	13	3	23%
WA (100)	386	149	39%	2	0	0%
TAS (100)	160	57	36%	0	0	0%
ACT (100)	104	36	35%	1	1	100%
NT (100)	85	53	62%	2	2	100%
<i>Sub-total (95.5)</i>	<i>5,884</i>	<i>2,437</i>	<i>41%</i>	<i>56</i>	<i>28</i>	<i>50%</i>
Private						
NSW (94.1)	280	155	55%	3	2	67%
VIC (83.3)	405	72	18%	4	0	0%
QLD (84.6)	376	204	54%	2	2	100%
SA (100)	202	35	17%	2	2	100%
WA (100)	97	47	48%	0	0	0%
TAS (100)	50	7	14%	0	0	0%
ACT (66.7)	28	4	14%	0	0	0%
<i>Sub-total (89.5)</i>	<i>1,438</i>	<i>524</i>	<i>36%</i>	<i>11</i>	<i>6</i>	<i>55%</i>
Australia (98.7)	7,321	2,961	40%	67	34	51%

Table 60. EN FTE, No. of ENs on Roster by Sector and ICU Level

ICU Level	EN FTE	No. ENs on Roster
Public		
Level 3	34.8	43.0
Level 2	9.8	13.0
Level 1		
<i>Sub-total</i>	<i>44.6</i>	<i>56.0</i>
Private		
Level 3	3.7	4.0
Level 2	4.6	5.0
Level 1	1.0	2.0
<i>Sub-total</i>	<i>9.3</i>	<i>11.0</i>
Australia	53.9	67.0

2.9.2 CRITICAL CARE CERTIFICATION

The following questions were answered by varying numbers of hospitals (see Tables 61 and 62). The percentage of RNs with a critical care qualification has not changed dramatically over the past 2 surveys. This is important to note in the face of current workforce planning issues. The ACHS Guidelines⁽⁴⁶⁾ state that ICUs must have a minimum of 50% qualified critical care nurses. The ACCCN supports the ACHS guidelines as a minimum standard but assume an optimum number of critical care qualified nurses would be 75%.⁽⁴⁷⁾ In the absence of these numbers of qualified staff, the ACCCN guidelines urge units to make provision to increase numbers of qualified staff.⁽⁴⁷⁾ Our figures over the past 3 survey periods show that no major gains are being made to attract or train qualified ICU RNs. With the ageing of the population and increasing technological advances, this would seem to be a high priority for the future. The issues facing the health workforce globally are many. Central to planning for the future is the need to look at an integrated strategy for the management of the health workforce as a whole, but also at a specialty level.

The number of RNs with critical care certificates returning to work is only making up 34.9% of the total number of nurses leaving the ICU environment. Continued enhancement of skills and retention of trained staff must be a high priority. Units were asked to report the maximum number of RNs in their graduate year rostered in the unit at any one time. Answers ranged between 60 and 17.6 RN FTEs. Level 3 hospitals overall, allowing more graduates to be rostered at one time than the level 1 and 2 hospitals as would be expected.

Table 61. RN FTE, No. of RNs & No. & Proportion Qualified by Sector and ICU Level

ICU Level	RN FTE	No. RNs on Roster	No. Crit Care Qualification	% RNs Critical Care Qualification
Public				
Level 3	3,366.9	4,106.5	2,390	58
Level 2	1,155.6	1,456.9	845	58
Level 1	288.9	319.7	137	43
<i>Sub-total</i>	<i>4,811.4</i>	<i>5,883.1</i>	<i>3,372</i>	<i>57</i>
Private				
Level 3	648.5	877.2	479	53
Level 2	355	501	265	53
Level 1	43	59.9	38	63
<i>Sub-total</i>	<i>1,046.5</i>	<i>1,438.1</i>	<i>782</i>	<i>54</i>
Australia	5,857.9	7,321.1	4,154	57

Table 62. RN FTE, No. of RNs & Proportion Qualified by Sector and ICU Type

ICU Level	RN FTE	No. RNs on Roster	No. Crit Care Qualification	% RNs Critical Care Qualification
Public				
General	3,506.6	4,328.9	2,444	56
ICU/CCU	852.3	1,065.1	665	62
PICU	419.1	450.3	253	56
<i>Sub-total</i>	<i>4,778.0</i>	<i>5,844.4</i>	<i>3,362</i>	<i>58</i>
Private				
General	753.6	1,041.2	534	51
ICU/CCU	278.0	367.9	227	62
Specialty	14.8	29.0	21	72
<i>Sub-total</i>	<i>1,046.5</i>	<i>1,438.1</i>	<i>782</i>	<i>54</i>
Australia	5,824.4	7,282.5	4,144	57

2.9.3 NURSING WORKFORCE RETENTION

Units were asked to specify the destination of RNs who had resigned in the 2002-2003 financial year. The information is reported in the Tables below. 134 units provided information on total resignations: The RN staff turnover can be calculated from the RN head count and RN resignation.

NURSING TURNOVER	MEDIAN (%) [RANGE (%)]
NSW	11(0 – 148)
VIC	7 (0 – 23)
QLD	14 (0 – 92)
SA	10 (2 – 30)
WA	15 (5 – 20)
TAS	9 (0 – 73)
ACT	12 (6 – 30)
NT	(62 – 100)
Total	11 (0- 148)

The data is not very detailed, but allows some insight into the issues that could be addressed. Firstly and perhaps most modifiable, may be the prevention of loss of nurses to other critical care nursing positions. Movement of staff from one unit to another although preferable to losing them from critical care altogether is disruptive and costly.

Perhaps further attention needs to be directed towards looking at the reasons nurses are moving from unit to unit. Also modifiable, may be the number of nurses leaving critical care for other permanent nursing positions. Why is this occurring? This group made up 23.4% of the RNs who left ICU and should be explored in greater detail. With the number (7.5%) leaving for parenting, another area at which attention should be directed is the retention of trained and /or experienced staff, which may be able to utilise the facilities offered by family friendly workplaces.

Table 63. RNs who resigned in 2002/2003

Destinations	Total No. of RNs Headcount (%)
Other Permanent Critical Care Positions	253 (32.2%)
Other Permanent Nursing Position	184 (23.4%)
Travel	132 (16.8%)
Parenting	59 (7.5%)
Unknown	46 (5.9%)
Casual Nursing	60 (7.6%)
Non-nursing Work	38 (4.8%)
Retired/Deceased	13 (1/7%)
Australia	785

Table 64. RN FTE, Vacancies & Vacancy Rates by Location, ICU Type and ICU Level.

	RN FTE	RN FTE Vacancies	Vacancy Rate (%)
Region			
NSW	1,956.6	138.1	6.6
VIC	1,404.3	82.8	5.6
QLD	1,199.8	50.2	4.0
SA	592.2	49.5	7.7
WA	405.7	31.5	7.2
TAS	130.3	24.7	15.9
ACT	100.8	8	7.4
NT	68.3	9	11.6
ICU Type			
General ICU	4,260.2	267.7	5.9
ICU/CCU	1,130.3	101.6	8.2
PICU/CTICU	425.1	24.4	5.4
ICU Level			
Level 3	4,015.4	244.4	5.7
Level 2	1,510.6	120.4	7.4
Level 1	331.9	28.9	8.0
Australia	5,857.9	5,857.9	6.3

There has been a decreased number of reported RN FTE vacancies this year of 393.7. There were (531.1 in 2001/2002, 610.1 in 2000/2001 and 484.8 in 1999/2000)

Table 65. RN FTE, Vacancies by Sector & Region

	RN FTE	RN FTE Vacancies	Vacancy Rate (%)
Public			
NSW	1,702.8	108.8	6.0
VIC	1,160.2	67.0	5.5
QLD	908.1	28.7	3.1
SA	455.2	24.5	5.1
WA	325.6	13.5	4.0
TAS	106.9	12.7	10.6
ACT	84.3	6.0	6.6
NT	68.3	9.0	11.6
<i>Sub-total</i>	<i>4,811.5</i>	<i>270.2</i>	<i>5.3</i>
Private			
NSW	253.8	29.3	10.4
VIC/TAS	244.0	15.7	6.1
QLD	291.7	21.5	6.9
SA	137.0	25.0	15.4
WA	80.1	18.0	18.4
TAS	23.4	12.0	33.9
ACT	16.5	2.0	10.8
<i>Sub-total</i>	<i>1,046.5</i>	<i>123.6</i>	<i>10.6</i>
Australia	5,857.9	393.8	6.3

Table 66. RN FTE, Vacancies Public Sector Adult ICUs

	No. ICU*	RN FTE	No. ICUs*	RN FTE Vacancies
NSW	38/41	1,546.2	31/41	95.7
VIC	21/22	1,060.7	20/22	59.0
QLD	20/20	833.6	19/20	28.7
SA	6/7	399.1	5/7	21.2
WA	6/6	293.2	6/6	13.5
TAS	3/3	106.9	3/3	12.7
ACT	2/2	84.3	2/2	6.0
NT	2/2	68.3	2/2	9.0
Australia	98/103	4,392.4	88/103	245.8

Note: *No of ICUs that volunteered vacancy data.

NSW Health posts RN FTE positions being actively recruited by specialty on a monthly basis on the website of the Nursing and Midwifery Office. In June 2003 there were 139 RN FTE positions listed for intensive care in the public sector. There was no metropolitan/rural area breakdown available.⁽⁴⁸⁾ Tables 69 – 72 examine the RN FTE, critical care qualifications and reported vacancy data by different geographical classification systems

Table 67. RN FTE, Vacancies by Sector & ICU Level

ICU Level	RN FTE	RN FTE Vacancies	Vacancy Rate (%)
Public			
Level 3	3,366.9	177.6	5.0
Level 2	1,155.6	71.4	5.8
Level 1	288.9	21.2	6.8
<i>Sub-total</i>	<i>4,811.5</i>	<i>270.2</i>	<i>5.3</i>
Private			
Level 3	648.5	66.8	9.3
Level 2	355.0	49.0	12.1
Level 1	43.0	7.7	15.2
<i>Sub-total</i>	<i>1,046.5</i>	<i>123.6</i>	<i>10.6</i>
Australia	5,857.9	393.8	6.3

Table 68. RN FTE, Vacancies, by Sector & ICU Type

ICU Level	RN FTE	RN FTE Vacancies	Vacancy Rate (%)
Public			
General	3,506.6	178.5	4.8
ICU/CCU	852.3	67.3	7.3
PICU	419.1	24.4	5.5
<i>Sub-total</i>	<i>4,778.0</i>	<i>270.2</i>	<i>5.4</i>
Private			
General	753.6	89.2	10.6
ICU/CCU	278.0	34.3	11.0
<i>Sub-total</i>	<i>1,031.7</i>	<i>123.6</i>	<i>10.8</i>
Australia	5,809.6	5,809.6	8.1

Table 69. RN FTE, No. of RNs & No. with Critical Care Qualification by Geographic Location

Location	RN FTE	No. RNs on Roster	No. Critical Care Qualifications	RN FTE Vacancies
Public				
Capital City	3,494.5	4,272.8	2,391.0	214.4
Metropolitan	548.1	642.4	394.0	4.0
Rural	735.5	933.3	574.0	46.8
Remote	33.5	34.5	13.0	5.0
<i>Sub-total</i>	<i>4,811.5</i>	<i>5,883.0</i>	<i>3,372.0</i>	<i>270.2</i>
Private				
Capital City	942.4	1,283.2	690.0	118.6
Metropolitan	67.7	105.0	68.0	4.0
Rural	36.3	49.9	24.0	1.0
<i>Sub-total</i>	<i>1,046.5</i>	<i>1,438.0</i>	<i>782.0</i>	<i>123.6</i>
Australia	5,857.9	7,321.1	4,154.0	4,154.0

Table 70. RN FTE, No. of RNs & No. with Critical Care Qualification by ARIA Classification

ARIA Classification	RN FTE	No. RNs on Roster	No. Critical Care Qualifications	RN FTE Vacancies
Public				
Highly Accessible	4,326.3	5,307.0	3,050	242.1
Accessible	410.4	493.6	287	22.1
Moderately Accessible	41.4	47.9	22	1.0
Remote	33.5	34.5	13	5.0
<i>Sub-total</i>	<i>4,811.5</i>	<i>5,883.0</i>	<i>3,372.0</i>	<i>270.2</i>
Private				
Highly Accessible	1,015.7	1,391.1	757	122.1
Accessible	30.8	47.0	25	1.5
<i>Sub-total</i>	<i>1,046.5</i>	<i>1,438.1</i>	<i>782</i>	<i>123.6</i>
Australia	5,857.9	7,321.1	4,154.0	393.8

Table 71. RN FTE, No. of RNs & No. with Critical Care Qualification by Population Category

Population Category	RN FTE	No. RNs on Roster	No. Critical Care Qualifications	RN FTE Vacancies
Public				
> 250,000	3,538.5	4,290.8	2,404	200.7
48,000-249,999	808.1	993.2	637	40.9
18,000-47,999	367.4	481.8	274	26.9
5,000-17,999	97.5	117.2	57	1.6
<i>Sub-total</i>	<i>4,811.5</i>	<i>5,883.0</i>	<i>3,372.0</i>	<i>270.2</i>
Private				
>250,000	939.4	1,275.2	678	116.8
48,000-249,999	97.2	147.9	100	6.8
18,000-47,999	9.9	15.0	4	0.0
<i>Sub-total</i>	<i>1,046.5</i>	<i>1,438.1</i>	<i>782</i>	<i>123.6</i>
Australia	5,857.9	7,321.1	4,154.0	393.8

Table 72. RN FTE Distribution, Public & Private Sectors

Population	RN FTE/ Available Bed	RN FTE/ Ventilator Bed	RN FTE/ 100,000
NSW (6,686,600)	2.8	5.0	29.3
VIC (4,917,400)	3.8	4.9	28.6
QLD (3,796,800)	3.2	4.6	31.6
SA (1,527,400)	3.0	4.5	38.8
WA (1,952,300)	3.2	4.4	20.8
TAS (477,100)	2.8	4.1	27.3
ACT (322,900)	2.5	5	31.2
NT (198,400)	4.9	6.2	34.4
Australia (19,881,500)	3.2	4.8	29.5

Note: See Table 13 for number of available and ventilator beds.

In an examination of the table, above, there have been some regional changes but the overall figures are almost identical to the previous year's figures.

2.9.4 NURSE EDUCATORS

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.⁽⁴⁹⁾ Table 73 presents data on the hours of ICU nurse educator time that was available. Time reported was to include clinical time and lectures on the hospital site, but not time spent at another educational institution.

Table 73. No. of Nurse Educators

	Nurse Educator	
	Total Hours (per week) ^a	Median (IQR) Hours (per week)*
Public		
NSW	1,043.8	24.0 (1.3, 40)
VIC	1,373.6	40.0 (31.5, 97)
QLD	464.0	24.0 (2, 40)
SA	185.3	34.0 (13.9, 43.7)
WA	263.0	43.0 (32, 78)
TAS	56.0	28.0 (16, 40.0)
ACT	20.0	- ^b
NT	78.0	- ^b
<i>Sub-Total</i>	3,484.0	38 (16.0, 42.25)
Private		
NSW	350	20.0 (0, 39.0)
VIC	220	22.5 (9.8, 38)
QLD	220	24 (12.0, 38.0)
SA	45	10(0, 17.5)
WA	107.5	28.0 (13.1, 39.5)
TAS	32	- ^b
ACT	8	- ^b
<i>Sub-Total</i>	982.5	21.3 (8.4, 38)
Australia	4,466.5	30 (9.6, 40.0)

Note: **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.

2.9.5 CASUAL EMPLOYMENT OF REGISTERED NURSES

Information was collected on the hours worked by casually employed RNs. This was to include nurse bank/pool agency to cover roster shortfalls but not ad-hoc shortfalls such as sick leave. This was requested as average hours per month for each unit in the 2002/2003 financial year. Additionally, a question in the survey requested data on hours worked by permanent staff in excess of contracted hours to covered roster shortfalls. The averages per month are reported in Table 74. Although the casual hours were submitted as an average monthly figure for each unit, they can be compared to the rostered hours to give a ratio. Eight units reported 0 hours, median was 3.7% of rostered hours, range from 0-57%, IQR 1.6 - 9.5%.

Table 74. RN Casual Hours, Overtime, by Location, ICU Type and ICU Level by Public Hospital.

	RN Casual Hours* Worked/month Mean (SD)	RN Overtime Hours* Worked/month Mean (SD)
Region*		
NSW	147.1 (153.2)	67.2 (57.4)
VIC	184.5 (242.3)	53.6 (31.9)
QLD	200.3 (215.6)	34.4 (52.5)
SA	333.5 (259.5)	74.7 (35.9)
WA	100 (56.6)	-
ICU Type		
General ICU	220.4 (220.9)	59.6 (53.2)
ICU/CCU	162.6 (175.4)	60.1 (48.6)
ICU Level		
Level 3	571.9 (662.1)	241.5 (242.7)
Level 2	205.6 (199.9)	79.5 (75.5)
Level 1	144.9 (186.7)	201.7 (632.3)
Total	334.3 (471.8)	163.3 (319.7)

Note: * excludes NT, ACT and TAS as number of respondents too small.

2.9.6 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.^(26;32;34;46;50-55) 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 75 to 77. 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.⁽⁵⁰⁾ 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.⁽⁵⁰⁾ 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,⁽⁵⁴⁾ and in Australia by Williams and Clarke, with 6.7 nurse FTE/ICU bed and 3.89 nurse FTE/HDU bed.⁽⁵¹⁾

Figures reported in the following two tables are based on maintaining a full complement of available beds i.e., there are no assumptions made on occupancy levels, ICU bed type and RN skill mix. The estimations include clinical, management and education RN FTE positions. When interpreting the results presented it is important to note that calculations for RN FTE projections in the Northern Territory are potentially misleading 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. These demands can be largely related to both climatic and geopolitical influences.

Table 75. Recommended RN FTE for Available Beds, Level 3 ICUs by Sector & Region

Region	RN FTE	Recommended RN FTE ⁽⁴⁶⁾	RN FTE Gap	No. RN FTE Vacancies
Public				
NSW	1,082.9	1,686	603.1	70.9
VIC	857.2	1020	162.8	43.6
QLD	580.7	786	205.3	8.0
SA	393.6	522	128.4	20.9
WA	263.9	396	132.1	10.5
TAS	87.9	144	56.1	11.7
ACT	56.5	60	3.5	6.0
NT ^a	44.3	36	-8.3	6.0
<i>Sub-Total</i>	<i>3,367.0</i>	<i>4,650</i>	<i>1,283.1</i>	<i>177.6</i>
Private				
NSW	147.8	390	242.3	16.0
VIC	194.8	402	207.2	10.7
QLD	219.5	726	506.5	15.1
SA	64.4	198	133.6	21.0
WA	22.0	60	38.0	4.0
<i>Sub-Total</i>	<i>648.5</i>	<i>1,776</i>	<i>1,127.6</i>	<i>66.8</i>
Australia	4,015.5	6,426	2,410.7	244.4

Note: a - Number of available beds varies according to service demands.

Table 76. Recommended RN FTE for Available Beds, Level 2 ICUs by Sector & Region

	RN FTE	Recommended RN FTE ⁽⁴⁶⁾	RN FTE Gap	No. RN FTE Vacancies
Public				
NSW	476.3	668	191.7	26.7
VIC	303.1	280	-23.1	23.5
QLD	272.0	260	-12	18.7
SA	31.5	40	8.5	1.6
WA	25.9	40	14.1	0.0
TAS	19.0	28	9	1.0
ACT	27.8	48	20.2	0.0
<i>Sub-Total</i>	<i>1,155.6</i>	<i>1,364</i>	<i>208.4</i>	<i>71.5</i>
Private				
NSW/ACT	82.9	272	235.1	9.0
VIC	33.0	196	163	5.0
QLD	44.2	128	83.8	3.0
SA	79.3	172	92.7	4.0
WA	54.8	104	49.2	14.0
TAS	13.5	44	30.5	12.0
ACT	16.5	40		2.0
<i>Sub-Total</i>		<i>956</i>		
Australia	476.3	668	191.7	26.7

Overall, nursing shortage issues continue to be widely discussed. The AIHW reports that there has been an increase in nurses of 3.4% nationally in the period 1995-2001, but in that time, the population of Australia has grown by 7.4%. The number of nurses has dropped from 1,221 per 100,000 population to 1,176 in the same 6 year period.⁽⁴⁵⁾ The AIHW state in their report that, the number of ICU nurses has increased by 12.6% in the period 1997-2001.

The latest AIHW data, presented by region, available for comparison with ARCCCR figures is from the 2001 Nursing labour force survey, published as the Nursing labour force 2002;⁽⁴⁵⁾ ARCCCR data is as at June 2003 (Table 77). ARCCCR data pertains to RNs in permanent employment. AIHW data is not for FTEs it represents nurses employed as clinicians.

Table 77. ARCCCR / AIHW Critical Care RN Comparative Data

	ARCCCR		AIHW*	
	RN FTE	No. RNs	RNs ^a	Enrolled Nurses ^b
NSW	1,956.6	2,171.0	3,748	34
VIC	1,404.3	1,996.0	2,553	42
QLD	1,199.8	1,490.0	1,901	27
SA	592.2	754.0	832	10
WA	405.7	483.0	848	41
TAS	130.3	210.0	305	9
ACT	100.8	132.0	221	5
NT	68.3	85.0	83	6
Australia	5,858.0	7,321.0	10,491	174

*Source: AIHW Nursing Labour Force 2002⁽⁴⁵⁾

Note: **a** - registered nurses employed as clinicians and clinical nurse managers: area of clinical nursing (critical care/ intensive care) 2001; **b** - enrolled nurses employed as clinicians and clinical nurse managers: area of clinical nursing (critical care/intensive care) 2001.

2.9.7 ACCESS NURSES

In the Australian College of Critical Care Nurses Ltd (ACCCN) position statement on intensive care nursing staff, ⁽⁴⁷⁾ ACCESS nurses have been recommended as one of the ten key points and principles that units should meet to attain the expected standards of critical care nursing in Australia.

According to the position statement, ACCESS nurses 'provide on the floor Assistance, Coordination, Contingency, Education Supervision and Support'. The number of ACCESS nurses are shown in Table 78.

Table 78. ACCESS Nurses by Sector and Region

	Public	Private
NSW	2	0
VIC	6	0
QLD	4	3
SA	2	2
WA	2	1
TAS	0	-
ACT	0	-
NT	1	6
Australia	17	12

2.10 QUALITY OVERVIEW

The survey sought responses to questions on a range of safety and quality issues. Twelve units indicated that they have an ICU post discharge review process. One ICU indicated that they had an ICU out-patients clinic operating.

2.10.1 MEDICAL EMERGENCY TEAMS (MET)

Figures 15 to 17 present the information collected on medical emergency teams. A total of 64 ICUs, 61 adult and 3 PICUs reported having a 'MET' and these are presented below by ICU level and ICU type by region. Of the 64 ICUs with MET teams, 40 were classified as general ICUs and 21 as ICU/CCU. There were 47 public units with a MET and 17 private units.

The year of commencement of the MET and the cumulative total of METs by year is presented in the figures below.

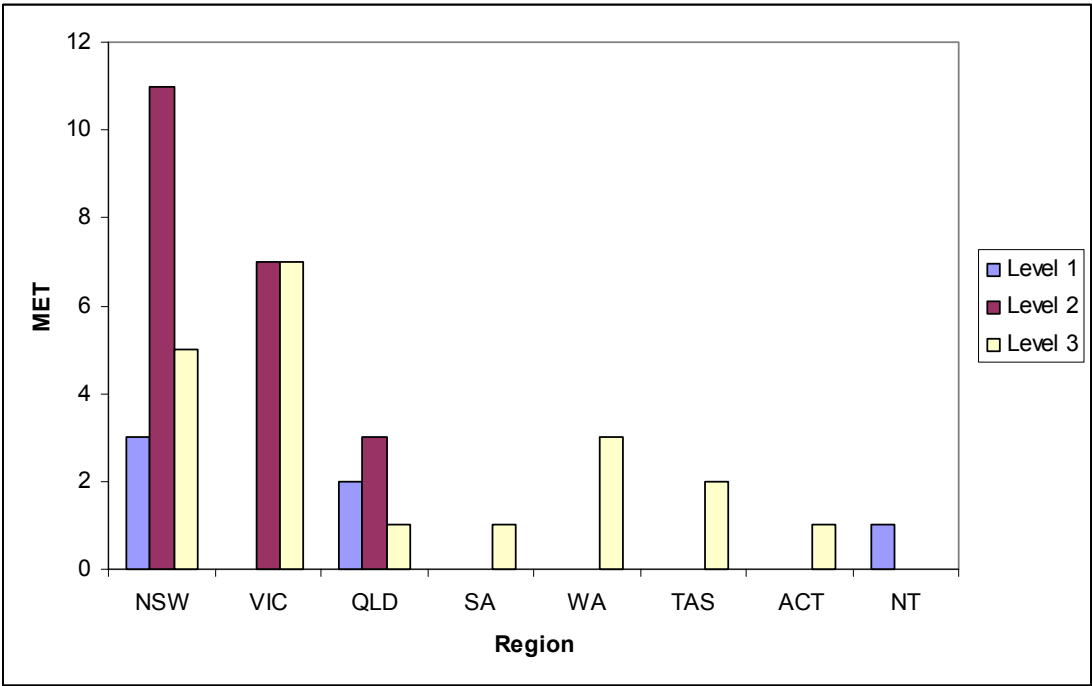


Figure 15. Medical Emergency Teams by Region and ICU Level

Figure 16 presents the number of METs operating in ICUs that classify themselves as General ICU and ICU/CCU across states and territories. Figure 17 represents the number of METs initiated by year.

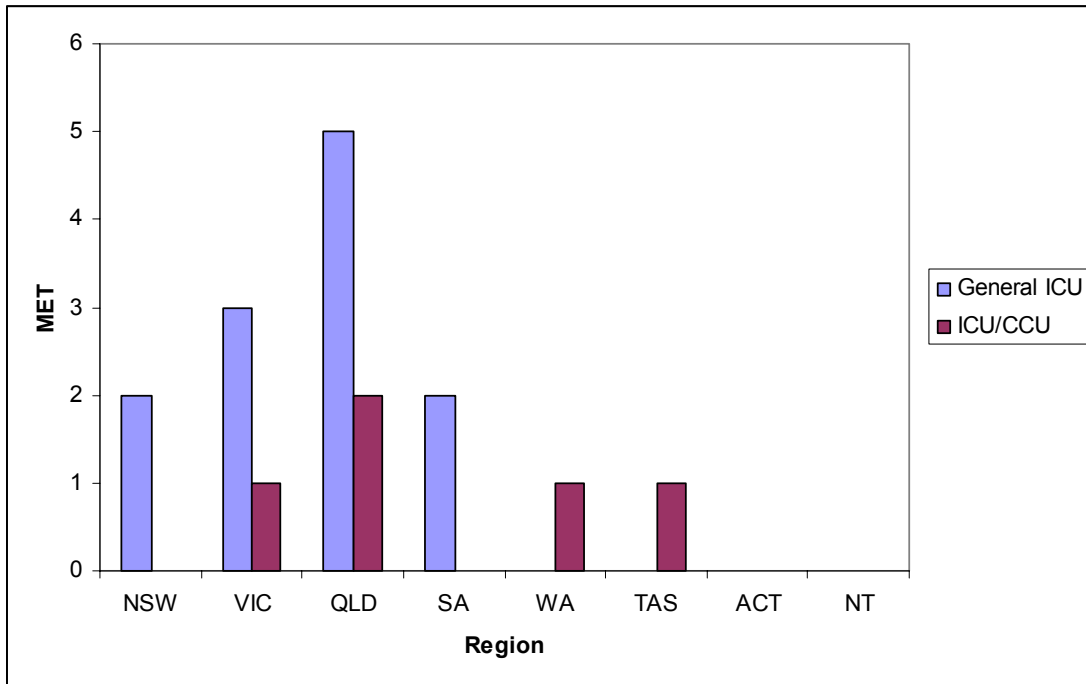


Figure 16. Year MET by ICU Type

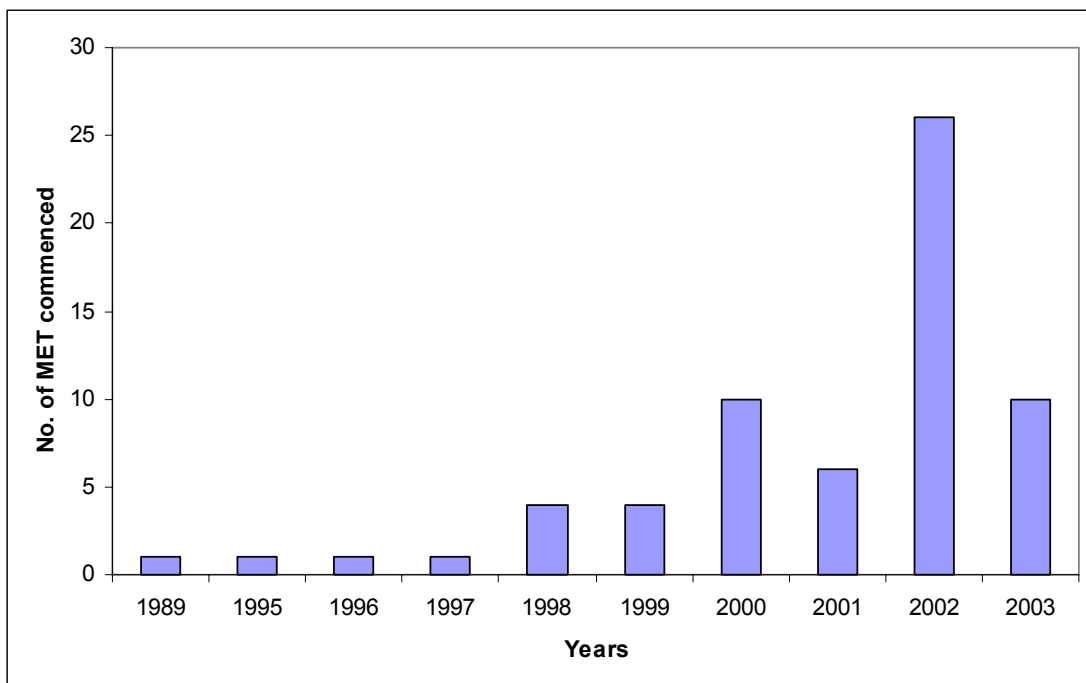


Figure 17. Year MET Team Commenced Operation

2.10.2 BEDSIDE CLINICAL INFORMATION SYSTEMS

Fourteen hospitals (12 public, 2 private) indicated that they currently utilised a bedside clinical information system. If no bedside clinical information system was currently in use, ICUs were asked to indicate if there were plans to implement one in the foreseeable future.

In response to this, 5 units indicated a system was planned for the coming year, 13 said they would have one within 2 years and 27 indicated they expected to implement a system within the next 5 years. So, a total of 45 hospitals have plans to implement as system within the next 5 years and, at the time of the survey, 14 hospitals currently had a system in place.

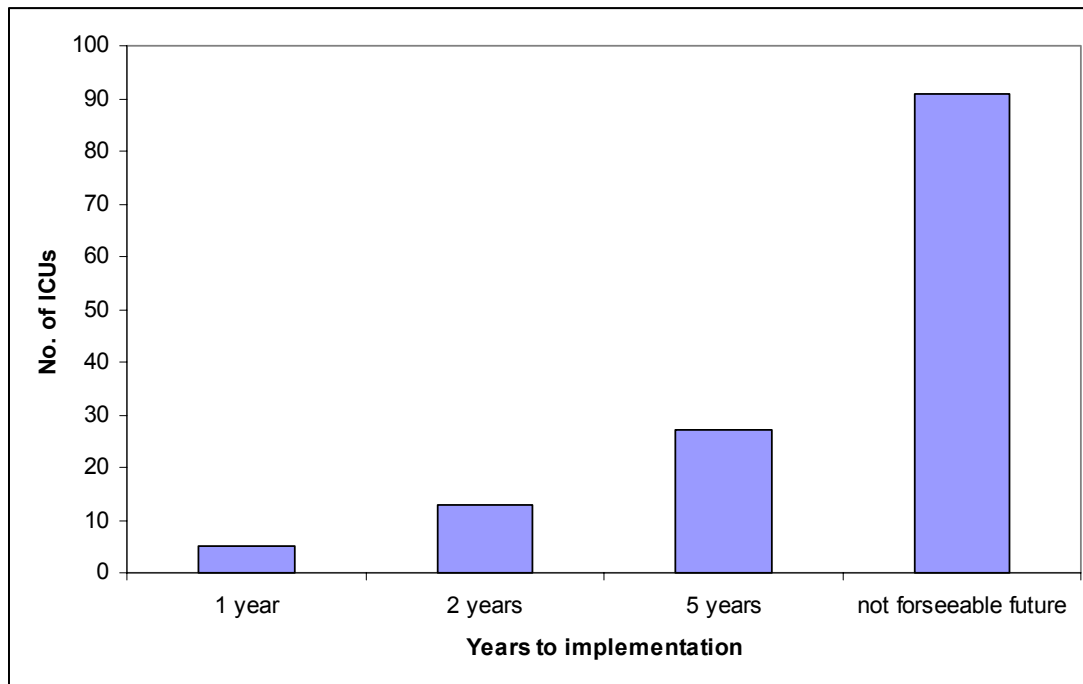


Figure 18. Bedside Clinical Information Systems to be implemented

2.10.3 FORMAL AUDIT OF MORTALITY AND MORBIDITY

When asked if their ICU had a formal audit of morbidity and/or mortality/quality assurance meetings, 123 (73.7%) indicated that such a system was in place.

Of these, 89 indicated that minutes were taken (72.4%). Of the 123 ICUs conducting these meetings 40 (32.5%) indicated that the meetings were proclaimed under the relevant QA legislation, 43 (34.9%) were unsure, and 40 (32.5%) said the meetings were not proclaimed.

Respondents were asked if, for an intubated & ventilated patient, they would seek specific, written consent for the performance of a number of invasive procedures.

The results obtained are presented in Table 79 and Figure 19

Table 79. Proportion Obtaining Consent for Invasive Procedures

Procedure	No. obtaining consent (%)
Percutaneous tracheostomy	126 (75.4)
Bronchoscopy	50 (29.9)
Chest drain insertion	14 (8.4)
Haemofiltration	8 (4.8)
Central line insertion	8 (4.8)
Arterial line insertion	6 (3.6)

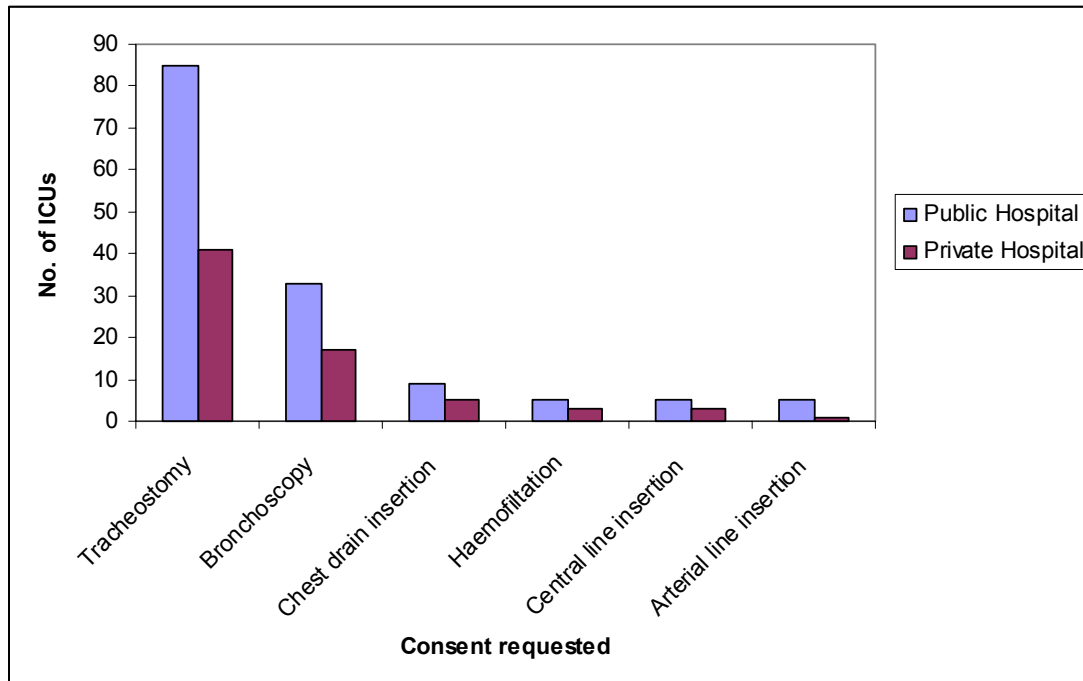


Figure 19. Consent sought for Invasive procedures

2.10.4 POTASSIUM ADMINISTRATION

Another area of interest was standardising methods of potassium administration. One survey question addressed the issue of the type of packaged K⁺ provided to the ICU by pharmacy, 151 (90.4%) indicated their ICU was supplied with at least one pre-packaged K⁺ preparation. Seventeen ICUs indicated that pharmacy supplied 100ml premix bags, 67 (40.1%) indicated 1 litre premix crystalloid solution with potassium was supplied and 149 ICUs indicated being supplied with K⁺ ampoules. Only 2 ICUs indicated that they were supplied with a different potassium preparation. Eighty three (49.7%) ICUs reported having a K⁺ administration protocol. Twenty seven of those hospitals (32.5%) actually provided the ARCCCR with a copy.

2.10.5 REMOTENESS AND RETRIEVALS

Twenty-seven hospitals reported being located in a population centre of less than 48,000, of these, 15 (55.6%) gave an estimate of their population catchment. The reported population catchments ranged between 22,000 and 270,000.

Eighty-seven hospitals (52.1%) indicated that they provided retrievals services. The hospital department responsible for the coordination of the services is reported in Table 80 and Figure 20. This information will be utilized in a 2005 ARCCCR project that will further characterise retrieval services in Australia and New Zealand.

Table 80. Retrieval Service Centres Reported

Coordination Centre	No. (%)
Intensive Care Unit (ICU)	45
Emergency Department	18
Emergency Department + Intensive Care Unit (ICU) + Anaesthetic Department	9
Emergency Department + Intensive Care Unit (ICU)	8
Anaesthetic Department	3
Emergency Department + Anaesthetic Department	2
Anaesthetic Department + Intensive Care Unit (ICU)	1
Shock – Trauma Service	1

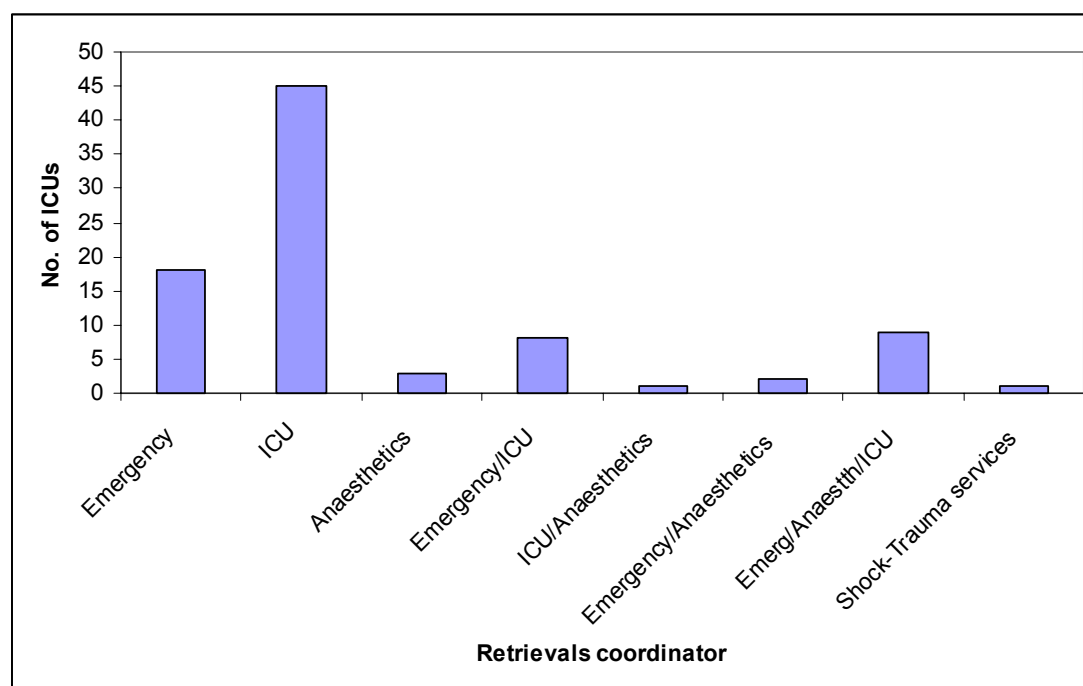


Figure 20. Retrieval Services provided

2.10.6 KEY AUDIT PARAMETERS

Figure 21 presents information collected on ICU audit indicators and should be viewed in conjunction with Table 81, which shows the key audit parameters.

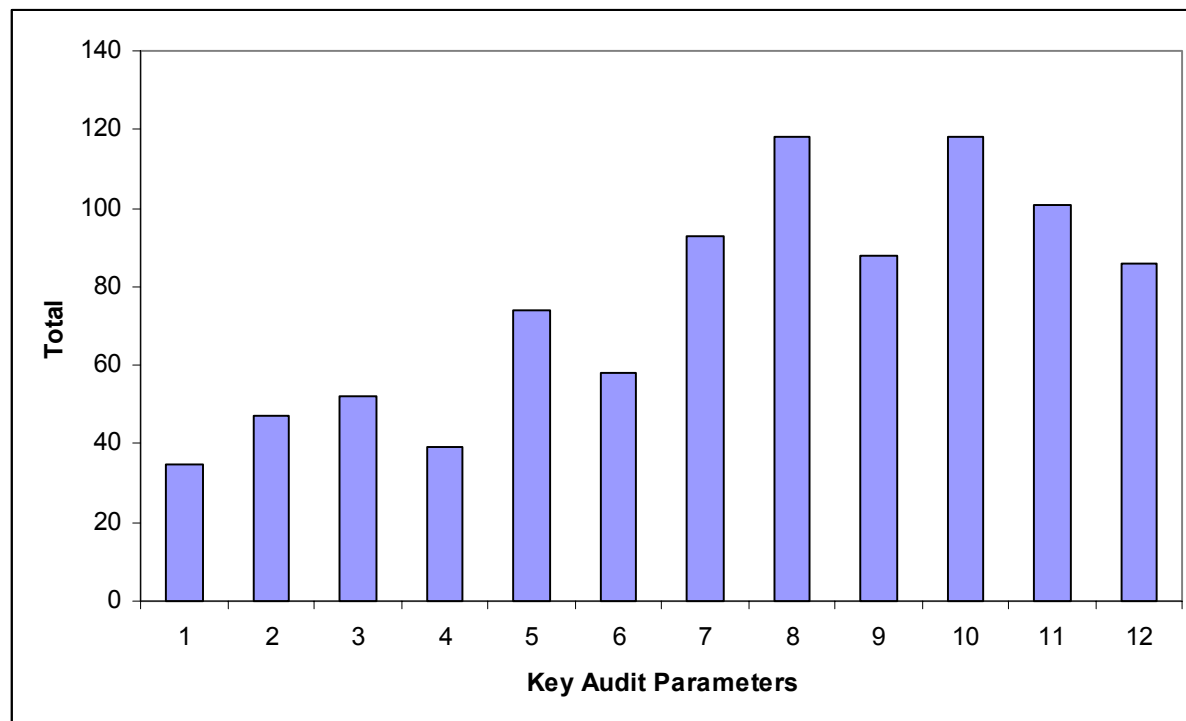


Figure 21. ICU Audit Overview

Table 81. Key Audit Parameters

Key Audit Parameters	
1	Out-of-hours discharge
2	Discharge delay
3	Family satisfaction
4	Infection - pneumonia
5	Infection - line
6	Bacteraemia
7	MRSA surveillance
8	ICU LOS
9	Hospital LOS
10	Mortality audit
11	ICU outcomes
12	Hospital outcomes

2.11 FINANCIAL INFORMATION

In the current survey, the ARCCCR, for the first time, endeavoured to collect financial data from ICUs. It was felt that collecting financial information would be an interesting and important exercise from a number of perspectives. There was also acknowledgement that it was difficult to predict how many units would be able to provide information and to what level of complexity.

As perhaps expected, data submitted varied greatly in quality and quantity. Some hospitals had no control over or idea of their budgets some refused to provide the information and some were able and willing to provide budget information in a very detailed format. Definitions were provided on a facing page to facilitate the accurate completion of the budget estimates survey. The data collection instrument for this section is included as part of Appendix 1.

In summary, respondents were asked to record the budget allocated to the ICU in their hospital. They were asked to place ticks in boxes to indicate the inclusion or not of items in the budget figure. If staff budget was unknown, respondents were asked to provide FTE details so an estimate of costs may have been possible. Seventy five of 167 units returned budget data (45%). The sum of all annual budgets was \$324,669,776. This represented 908 of 1859 (48%) available beds or 622 of 1228 (50%) ventilated beds. Extrapolating using 50% estimates a total budget of \$649,339,552 for public and private intensive care. Eighty-four units provided at least partial financial information (50.3%). In addition, a question was included to ascertain whether the units have a regular capital budget, 21 units (12.5%) responded in the affirmative. Of those who said they did have a regular capital budget, 11 units (52.3%) provided the figure; Mean \$163,225 SD \$163,705 Min \$10,400 Max \$531,000.

For those units who indicated they did not have a regular capital budget, they were asked to state their expenditure on major items such as monitors, ventilators and haemofiltration equipment in the 2002/2003 financial year. Only 7 hospitals listed any items in this category. In response to a question about whether the respondent would be able to provide further financial information, only 15 (9%) hospitals said they could assist. Summary information is provided in Table 82. Further information will be published as a result of a more detailed planned analysis of the data obtained.

Table 82. Summary Financial Data

	No.
Units responding	84 (50.3%)
Units who have a regular capital budget	21 (12.5%)
Units who would be able to provide further financial information	15 (9%)

2.11.1 CONTACT DETAILS

The ARCCCR is asked by various organisations and individuals for contact details for non commercial, professional contact purposes. The ARCCCR does currently work with other ANZICS entities to ensure contact information for individuals and ICUs is up to date; however, the ARCCCR due to privacy considerations/legislation does not release information without consent. The survey requested consent for release of information. The majority view prevails and in line with current ARCCCR policy no information will be released to a third party (outside ANZICS) without specific consent.

SECTION THREE

NEW ZEALAND

3. INTRODUCTION

The Australian and New Zealand Intensive Care Society (ANZICS) Research Centre for Critical Care Resources (ARCCCR) is committed to providing contemporary information about intensive care resources and activities in New Zealand. To facilitate this process the ARCCCR routinely updates the survey instrument used to ensure accurate and contemporary information can be made available. An adapted version of the questionnaire was sent to all New Zealand hospitals with an intensive care unit to capture data for 2002/2003 (see Appendix 1). For the first time units were asked to provide detailed financial information.

The overall New Zealand survey response rate was 92.6%. Two hospitals did not respond by the due date and as a result their responses to the previous ARCCCR survey were used (where appropriate) for key demographic variables. Therefore, this chapter summarises data collected from all 27 units. The information presented in the main part of this section focuses on data obtained from the 25 public sector ICUs (92.6%) only. Two private sector ICUs (7.4%) also contributed survey information and an overview of their resources and activity is included separately at the end of this section. It is important to note that the survey was fixed-format and the data was self-reported by a mixture of medical, nursing and administrative staff in individual units.

3.1 GEOGRAPHIC STATISTICS

Responses to the survey were aggregated and based on key demographic variables. All intensive care units (ICUs) were assigned a geographic location with twenty (74.1%) located on New Zealand's North Island (includes the 2 private ICUs) and seven (25.9%) on the South Island.

ICU's were further examined via a distinction in facility classifications within the critical care domain. Of the total, fourteen units (51.9%) were categorised as General ICU (i.e., combined medical/surgical), nine (33.3%) as ICU/CCU (i.e., combined intensive care/coronary care/high dependency), one (3.7%) as PICU (i.e., paediatric ICU) and three (11.1%) as CTICU (i.e., cardiothoracic ICU).

Self-reported ICU levels were also used as an examination entity. Respondent ICU's nominated themselves as a Level 3; 8 (29.6%), a Level 2; 9 (33.3%) or a Level 1; 10 (37.0%) ICU with reference to the JFICM criteria that was included as part of the survey instrument.⁽⁵⁶⁾

Twenty one units (77.8%) provided either complete or partial financial information with only six units (22.2%) abstaining. Population statistics are estimated resident-population figures based on the 2001 census. Aggregate figures are rounded to the nearest hundred. North island figures include the population of Kermadec Islands and people on oil rigs; the South Island figures include the populations of the Chatham Islands Territory and people on oil rigs.⁽⁵⁷⁾

3.2 DISTRIBUTION OF ICU BEDS

For the current survey, as in past ARCCCR surveys, ICU beds were categorised as either physical, available or ventilator and 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: A 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.

Latest available figures show that in 2002, there were 85 publicly funded hospitals⁽⁵⁸⁾ in New Zealand and 25 of these had critical care facilities (29.4%). The total available ICU beds comprise 1.7% of public hospital beds (214 of a total of 12,484 beds which may include psychiatric, aged care and day procedure beds).⁽⁵⁹⁾

In the current survey, as in previous years, the number of physical and available beds includes High Dependency Unit HDU/ Step-Down beds managed by the ICU team. Figure 22 shows the total number of available ICU beds categorised by hospital bed range. As shown (below), the majority of available ICU beds are in hospitals with a bed range in excess of 501 beds and hospitals with 101-200 beds this is consistent with previous findings.

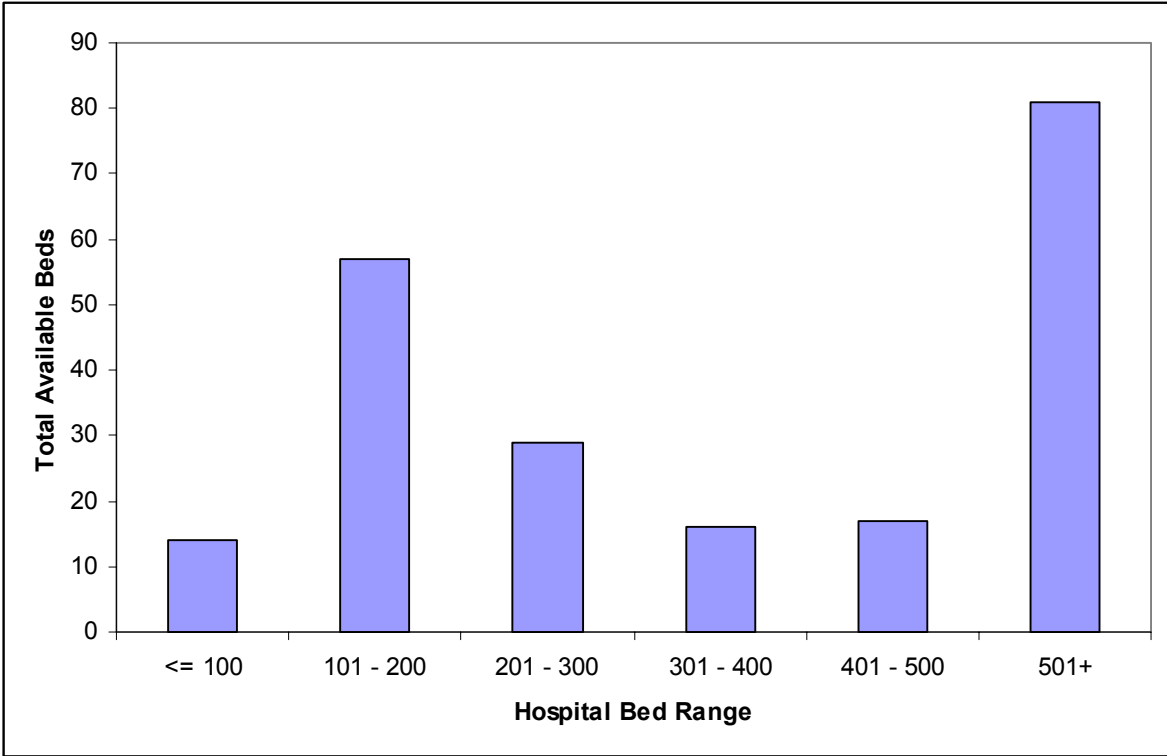


Figure 22. Available ICU Beds by Hospital Bed Range.

A more detailed distribution of ICU beds by geographical region is shown in Tables 83 - 87. The total number of beds reported in Table 83 included 26 dedicated available (HDU) beds in 5 ICUs, 24 available CCU beds in 6 ICUs & 12 available cardiothoracic beds in one unit.

Table 83. ICU Bed Distribution by region.

Region	Physical Beds	Available Beds	Ventilator Beds
North Island	184	163	118
South Island	63	51	31
New Zealand	247	214	149

Table 84. Demographic Distribution of ICU Beds.

Region	Population ⁽²⁾	Available Beds/ 100,000	Ventilator Beds/ 100,000
North Island	3,047,900	5.4	3.9
South Island	961,600	5.3	3.2
New Zealand	4,009,500	5.3	3.7

The number of available and ventilator beds/100,000 population reported for the current survey has decreased from the numbers reported in the previous two surveys.^(4;11)

Totals are presented in Tables 85 and 86 and shown graphically in Figures 23 and 24. The decrease in bed numbers is partly explained by an alteration in reporting. The level 3 units are reporting ventilator beds as those capable of being staffed for ventilation (cf physical space plus ventilator) and this account for 10 of the 14 reduced beds. While it makes previous data less comparable it gives a better indication of the resources available.

Table 85. Available Beds/ 100, 000 between 2000/2001 and 2002/2003.

Region	Available Beds/ 100,000 in 2000/2001	Available Beds/ 100,000 in 2001/2002	Available Beds/ 100,000 in 2002/2003
North Island	6.0	5.5	5.4
South Island	5.9	5.8	5.3
New Zealand	6.0	5.7	5.3

Table 86. Ventilator Beds/ 100, 000 between 2000/2001 and 2002/2003.

Region	Ventilator Beds/ 100,000 in 2000/2001	Ventilator Beds/ 100,000 in 2001/2002	Ventilator Beds/ 100,000 in 2002/2003
North Island	4.4	4.3	3.9
South Island	4.4	4.2	3.2
New Zealand	4.4	4.4	3.7

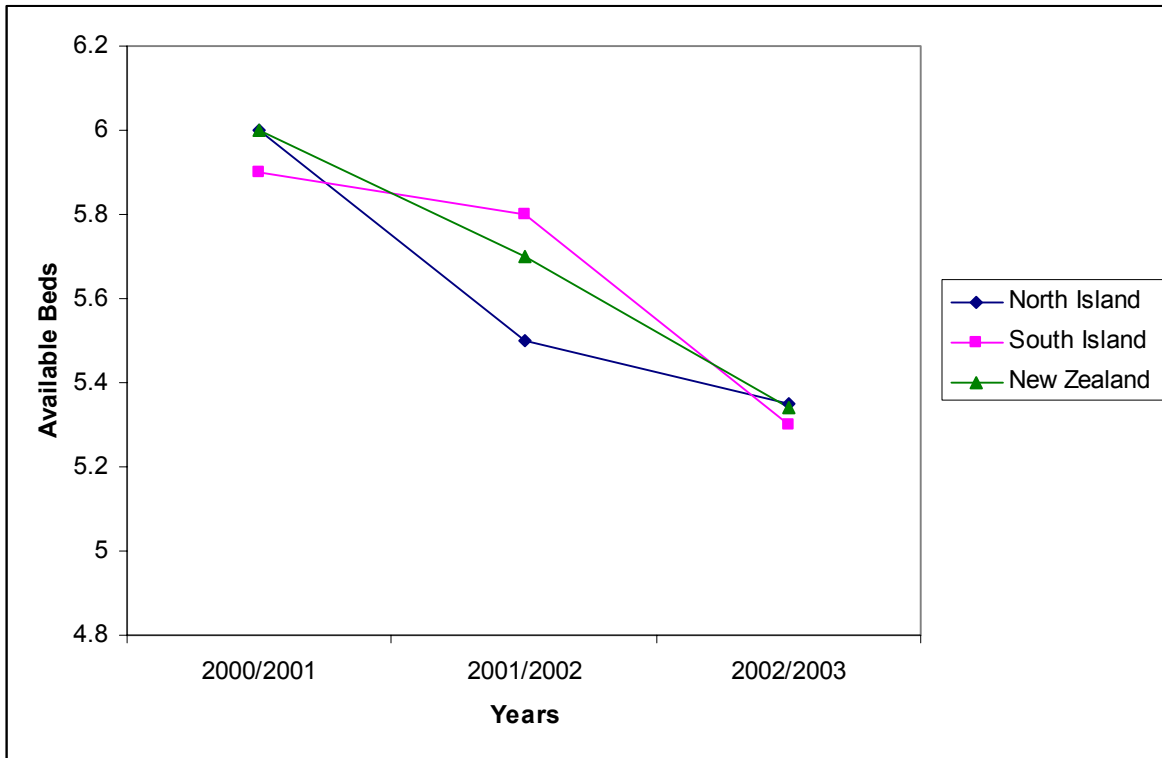


Figure 23. Total Available Beds between 2000/2001 and 2002/2003.

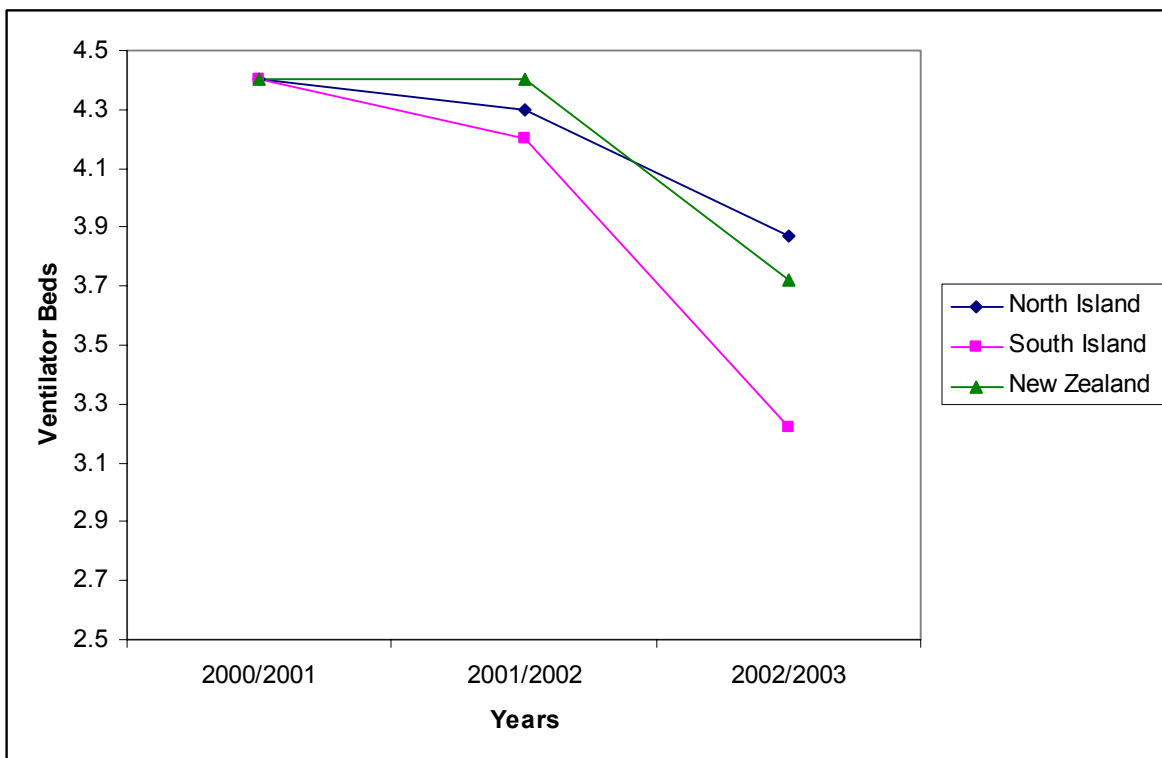


Figure 24. Total Ventilator Beds between 2000/2001 and 2002/2003.

The total number of physical, available and ventilator beds along with the number of available and ventilator beds/100,000 for each DHB are shown in Table 87.

The increasing population and decreasing numbers of beds has compounded to mean that the available beds and ventilator beds /100,000 have fallen. The trend was apparent across both Islands of New Zealand, with the number of available beds per 100,000 falling from 6.0 in 2000/2001 to 5.3 in the 2002/2003 survey. The number of ventilator beds has similarly decreased across New Zealand with the number dropping from 4.4/100,000 in 2000/2001 to 3.7/100,000 in 2002/2003.

Table 87. Distribution of ICU Beds by District Health Boards.

District Health Board	N	Population (60)	Physical Beds	Available Beds	Ventilator Beds	Available Beds/ 100,000	Ventilator Beds/ 100,000
Auckland	3	400,950	43	37	37	9.2	9.2
Bay of Plenty	2	187,590	12	12	6	6.4	3.2
Canterbury	1	447,400	18	11	11	2.5	2.5
Capital & Coast	1	259,920	14	11	11	4.2	4.2
Counties Manukau	1	404,330	10	10	10	2.5	2.5
Hawkes Bay	1	148,470	11	11	11	7.4	7.4
Hutt	1	137,050	5	4	2	2.9	1.5
Midcentral	1	161,710	8	6	6	3.7	3.7
Nelson-Marlborough*	2	128,310	14	14	6	10.9	4.7
Northland	1	145,385	10	7	5	4.8	3.4
Otago	1	178,000	12	8	8	4.5	4.5
South Canterbury	1	53,825	8	7	3	13	5.6
Southland	1	106,735	7	7	3	6.6	2.8
Tairāwhiti	1	45,365	7	6	2	13.2	4.4
Taranaki	1	105,850	16	12	3	11.3	2.8
Lakes	1	100,310	9	8	3	8.0	3.0
Waikato	1	331,310	24	24	14	7.2	4.2
Wairarapa	1	39,275	5	5	2	12.7	5.1
Waitemata	1	461,150	6	6	4	1.3	0.9
West Coast	1	30,920	4	4	0	12.9	0.0
Whanganui	1	65,385	4	4	2	6.1	3.1
New Zealand	25	3,939,240	247	214	149	5.3	3.8

It should be noted that population figures are based upon 2002 projections from the 2001 census data⁽⁶¹⁾ and have been obtained from the DHB. There are no 2003 figures available at the time of writing. No assumptions are made with regard to ICU Level, ICU Type, or ICU bed categories. Auckland District Health Board includes ICUs in specialty hospitals.

Examination of the distribution of ICU beds by DHB shows decreases overall in the number of available and ventilator beds per 100,000 with wide variation apparent in distribution of beds between DHBs. In 2000/2001, the number of available beds across New Zealand was 6.0/100,000 and 4.4/100,000 ventilator beds.

3.3 ICU TYPE

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

GENERAL ICU: Medical and surgical care; may incorporate HDU facilities/beds and the ICU/HDU beds may be interchangeable.

ICU/ CCU: Combined intensive and coronary care services within a single patient care location. May also include HDU facilities/beds and beds may be interchangeable.

PICU: Medical and surgical care; A paediatric patient for the purposes of this survey is < 16 years of age.⁽²²⁾ Age range has an upper limit of 14 or 15 in some areas, and some PICUs may accept neonates (live birth < 28 days old) or patients > 16 years of age.

SPECIALTY: A specialty service for cardiothoracic or neuro-intensive care patients.

HDU: An HDU provides an intermediate level of care between intensive care and general ward care. 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.

The above defined critical care categories are quite broad and do not limit the types of care or services provided to patients. Beds may be interchangeable across all categories.

For example, General ICU included a total of 104 available ICU beds, 7 CCU beds and 22 HDU beds; ICU/CCU included a total of 36 available beds and 17 CCU beds; Specialty ICU included 12 available cardiothoracic beds. Both adult and paediatric patients may be admitted to any of these ICUs.

Table 88 provides a summary of bed numbers for each ICU type while Figure 25 graphically represents the distribution of beds across ICU types.

Table 88. ICU Beds by ICU Type.

ICU Type	Physical Beds	Available Beds	Ventilator Beds
General ICU	161	131	101
ICU/ CCU	61	58	23
PICU	9	9	9
CTICU	16	16	16
New Zealand	247	214	149

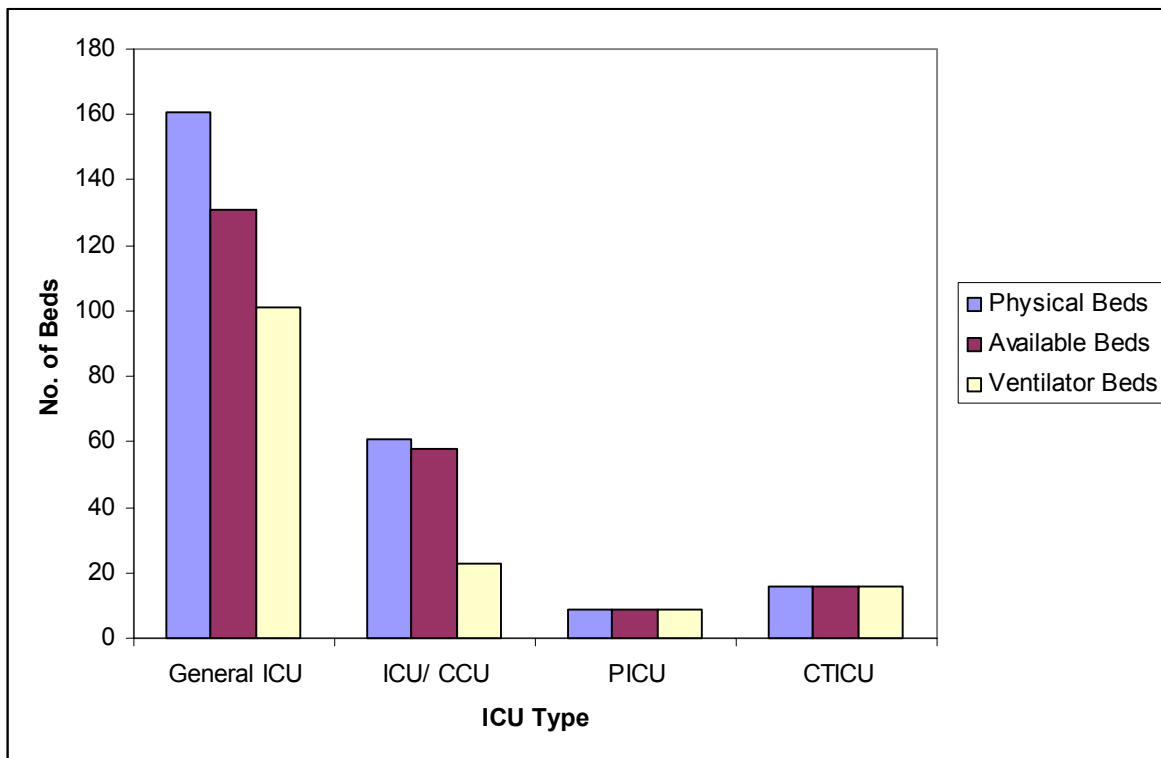


Figure 25. ICU Bed Numbers by ICU Type.

3.4 ICU LEVELS

All ICU levels in this report are self-determined. An extract of the JFICM standards document was included with the survey.⁽¹²⁾ Despite the application of the 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 Level 1 and Level 2 ICU can be problematic. Even ICUs within a particular level classification may be different in terms of patient acuity, outcomes and case-mix. ICU levels for an individual ICU may vary from year to year. ICU levels should be viewed with a degree of caution. Case-mix, morbidity and mortality data and severity of illness scores do not form part of standards documents so little is known about patient acuity. 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 examples of why this may occur.

3.4.1 ICU LEVEL AND BED CHARACTERISTICS

Table 89 summarises bed numbers for each ICU level. There was a decrease of approximately 10 physical, available and ventilator beds at Level 3 compared with the previous years survey results. There were also less Level 2 beds and more Level 1 beds reported than in the previous survey⁽⁴⁾ which is most likely due to differences in hospital level classification from year to year. Figure 26 graphically represents the numbers of beds at each ICU level. Table 90 provides an indication of the variation in the way beds are categorised at each level.

Table 89. ICU Beds by ICU Level.

ICU Level	Physical Beds	Available Beds	Ventilator Beds
Level 3	121	101	91
Level 2	73	66	43
Level 1	53	47	15
New Zealand	247	214	149

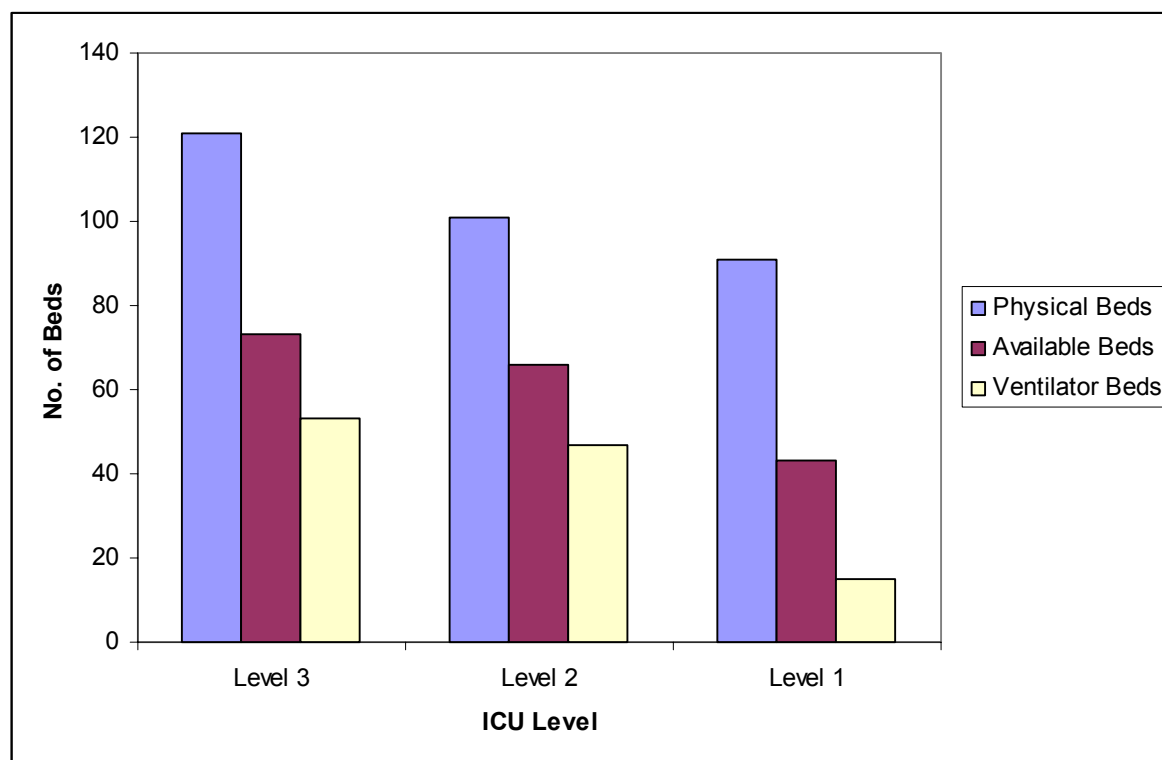


Figure 26. ICU Bed numbers by ICU Level.

Table 90. Total ICU Beds by ICU Level.

Level 3 includes	Level 2 includes:	Level 1 includes:
92 available beds of which 66 are designated ICU beds	68 available beds of which 55 are designated ICU beds	42 available beds of which 19 are designated ICU beds
14 available HDU beds	7 available CCU beds	17 available CCU beds
12 Cardiothoracic beds	6 HDU beds	6 available HDU beds

Numbers of beds in each category in ICU in New Zealand have dropped from 256 physical; 225 available and 167 Ventilator in our 2000/2001 survey⁽¹¹⁾ to the figures below (see Table 91 and Figure 27).

Table 91. Historical summary ICU beds

Year	Physical Beds	Available Beds	Ventilator Beds
Total 2002 / 2003	247	214	149
Total 2001 / 2002 ⁽⁴⁾	250	220	168
Total 2000 / 2001 ⁽¹¹⁾	256	225	167

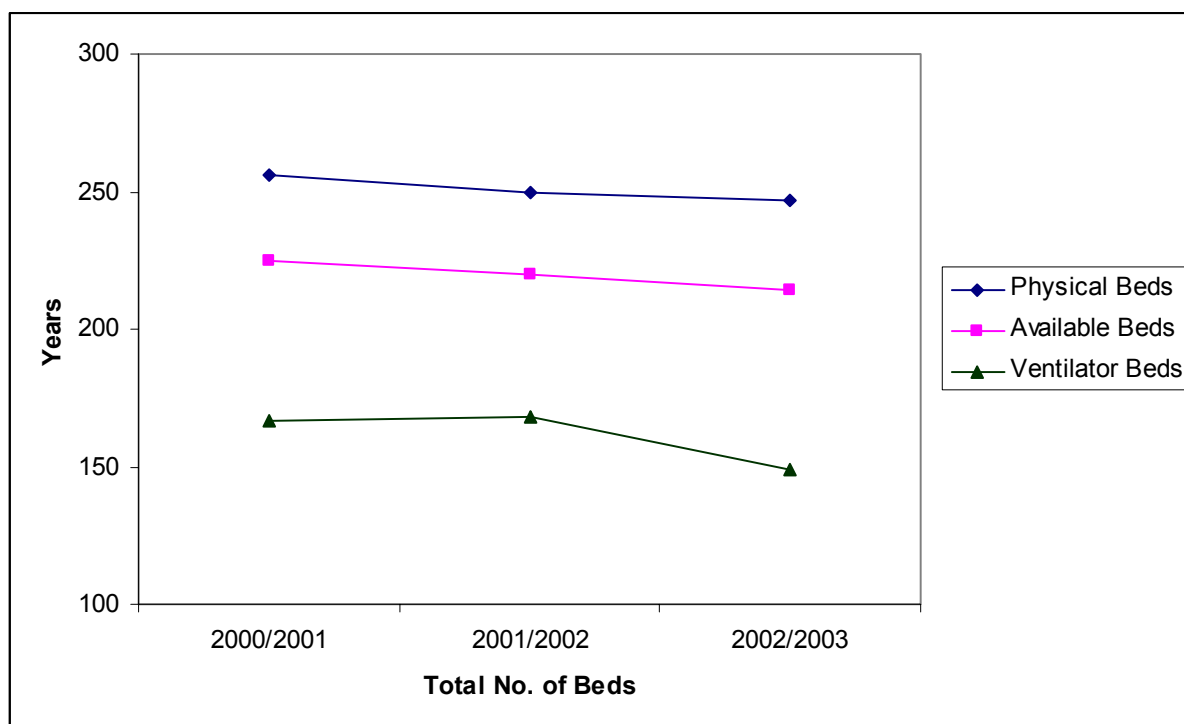


Figure 27. ICU Bed numbers by ICU level between 2000/2001 and 2002/2003.

3.5 ICU ACTIVITY

3.5.1 ICU ADMISSIONS DATA

Of the 25 public ICUs, 23 (92%) provided current survey admissions data (for the two units who did not contribute current data admission data, data from the previous survey was used). Where differentiated admission data was not supplied, the admissions were included under ICU admissions. ICU admissions comprised 2.6% of discharges (all admissions) and 3.6% of discharges (day patients excluded) in public hospitals. These calculations were based on 2000/2001 data⁽⁵⁹⁾ as 2001/2002 data was not available at time of writing. Data on ICU, HDU and CCU and 'other' admissions by region, ICU type and ICU level is tabulated in Table 92.

Table 92. ICU Admissions by Region; ICU Type and ICU Level.

	ICU Admissions	HDU Admissions	CCU Admissions	Other Admissions	Total
Region					
North Island	8,698	3,409	1,336	2,368	15,811
South Island	3,645	239	1,702	305	5,891
ICU Type					
General ICU	9,443	2,563	-	305	12,311
ICU/CCU	2,900	658	3,038	29	6,625
PICU/CTICU	-	427	-	2,339	2,766
ICU Level					
Level 3	5,882	2,330	-	2,644	10,856
Level 2	4,156	660	917	-	5,733
Level 1	2,305	658	2,121	29	5,113
New Zealand	12,343	3,648	3,038	2,673	21,702

Total admissions have increased slightly from 21,255 in 2001/2002. Summary admission statistics are displayed in Table 93.

Table 93. ICU Summary Admissions Data by ICU Type

ICU ADMISSIONS: Minimum 24; maximum 1,265; mean 561.1; standard deviation 369.2.
HDU ADMISSIONS: Minimum 154; maximum 1,675; median 272.5; 25th percentile 230.8; 75th percentile 415.3.
CCU ADMISSIONS: Minimum 184; maximum 785; mean 506.3; standard deviation 235.9.
OTHER ADMISSIONS: Minimum 29; maximum 1,800; mean 668.3; standard deviation 782.8.
TOTAL ADMISSIONS: Minimum 190; maximum 2,798; median 788; 25th percentile 480.5; 75th percentile 1026.0.

3.5.2 ICU READMISSION DATA

For the purposes of the survey, 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). It is not the same as the ACHS ICU readmission indicator.

Of the 25 public ICUs for whom we had admission data, 16 (64%) contributed readmission data. Where differentiated readmission data was not supplied, the readmissions were included under ICU readmissions. Only those hospitals submitting data on admissions and readmissions are included in the tables below. Table 94 presents the data on ICU, HDU and CCU readmissions by region, ICU type and level while Tables 95 and 96 presents the summary statistics generated for ICU readmissions. Although there were two fewer units contributing data, the number of ICU and HDU readmissions has significantly fallen. There is no apparent reason for this from other data submitted.

Table 94. Summary Readmissions by region, ICU type and ICU level.

	ICU Readmissions	HDU Readmissions	CCU Readmissions	Other Readmissions	Total
Region					
North Island	174	15	15	170	374
South Island	145	-	8	-	153
ICU Type					
General ICU	274	15	-	-	289
ICU/CCU	45	-	23	-	68
PICU/CTICU	-	-	-	170	170
ICU Level					
Level 3	225	-	-	170	395
Level 2	71	15	8	-	94
Level 1	23	-	15	-	38
New Zealand	319	15	23	170	527

Table 95. ICU, HDU and CCU Readmissions as % of Total Admissions by level

Readmissions Rate	Level 3	Level 2	Level 1
No. Contributing data (%)	4 (50.0)	8 (88.9)	2 (25.0)
% ICU Readmissions Rate	5.9	2.2	2.9
No. Contributing data (%)	0	1 (14.3)	0
% HDU Readmissions Rate	0	3.9	0
No. Contributing data (%)	0	1 (11.1)	1 (12.5)
% CCU Readmissions Rate	0	1.1	2.7
No. Contributing data (%)	6 (75)	8 (88.9)	2 (25)
Overall % readmission rate	5.7*	2.0	2.8

Note: * Includes 'other' readmissions i.e., cardiac surgery

Table 96. Summary Readmissions Data

ICU Readmissions*: Minimum 4; maximum 79; median 9.0; 25th percentile 5.8; 75th percentile 38.0.
Total Readmissions: Minimum 4; maximum 104; median 17.5; 25th percentile 6; 75th percentile 64.25

Note: *There was not enough readmissions data reported in the other categories to report meaningful summary statistics.

3.5.3 ICU BED HOURS/DAYS & VENTILATOR HOURS/DAYS

The survey requested information on all admissions relating to ICU bed hours/days and ventilator hours/days. The number of units reporting was varied in these categories so the percentage of units responding is shown in parentheses. Respondents were encouraged to provide information on number of bed hours and ventilator hours as the preferred option over the number of bed days and ventilator days. Of the 25 hospitals, 16 (64%) provided information on bed hours or bed days. Sixteen respondents (64%) provided ventilator hours, and 5, (20%) provided ventilator days. Four hospitals (16.7%) did not provide information in this category. This information has been difficult to compare with previous years because of the incomplete reporting and differing methods of submission. There appears to be a significant decrease in the bed hours/bed days from 2001/2002 where there were 20 respondents, 674,000 hours and 12,771 days. This decrease is most likely due to a decrease in the number of units reporting. Eighty per cent of units reported in 2001/2002 while 68% reported for the current survey.

Table 97. ICU Bed Hours/Days

	Bed Hours	Bed Days	Ventilator Hours	Ventilator Days
Region				
North Island	494,161 (50.0)	1,608 (17.6)	251,106 (55.6)	603 (23.5)
South Island	111,778 (28.6)	2,319 (28.6)	87,042 (85.7)	2 (14.3)
ICU Type				
General ICU	458,859 (57.1)	2,223 (23.1)	256,087 (71.4)	170 (7.7)
ICU/CCU	2,575 (11.1)	1,704 (22.2)	26,103 (44.4)	435 (44.4)
PICU/CTICU	144,505 (100)	-	55,958 (100)	-
ICU Level				
Level 3	458,428 (85.7)	-	251,423 (87.5)	-
Level 2	144,936 (33.3)	2,490 (22.2)	76,489 (55.7)	297 (11.1)
Level 1	2,575 (12.5)	1,437 (37.5)	10,236 (37.5)	308 (50)
New Zealand	605,939	3,927	338,148	605

3.5.4 VENTILATION DATA

Of the 25 hospitals, all but one submitted figures on numbers of patients ventilated. For that hospital, the ventilator hours for this and the previous year were likely to be similar as patient numbers were similar, so the number of ventilator hours extrapolated from the previous year was used.

The high response rate is because ventilation hours are part of the National Minimum Hospital Data Set reported for every hospital in-patient episode. Therefore, numbers of ventilated patients were included for all hospitals.

The survey included a note stating that ventilated patients could be counted in both invasive and non-invasive categories; further information was contained in the survey glossary. Nineteen units (76%) submitted figures on non-invasive ventilation. This has increased from the previous survey where only 12 hospitals submitted this data.

Total ventilation hours were 387,881 hours. For hospitals reporting bed hours and ventilation hours the percentage of time for ventilation was median 46 per cent (range 11% - 80%). Table 98 and 99 include data from only those hospitals that provided total number ICU admissions and total number of ventilated patients and those reporting both numbers invasively and non-invasively ventilated (n=14).

Table 98. Proportion of Patients Invasively Ventilated by ICU Type.

ICU Type	% Units contributing data	ICU Admissions	No. Ventilated	% Admissions Ventilated
General ICU	92.8	9,253	6,037	65.2%
ICU/CCU	88.8	2,900	454	15.7%
PICU	100	539	316	58.6%
CTICU	100	1,800	817	45.4%
New Zealand	90.8	14,492	7,624	52.6%

Table 99. Proportion of Patients Ventilated (invasive and non-invasive) by ICU Type.

ICU Type	% Units contributing data	Total number of Admissions	Total No. Ventilated	Invasive	Non-Invasive
General ICU	42.8	4,765	2,879	2,715	234
ICU/CCU	77.8	5,685	282	235	97
PICU	100	539	316	284	63
New Zealand	73.6	10,989	3,477	3,234	394

Note: With PICU excluded, ventilated patients account for 53.1% of the total number of admissions.

3.6 PAEDIATRIC ADMISSIONS

Information was collected from all ICUs on paediatric admissions. Three public hospitals did not report any paediatric admissions. The minimum number of admissions reported was 0; maximum 537; median 29 (10 – 95). A summary of paediatric admissions information is provided below and all data obtained is tabulated in Table 100.

Table 100. Summary Paediatric Admissions by region, ICU type and ICU level.

	Paediatric Admissions	No. Ventilated	No. Transferred	No. Deaths
Region				
North Island	1,652	524	110	57
South Island	184	77	39	2
ICU Type				
General ICU	765	256	106	11
ICU/CCU	157	29	43	2
PICU/CTICU	914	316	-	46
ICU Level				
Level 3	1,323	500	39	53
Level 2	451	86	75	5
Level 1	62	15	35	1
New Zealand	1,836	601	149	59

3.6.1 SUMMARY OF PAEDIATRIC ADMISSIONS

- 9.1% of all admissions were paediatric admissions
- 29.2% of all paediatric patients were admitted to a specialty ICU
- 32.4% of all paediatric patients were ventilated during their stay in ICU
- 8.2% of paediatric patients were transferred.
- 3.2% unadjusted paediatric mortality overall (6.7% in specialty ICUs)

3.7 MEDICAL LABOUR FORCE

Capturing medical labour force data in intensive care settings is challenging. The data is predominantly focused on full time equivalents (FTE/EFT). All ARCCCR medical labour force data is as at 30th June 2003. In New Zealand an FTE is defined as ≥ 30 hours per week.^(59;62) An intensivist may be more than one FTE, depending 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 30th June 2003 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).

'Other specialist' is a medical practitioner with a non-intensive care qualification who is employed in intensive care. Specialist FTE refers to combined intensivist and other specialist FTE data. An overview of registrar and resident medical officer FTE is included. New Zealand Ministry of Health figures for 2003 show there were 18 active medical practitioners who cited intensive care as their main employment setting in 2003.⁽⁶³⁾ Workforce knowledge would suggest that this is far short of the actual numbers working in ICUs in New Zealand. Information about the number of intensive care specialist FTE and the number of non

intensive care specialist (other) FTE was collected. All units responded to these questions and the results are reported in Table 101.

Units were asked to provide information on the numbers of specialists on their roster. There were 52 salaried intensive care specialists on the roster and 8 sessional intensive care specialists on the roster. For non-intensive care specialists, there were 79 salaried specialists on the roster and 44 sessional specialists on the roster. The distribution of the specialists across the New Zealand health service is presented in Tables 102 There is an increase in Intensivist FTE of 8.5 from the preceding year.

Table 101. Specialist FTE by region, ICU Type and ICU Level

	Intensivist FTE	Other Specialist FTE	Total FTE
Region			
North Island	37.9	12.1	50.0
South Island	7.2	5.4	12.6
ICU Type			
General ICU	33.9	9.6	44.1
ICU/CCU	1.6	6.4	8
PICU/CTICU	9	1.5	10.5
ICU Level			
Level 3	33.9	3.5	37.4
Level 2	10.2	10	20.2
Level 1	1	4	5
New Zealand	45.1	17.5	62.6

Table 102. Distribution of Specialists by region.

Region ⁽⁵⁷⁾	Available Beds/Spec FTE	Ventilator Beds/Spec FTE	Specialists/100,000	Intensivists/100,000
North Island 3,047,900	3.26	2.36	1.64	1.24
South Island 961,600	4.05	2.46	1.31	0.75
New Zealand	3.42	2.38	1.56	1.12

3.7.1 SPECIALIST VACANCIES

Table 103 shows the number of specialist FTE positions funded, but unfilled. The vacancy rate as a percentage of the total funded specialist FTEs is also shown.

The vacancy rates have decreased from the previous year's figures. In the 2001/2002 survey, the overall vacancy rate was 13.5 with rates of 13.9 in the North Island and 11.0 in the South Island.

Table 103. Specialist FTE Vacancies

Region	Total Specialist FTEs	Reported FTE Vacancies	Vacancy Rate
North Island	50	6.1	10.9
South Island	12.6	1.5	10.6
New Zealand	62.7	7.6	10.8

Some basic extrapolations of the data have been made to explore the implications of applying AMWAC⁽³⁵⁾ recommended levels of medical staffing for level 3 hospitals.

Figures have been calculated using 4 and 5 FTE per 10 available beds. These simple calculations were performed as an exercise to examine the differences in current supply and demand, and are shown in Table 104.

Table 104. Specialist FTE Benchmarks.

	Total Spec FTE's	Recommend FTE of 4	FTE Gap	Recommend FTE of 5	FTE Gap	FTE Vacancies
Region						
North Island	50	58.8	8.8	73.5	23.5	6.1
South Island	12.6	20.4	7.8	25.5	12.9	1.5
New Zealand	62.6	79.2	16.6	99	36.4	7.6

Source: As recommended by AMWAC⁽³⁵⁾

3.7.2 DIRECTORS QUALIFICATIONS

All Level 3 directors hold a JSAC-IC recognised qualification while 5/9 55.6% of Level 2 directors hold that qualification. Of the 8 Level 1 ICU directors, only one holds the qualification.

3.7.3 REGISTRAR AND RESIDENT FTE

The ICU Registrar and Resident profile as at 30/6/03 is shown in Table 105. NZJSAC-ICM Registrar FTE refers to the number of Registrar FTE's in the training program. Registrar FTE refers to those not in the training program. The Joint Faculty of Intensive Care Medicine has provided numbers of 'active' registered ICU trainees in New Zealand by year (census in May of each year). 2002: 22, 2003: 30 trainees.⁽⁴⁰⁾

Resident FTE relates to dedicated ICU staff only and other resident FTE relates to those residents who work in ICU and the general hospital – provide non-emergency services outside ICU. The number of registrars in the training program has increased slightly this year from 7 in 2001/2002 to 10 in the current survey. The registrar FTE has decreased from 60 to 57.5. Other resident FTE has increased by 3.

Table 105. Registrar and Resident FTE by Location, ICU Type and ICU Level

	NZJSAC-ICM Registrar FTE (training)	Registrar FTE	Resident FTE	Other Resident FTE
Region				
North Island	8	42.5	6.5	2
South Island	2	15	0	2
ICU Type				
General ICU	8	46	5.5	0
ICU/CCU	0	0	1	4
PICU/CTICU	2	11.5	0	0
ICU Level				
Level 3	10	51.5	0	0
Level 2	0	6	6.5	2
Level 1	0	0	0	2
New Zealand	10	57.5	6.5	4

3.8 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.⁽⁴²⁾

RN FTE as presented in the following tables was to include all nursing staff (e.g., educators, nurse unit managers (NUMS), Liaison nurses and students).

The actual number of nurses (headcount) was to include the same group of nurses. For the purposes of the survey a critical care qualification was defined as an award at a minimum of certificate level obtained by successful completion of an accredited critical care program (≥ 6 months duration) at a hospital or tertiary institution. All units have responded to each question unless otherwise stated.

3.8.1 ENROLLED NURSES

In the current survey a number of questions were included to examine the extent of enrolled nurses working in intensive care settings.

An enrolled nurse is defined in the Nurses Act 1977 as a nurse whose name is recorded on the Roll of Nurses.⁽⁶⁴⁾ Legislation is in place to restrict the scope of practice for enrolled nurses which requires they work under the supervision of a medical practitioner or a registered nurse. Importantly, until recently, there have been no enrolled nurse training programs offered in New Zealand since 1993.⁽⁶⁴⁾

Work force statistics show that in 2004 there were 3824 active enrolled nurses in New Zealand with 3 of these working in intensive care settings.⁽⁶⁴⁾ There have been recent initiatives in New Zealand, to ensure that DHB's employ enrolled nurses within their scope of practice.

In May 2003 the Ministry of Health jointly with the Nursing Council sent letters to DHB's reminding them that enrolled nurses were only to work with people with 'predictable health outcomes in situations that do not call for complex nursing judgment'^(64;65). With this in mind, it is not surprising that the numbers of enrolled nurses employed in ICU in New Zealand is negligible. Our survey, looking at 2002/2003 captured no enrolled nurses working in ICU at that time.

3.8.2 NURSE WORKFORCE

Table 106 presents the findings of questions relating to critical care RN Full Time Equivalent (FTE); actual number of RNs (headcount), and the number of RN's working full time.

There has been an increase in the reported number of RN FTE this year. The total RN FTE has risen from 740.2 in 2001-2002 to 775.7 this year. The headcount of RNs has increased from 979 in 2001/2002 to 992 this year.

Table 106. RNs summary statistics by Location, Type and Level

	RN FTE	Total RNs (Headcount)	No RNs Full-time(> 35 hours/week)
Region			
North Island	621.9	793	419
South Island	153.8	199	87
ICU Type			
General ICU	521.8	659	312
ICU/CCU	130.7	164	69
PICU/CTICU	123.2	169	125
ICU Level			
Level 3	462.6	590	379
Level 2	205.2	274	77
Level 1	107.9	128	50
New Zealand	775.7	992	506

One South Island hospital did not provide staff numbers this survey period so information from the 2001/2002 survey period was included for that hospital. In Table 107 the numbers of RNs and ENs who reported to the Nursing Council of New Zealand that they were working in intensive care/coronary care over the 3-year period 2001-2003 are presented.

Table 107. RNs summary between 2001 and 2003.

	2003 ^(66;67)	2002 ⁽⁴²⁾	2001 ⁽⁴²⁾	2000 ⁽⁶⁸⁾
RN	1,424	1,451	1,452	1,409
EN	4	5	6	-

3.8.3 CRITICAL CARE CERTIFICATION

The following questions were answered by varying numbers of hospitals (see Tables 108 and 109). The percentage responding is reported in parentheses.

Table 108. RNs with a Critical Care Qualification summary statistics.

	RNs with a Critical Care Qualification FTE	RNs with a Critical Care Qualification Headcount	% RN with a Critical Care Qualification Headcount
Region			
North Island	157.1 (41%)	361 (88.9%)	45.5
South Island	47.7 (71%)	100 (85.7%)	52.6
ICU Type			
General ICU	93.5 (38.5%)	319 (92.9%)	48.4
ICU/CCU	37.7 (55.5%)	59 (77.7%)	36
PICU/CTICU	73.5 (100%)	83 (100%)	49.1
ICU Level			
Level 3	130.4 (57.1%)	291 (100%)	49.3
Level 2	52.3 (55.5%)	105 (88.8%)	38.3
Level 1	22 (37.5%)	65 (75%)	54.6
New Zealand	204.7	461	46.5

Table 109. RNs with a Critical Care Qualification summary statistics

	RNs who will graduate with CCC Headcount	RNs with CCC* who have RTW in 2002/2003	RNs who resigned in 2002/2003 Headcount
Region			
North Island	24	24	131
South Island	12	5	23
ICU Type			
General ICU	24	19	92
ICU/CCU	12	2	20
PICU/CTICU	-	8	42
ICU Level			
Level 3	16	25	93
Level 2	17	4	48
Level 1	3	0	13
New Zealand	36	29	154

Note: *CCC = Number of Nurses with Critical Care Qualifications.

The percentage of RNs with a critical care qualification has not changed dramatically over the past 2 surveys. This is important to note in the face of current workforce planning issues. The ACHS Guidelines⁽⁴⁶⁾ state that ICUs must have a minimum of 50% qualified critical care nurses. The ACCCN supports the ACHS guidelines as a minimum standard but assume an optimum number of critical care qualified nurses would be 75%.⁽⁴⁷⁾

Units without these numbers of qualified staff are urged by the ACCCN guidelines to make provision to increase numbers of qualified staff.⁽⁴⁷⁾ Our figures over the past 3 survey periods show that no major gains are being made to attract or train qualified ICU RNs. With the ageing of the population and increasing technological advances, this would seem to be a high priority for the future.

The issues facing the health workforce globally are many. Central to planning for the future is the need to look at an integrated strategy for the management of the health workforce as a whole, but also at a specialty level. RNs with critical care certificates returning to work are only making up 18% of the total number of nurses leaving the ICU environment.

Continued enhancement of skills and retention of trained staff must be a high priority. Units were asked to report the maximum number of RNs in their graduate year rostered in the unit at any one time. Answers ranged between 3 and 8. Level 3 hospitals overall, allowing more graduates to be rostered at one time than the level 1 and 2 hospitals as would be expected.

3.8.4 NURSING WORKFORCE RETENTION

Units were asked to specify the destination of RNs who had resigned in the 2002/2003 financial year. The information is reported in Tables 110 and 111.

21 units provided information on total resignations: The RN staff turnover can be calculated from the RN head count and RN resignation. The annual RN turnover for NZ was 15% and ranged from 3% - 50%, median 13%. The data is not very detailed, but allows some insight into the issues that could be addressed. Firstly and perhaps most modifiable, may be the prevention of loss of nurses to other nursing positions. This group made up 26% of the RNs who left ICU and could be explored in greater detail. With the large number (23%) leaving for parenting, another area at which attention should be directed is the retention of trained and /or experienced staff, which may be able to utilise the facilities offered by family friendly workplaces.

Table 110. Destinations of RN's.

	RN FTE	Total No. of RNs Headcount
Other Permanent Nursing Position	18.6	41
Travel	31.1	36
Other Permanent Critical Care Position	36.9	31
Parenting	7.8	23
Unknown	2.4	9
Casual Nursing	1.9	6
Non-nursing Work	3.2	6
Retired/Deceased	1.4	2
New Zealand	103.3	154

Table 111. RN FTE, Vacancies & Vacancy Rates by Location, ICU Type and ICU Level.

	RN FTE	RN FTE Vacancies	Vacancy Rate (%)
Region			
North Island	621.9	23.7	3.7
South Island*	153.8	4.9	3.1
ICU Type			
General ICU	521.8	16.6	3.1
ICU/CCU	130.7	2.2	1.7
PICU/CTICU	123.2	9.8	7.4
ICU Level			
Level 3	462.6	21.8	4.5
Level 2	205.2	4	1.9
Level 1	107.9	2.8	2.5
New Zealand	775.7	28.6	3.6

Note: *6/7 South Island Hospitals responded

The overall vacancy rate has remained stable this year after it's fall from a high point of 5.7 in 2000/2001⁽¹⁾ to 3.6 in 2001/2002⁽⁴⁾ and 2002/2003.

3.8.5 CASUAL EMPLOYMENT OF REGISTERED NURSES

Information was collected on the hours worked by casually employed RNs. This was to include nurse bank/pool agency to cover roster shortfalls but not ad-hoc shortfalls such as sick leave. This was requested as average hours per month for each unit in the 2002/2003 financial year.

Additionally, a question in the survey requested data on hours worked by permanent staff in excess of contracted hours to covered roster shortfalls. The averages per month are reported in Table 112.

Although the casual hours were submitted as an average monthly figure for each unit, they can be compared to the rostered hours to give a ratio. 8 units reported 0 hours, the overall ratio was 1.5% of rostered hours and ranged from 0 - 17%; median 1%. The smaller units reported a higher % use of casual staff. Extra shifts by permanent staff were 1% of roster shifts (range 0% - 4.5% median 1%).

Table 112. RN Casual Hours, Overtime, by Location, ICU Type and ICU Level by Public Hospital.

	Mean (SD) RN Casual Hours Worked/month	Mean (SD) RN Overtime Hours Worked/month
Region		
North Island	76.1 (92.2)	65.1 (68.8)
South Island	81.3 (124.5)	64.4 (104.4)
ICU Type		
General ICU	80.9 (96.0)	79.9 (90.9)
ICU/CCU	61.1 (104.9)	49.40 (42.4)
ICU Level		
Level 3	115.6 (78.6)	97.3 (103.6)
Level 2	72.0 (116.0)	55.3 (62.4)
Level 1	50.6 (98.7)	43.7 (52.4)
New Zealand	77.6 (99.8)	64.9 (75.4)

Hours of ICU nurse educator time was collected. We asked respondents to tell us the average number of rostered hours per week an ICU nurse educator works in their unit. This time included clinical time and lectures on the hospital site, but not time spent at another educational institution. For this reason, we've presented in Table 113, the total and mean hours per week.

Table 113. Weekly Nurse Educator hrs & Median Nurse Educator Hours.

	Total Hours Nurse Educator(s) per week	Mean Hours Nurse Educator (per week)
Region		
North Island	384	22.6
South Island	88	12.6
ICU Type		
General ICU	351	25.1
ICU/CCU	16	2
ICU Level		
Level 3	352	44.0
Level 2	104	11.6
Level 1	16	2.3
Total	472	19.7

Table 114 contains the distribution of RN FTE's per available and ventilator bed and the number of RN FTE's per 100,000 population.

Table 114. RN FTE Distribution by region.

	RN FTE/Available Bed	RN FTE/Ventilator Bed	RN FTE/100,000
Region ⁽⁵⁷⁾			
North Island 3,047,900	3.8	5.3	20.4
South Island 961,600	3.0	5.0	16.0
Total	3.6	5.2	19.4

3.8.6 ESTIMATING REQUIRED REGISTERED NURSES FTEs

A number of recommendations and standards have been proposed that include methods for estimation of clinical nursing requirements for intensive care.^(26;32;34;46;50-55;69)

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 Table 115. 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.⁽⁵⁰⁾

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.⁽⁵⁰⁾ These simple calculations were performed as an exercise to examine the differences in current supply and demand. The required RN FTE projections proposed is the minimum number of RN FTE likely to be required, and are less than those proposed by the Audit Commission in England with 6.3 nurses/bed,⁽⁵⁴⁾ and in Australia by Williams and Clarke, with 6.7 nurse FTE/ICU bed and 3.89 nurse FTE/HDU bed⁽⁵¹⁾.

Table 115. Recommended RN FTE for Available Beds by ICU Level.

ICU Level	RN FTE	Recommended RN FTE	RN FTE Gap	No RN FTE Vacancies
Level 3	462.6	534	71.4	21.8
Level 2	205.2	264	58.8	4
Level 1	107.9	86	-21.9	2.8
Total	775.7	884	108.3	28.6

*Source: Ferdinande et al (1997)⁽⁵⁰⁾

These figures are predicated on maintaining a full complement of available beds (no assumptions re occupancy levels, ICU bed type and RN skill mix) and include clinical, management and education RN FTE positions. The amount of time spent by the Nurse Unit Manager on direct patient care is shown in Table 116.

Table 116. Nurse Unit Manager: % Time (FTE) on Direct Patient Care.

ICU Level	0%	1- 25%	26-50%	51-75%	76-100%
Level 3	50	37.5	14.3	0	0
Level 2	11.1	22.2	22.2	44.4	0
Level 1	37.5	12.5	37.5	0	12.5

The percentage of time on direct patient care by a NUM was categorised as above. Of the total, 8 (32%) indicated that they spent no time on direct patient care, 6 (24%) that they spent between 1% and 25% of their time, 6 (24%) between 26 and 50%, 4 (16%) between 51 and 75% and only one, (4%) that they spent the majority of their time (>75%) on direct patient care.

3.8.7 ACCESS NURSES

In the Australian College of Critical Care Nurses Ltd (ACCCN) position statement on intensive care nursing staff,⁽⁴⁷⁾ ACCESS nurses have been recommended as one of the ten key points and principles that units should meet to attain the expected standards of critical care nursing in Australia. According to the position statements, ACCESS nurses 'provide on the floor Assistance, Coordination, Contingency, Education Supervision and Support'. Only two hospitals reported that they had an access nurse. Both hospitals reported that they had one person per shift in this role.

3.9 QUALITY OVERVIEW

The survey sought responses to questions on a range of quality issues. Two hospitals indicated that they had initiated a new post discharge review process. There were no new ICU outpatients clinics established. One general ICU indicated the formation of a MET Team during this year. The other 2 MET teams in New Zealand were established during 1995 and 1999. Two hospitals indicated that they utilised a bedside clinical information system. An additional 9 hospitals indicated that they planned to implement one within a 5-year period.

When asked if their ICU had a formal audit of morbidity and/or mortality quality assurance meetings, 16 (64%) indicated this system was in place. Of these, 12 indicated that minutes were taken (75%) and 1 respondent did not know whether minutes were taken. Of the 16 ICUs conducting these meetings 9 indicated that the meetings were proclaimed under the relevant QA legislation, 5 were unsure, and 2 said the meetings were not proclaimed.

3.9.1 CONSENT ISSUES

Respondents were asked if, for an intubated & ventilated patient, they would seek specific, written consent for the performance of a number of invasive procedures. Only one hospital (4.2%) specified they would seek specific consent for the insertion of a central line. The majority of hospitals 19 (76%) said they would seek specific consent for percutaneous tracheostomy. None of the respondents said specific consent would be obtained for arterial line insertion in their unit. One unit responded they would seek consent for each of haemofiltration and bronchoscopy. For chest drain insertion, 4 (16%) hospitals responded that specific consent for the procedure would be obtained.

3.9.2 POTASSIUM ADMINISTRATION

Another area of interest was standardising methods of potassium administration. One question addressed the issue of the type of packaged K⁺ provided to the ICU by pharmacy, 23 (92%) indicated these were supplied. No hospital indicated that pharmacy supplied 100ml premix bags, 14 (56%) indicated 1 litre premix crystalloid solution with potassium was supplied and no hospital indicated that they were routinely supplied with another potassium preparation. Seven (28%) ICUs reported having a K⁺ administration protocol. Only one hospital actually provided a copy in response to that request.

3.9.3 REMOTENESS AND RETRIEVALS

Only 3 hospitals reported being located in a population centre of less than 48,000, of these, population catchments reported were between 35,000 and 46,000. Fifteen hospitals (60%) indicated that they provided retrievals service. Of that total, 12 (80%) were coordinated by intensive care units, one, by the anaesthetic department, one by a combination of ICU and anaesthetic departments and one independent. This information will be utilized in a 2005 ARCCCR project that will further characterise retrieval services in Australia and New Zealand.

3.9.4 KEY AUDIT PARAMETERS

Figure 28 presents information collected on ICU audit indicators for New Zealand.

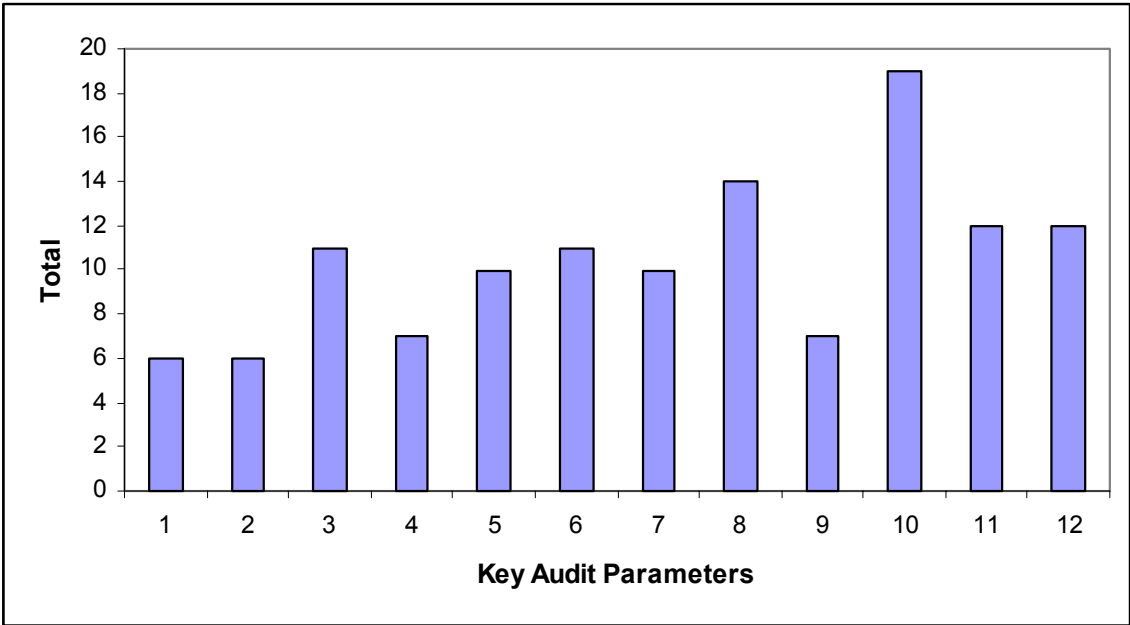


Figure 28. ICU Audit Overview.

- | | |
|--------------------------|----------------------|
| 1 Out-of-hours discharge | 7 MRSA surveillance |
| 2 Discharge delay | 8 ICU LOS |
| 3 Family satisfaction | 9 Hospital LOS |
| 4 Infection - pneumonia | 10 Mortality audit |
| 5 Infection - line | 11 ICU outcomes |
| 6 Bacteraemia | 12 Hospital outcomes |

3.10 FINANCIAL INFORMATION

In the current survey, the ARCCCR, for the first time, endeavoured to collect financial data from ICUs in New Zealand. It was felt that collecting financial information would be an interesting and important exercise from a number of perspectives. There was also acknowledgement that it was difficult to predict how many units would be able to provide information and to what level of complexity. As perhaps expected, data submitted varied greatly in quality and quantity. Some hospitals had no control over or idea of their budgets some refused to provide the information and some were able and willing to provide budget information in a very detailed format.

Definitions were provided on a facing page to facilitate the accurate completion of the budget estimates survey. The data collection instrument (questionnaire) for this section is included as part of Appendix 1. In summary, respondents were asked to record the budget allocated to the ICU in their hospital. They were asked to place ticks in boxes to indicate the inclusion or not of items in the budget figure. If staff budget was unknown, respondents were asked to provide FTE details so an estimate of costs may have been possible.

18 units returned data (72%). The sum of all annual budgets was \$80,434,811. This represented 130 of 176 (74%) available beds or 118 of 140 (84%) ventilated beds. Extrapolating using 80% estimates a total budget of \$100,543,000 for intensive care. This represents 1% of all New Zealand Health Expenditure. In addition, a question was included to ascertain whether the units have a regular capital budget, 8 units (32%) responded in the affirmative. Of those who said they did have a regular capital budget, 6 units (75%) provided the figure (Min: \$12,000, Max: \$170,000, Mean: \$104,691).

For those units who indicated they did not have a regular capital budget, they were asked to state their expenditure on major items such as monitors, ventilators and haemofiltration equipment in the 2002/2003 financial year. Only 5 hospitals listed any items in this category. In response to a question about whether the respondent would be able to provide further financial information, only 8/25 (32%) hospitals said they could assist.

3.10.1 CONTACT DETAILS

The ARCCCR is asked by various organisations and individuals for contact details for non commercial, professional contact purposes. The ARCCCR does currently work with other ANZICS entities to ensure contact information for individuals and ICUs is up to date; however, the ARCCCR due to privacy considerations/legislation does not release information without consent. Survey respondents endorsed this stance. Current ARCCCR policy will remain in place and no information will be released to a third party (outside ANZICS) without specific consent.

3.11 PRIVATE SECTOR ICUs

Data was received from two New Zealand private sector hospitals that offered critical care services.

Both of these ICUs were located on the North Island. An overview of ICU characteristics and activity is presented below. Data has only been included in the table if there was a response from both ICUs.

Table 117. Two private hospitals with ICU.

DEMOGRAPHIC CHARACTERISTICS	NUMBER
No. of ICUs:	2
ICU Type:	Cardiothoracic
ICU Level:	1
Physical Beds:	10
Available Beds:	10
Ventilator Beds:	8
Total Admissions:	769 (includes 74 HDU admissions)
No. Invasively Ventilated:	494
RN FTE:	16
No RNs on roster:	26
No. RN's full-time	4
No. Crit. Care Qual:	7
RN FTE Vacancies:	0
RNs resigned	2
Nurse Educator FTE:	0
Nurse Unit Manager % of time (FTE) on direct patient care	5% at one hospital 20% at the other.

SECTION FOUR

COMPARATIVE DATA

4. ARCCCR COMPARATIVE DATA

4.1 AUSTRALIAN COMPARATIVE DATA

Calculations for the 2002/2003 figures include estimates from 2001/2002 figures from non-responding hospitals for comparative purposes. In those cases, we have assumed there has been no change in bed numbers or staffing.

Table 118. Comparative ARCCCR Data

Item	1997 ⁴	1998 ³	1999/2000	2000/2001	2001/2002	2002/2003
Hospitals	153	148	170	171	171	167
ICUs	163	153	170+	171+	171+	167
Public sector ICUs	112	112	115	116	118	110
Private sector ICUs	42	41	55	55	53	57
Physical Beds	1,589	1,646	1,912	2,027	2,112	2,125
Public & Private sectors						
Available Beds	1,387	1,420	1,672	1,803	1,844	1,859
Public & Private sectors						
Ventilator Beds	1,004	1,047	1,187	1,240	1,244	1,228
Public & Private sector						
Level 3 ICU Available Beds	664	838	951	998	1,033	1,071
Public & Private Sectors						
Level 2 ICU Available Beds	496	423	494	547	594	580
Public & Private Sectors						
Level 1 ICU Available Beds	217	159	227	258	217	207
Public & Private Sectors						
Available Beds/100,000	5.5	5.58	6.02	6.52	6.55	6.4
Public sector						
Ventilator Beds/100,000	4.2	4.07	4.44	4.51	4.46	4.3
Public sector						
Available Beds/Specialist FTE	4.3	4.6	4.71	5.26	4.69	4.6
Public sector						
Nurse FTE/Available Bed	3.9	3.26	3.21	3.51	3.71	3.8
Public sector						

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

4.2 NEW ZEALAND COMPARATIVE DATA

The ARCCCR has collected comparable data for New Zealand since 1997. The results are presented in Table 119.

Table 119. Comparative ARCCCR Data.

Item	1997	1998	1999/2000	2000/2001	2001/2002	2002/2003
Hospitals	25	24	26	28	27	27
ICUs	25	23	26+	28	27	27
Public sector ICUs	21	23	25	25	25	25
Private sector ICUs	n/a	n/a	1	3	2	2
Physical Beds – Public sector	198	225	261	256	250	247
Available Beds – Public sector	155	177	228	225	220	214
Ventilator Beds – Public sector	127	154	173	167	168	149
Level 3 ICU Available Beds	80	74	100	108	111	101
Public sector						
Level 2 ICU Available Beds	62	77	96	46	74	66
Level 1 ICU Available Beds	13	26	32	71	35	47
Available Beds/100,000	4.3	4.7	6	6	5.7	5.3
Public sector						
Ventilator Beds/100,000	3.5	4.1	4.5	4.5	4.4	3.7
Available Beds/Specialist FTE	3.9	3.1	4.1	5.6	4.3	3.4
Nurse FTE/Available Bed	3.6	3.3	3.1	3.1	3.4	3.6

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.

4.3 INTERNATIONAL COMPARATIVE DATA

International comparators for intensive care beds are frequently sought to enable benchmarking of critical care services. Reviewing the literature on critical care services however, demonstrates the difficulties in comparative analysis across international boundaries.

The composition of ICU beds and service types is not always clearly articulated in the literature and this raises a number of questions associated with the benchmarking of resources. What is meant by an ICU bed? Where are these beds located? Do the beds refer to adult and/or paediatric services (as in Australia and New Zealand)? How are these beds staffed and funded? What are the contexts of care for ICU patients in international settings? Despite the many uncertainties, there are some similarities and an attempt at understanding is shown in Table 120.

Table 120. Critical care beds, international comparisons

Country/Region	Year	ICUs	Critical Care Beds	Critical Care Beds as % Available Hospital Beds#	Available Critical Care Beds/100,000
Australia ^a	2002/2003	110	1,274*	2.6	6.4
New Zealand ^a	2002/2003	25	214	1.7	5.4
England ^b	2003 ^(70;71)	169	3,128		6.3
Scotland ^c	2001 ^(71;72)	25	137		2.7
Northern Ireland ^d	1998 ^(71;72)	11	57		3.4
USA ^e	1992 ^(73;74)	597,959	7,760,058	8.057	
	1997 ⁽⁷⁵⁾			6.358	
Canada ^f	1989 ⁽⁷⁶⁾			4.1	11.2
UK	2002 ⁽⁷⁷⁾				3-5
Germany	2002 ⁽⁷⁷⁾				25
Switzerland	2002 ⁽⁷⁷⁾				11
The Netherlands	2002 ⁽⁷⁷⁾				10
Italy	2002 ⁽⁷⁷⁾				4-9
USA	2002 ⁽⁷⁷⁾				24 [^]

Note: **a:** public sector ICUs – includes specialty and integrated ICU/HDU/CCU beds \geq Level 1 (JFICM); **b:** NHS Trust hospitals – includes specialty, general & HDU beds (Levels 2 & 3) [1,731 ICU & 1,397 HDU available beds]; **c:** ICU funded beds [? Does not include any HDU beds]; **d:** ICU and ICU/HDU beds (excludes stand alone HDU beds); **e:** non coronary ICUs included public/private sector; **f:** ICU beds - Ontario province. Critical care beds per 100,000 residents is for beds affiliated with faculties of medicine # Public beds only ; * includes available critical care beds reported in 2000/2001 for non responders to the 2001/2002 survey assuming no change, ^ approximate number

SECTION FIVE

JFICM INFORMATION

5. ACCREDITED 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.⁽⁷⁸⁾

Duration of core training is restricted according to the classification of the ICU by the JFICM.⁽¹²⁾

At the start of the 2004 Hospital year the S3 classification was disbanded. As information pertaining to these units is no longer relevant, the new classifications have been used to increase the comparability of the data in future years.⁽⁷⁹⁾ In the past, S3 units, allowed trainees to gain specific clinical exposures.

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

5.1 NUMBER OF ICUS/ICU LEVEL/HOSPITAL SECTOR

Of the 62 ICUs in Australia (n = 54) and New Zealand (n = 8) (C24: 31; C12: 19; C6: 12) 55 Level 3 ICUs; 7 Level 2 ICUs

PUBLIC SECTOR:

JFICM LEVEL – C24:

- Level 3: n = 25

JFICM LEVEL – C12

- Level 3: n = 14
- Level 2: n = 3

JFICM LEVEL – C6

- Level 3: n = 3
- Level 2: n = 4

ICU TYPE:

- General ICU: n = 51
- ICU/CCU: n = 2
- Cardiothoracic: n = 1
- PICU: n = 8

ACCESSIBILITY REMOTENESS INDEX AUSTRALIA (ARIA):

- Highly Accessible: n = 52
- Accessible: n = 2

PRIVATE SECTOR:

- Level 3: n = 1

- Level 3: n = 1

- Level 3: n = 3

ICU LOCATION:

- Capital City: n = 46
- Metropolitan: n = 7
- Rural: n = 1
- New Zealand*: n = 8

SERVICE CENTRE (POPULATION) CATEGORY:

- > 250,000: n = 45
- 48,000 - 249,000: n = 8
- 5,000 – 17,999: n = 1

Table 121. ICU Bed Stock (includes HDU / CCU / other beds)

Classification	Physical Beds	Available Beds	Ventilator Beds
C24 (n=31)	772	623	513
C12 (n=19)	261	221	179
C6 (n=12)	143	125	108
Total (n=62)	1176	969	800

Table 122. Classification Data for Australian ICU Available Beds

Classification	Available beds minimum	Available beds maximum	Available beds median	Available beds (IQR)
C24	9	44	19.5	13.8; 28
C12	5	21	10	8;15.8
C6	5	18	10.5	6.8;13

Table 123. Classification Data for New Zealand ICU Available Beds

Classification	Available beds minimum	Available beds maximum	Available beds median
C24	10	24	10.5
C12*	9	9	9
C6 [#]	8	16	12

Note: *Only 1 hospital in this category reported ICU bed numbers, # Only 2 hospitals in this category reported ICU bed numbers

Table 124. Admission Data

Classification	ICU Admissions	CCU Admissions	HDU Admissions	Other Admissions	Total Admissions
C24	32,027		5,822	6,151	44,000
C12	9,712	2,776	1,229	2,423	16,140
C6	6,983	1,169	500	2,377	11,029
Total	48,722	3,945	7,551	10,951	71,169

ICU ADMISSION DATA FOR EACH CLASSIFICATION FOR AUSTRALIA:

- C24: 595 Minimum No. ICU admissions; 1,852 Maximum no. of ICU admissions; Median (IQR) no. ICU admissions; 1100 (776, 1,341)
- C12: 296 Minimum No. ICU admissions; 1,299 Maximum no. of ICU admissions; Median (IQR) no. ICU admissions; 507.5 (476, 697.5)
- C6: 293 Minimum No. ICU admissions; 1,202 Maximum no. of ICU admissions; Median (IQR) no. ICU admissions; 486 (371, 922.8)

Seven C12 ICUs had 500 or less ICU admissions in 2001/2002

Two C6 ICUs had less than 350 admissions in 2001/2002

Table 125. ICU Bed Hours/Days and Ventilator Hours/Days

Classification	Bed Hours	Bed Days	Ventilator Hours	Ventilator Days
C24	1,412,183 ^a	66,011	833,370.3 ^d	23,786.0
C12	277,485 ^b	25,034	194,178 ^e	7,571.0
C6	230,118 ^c	16,288	156,111.1	2,987.0
Total	1,919,786	107,333	1,183,659.4	34,344.0

Note: a - data not reported by 3 C24 units; b - data not reported by 4 C12 units; c - data not reported by 3 C6 units.

Table 126. No. of Patients Ventilated

Classification	No. Ventilated	No. Invasive Ventilation
C24 ^a	22,705	20,536
C12 ^b	6,254	5,732
C6	5,168	3,792
Total	34,127	0

Note: a - data not reported by 5 C24 units; b - data not reported by 2 C12 units; Assumed number ventilated = number invasively ventilated if not specified.

Table 127. Specialist FTE & Vacancies

Classification	Intensivist FTE	Other Specialist FTE
C24	159.5	1.1
C12	59.1	0.9
C6	23.9	5.8
Total	242.5	7.8

Table 128. Registrar FTE

Classification	JSAC-IC Registrar FTE	Other Registrar FTE
C24	101	187
C12	20	75.5
C6	11	46
Total	132	308.5

Table 129. RN FTE, Vacancies & RN FTE Vacancies

Classification	RN FTE	RN FTE Vacancies
C24	2,673.2	133.2
C12	952.3	47.9
C6	516.9	29.1
Total	4,142.4	210.2

Table 130. RN FTE, No. on Roster, & No. with Critical Care Qualification

Classification	RN FTE	RN's on Roster	RN's with Critical Care Qualification
C24	2,673.2	3,255	1,864
C12	952.3	1,177	677
C6	516.9	671	358
Total	4,142.4	5,103	2,899

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APPENDIX I



ANZICS RESEARCH CENTRE FOR CRITICAL CARE RESOURCES CRITICAL CARE RESOURCE SURVEY: 2002 – 2003 FINANCIAL YEAR (1/7/2002 – 30/6/2003)

Please complete all details, place in the pre-addressed envelope and submit by **30th April 2004**.
Refer to the enclosed documentation for glossary with data definitions and abbreviations.

Tick one box only unless otherwise specified. Please write clearly.

1. Hospital Name: _____

2. Number of Hospital Beds: _____
(average available beds)

3. Number of Hospital Separations: _____
(refer to glossary)

4. Hospital Type:

- Public Hospital
- Private Hospital
- Other (specify type) _____

5. CU Type:

- General ICU (integrated medical / surgical) ICU/CCU (integrated intensive care / coronary care)
- Cardiac Surgery ICU
- Paediatric ICU
- High Dependency Unit / Step Down / Special Care Unit
- Other (specify type) _____

6. Functional ICU Level: (refer to attached JFICM guidelines, note these have been updated since last survey)

- Level 3
- Level 2
- Level 1 (short term ventilation only)
- High Dependency Unit / Step Down / Special Care Unit (no ventilatory capacity)

7. Number of Critical Care Beds: List usual number of beds in each category for 2002/2003

	General Intensive Care	Dedicated Cardiac Surgery*	High Dependency**	Coronary Care***	Other ICU	Total No. Beds
Physical Beds						
Available Beds						
Ventilator Beds						

* Separate Cardiac Surgery ICU ** HDU beds managed by the ICU *** Integrated ICU/CCUs

8. Critical Care Admission Data: 2002/2003 (AORTIC users refer to enclosed documentation)

Admissions: all admissions including readmissions*

Readmissions: all readmissions including multiple readmissions for the same hospital episode of care*

Don't double count patients if transferred between ICU/HDU for same ICU/HDU admission

	General ICU	HDU	CCU	Other ICU*	Total
Admissions					
Readmissions					

* eg cardiac surgery / neurosurgical / other ICU

8a. All admissions:

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

Number of Invasive Ventilator Hours (preferred option) _____ or Number of Ventilator Days _____

Number of ICU/HDU Bed Hours (preferred option) _____ or _____ Number of ICU/HDU Bed Days.

8b. 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 _____

Medical Staff

9. Senior Medical Staff Profile as at 30/6/03:

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 _____

Does the ICU director hold an intensive care specialist qualification*? **yes / no**

* fulfils criteria for JFICM specialist recognition

9a. ICU Registrar Staff Profile as at 30/6/03:

Number of Registrar FTE in JFICM training program _____

Number of Registrar FTE (not in JFICM training program) _____

9b. ICU Resident / House Officer / Career Medical Officer Staff Profile as at 30/6/03:

Number of FTE (dedicated ICU staff only) _____

Number of FTE
(ICU / general hospital – provides non-emergency services outside ICU) _____

Nursing Staff Profile Data as at 30/6/03. This includes all nursing positions, RN and EN. Please refer to glossary before completing this section.

10a. Total number of **RN FTE** (*permanent / rostered positions*) include all nursing staff _____
eg. Educators, NUM's, Liaison, students

10b. Actual Number (headcount) of **RNs** (*permanent / rostered positions*) include all nursing staff _____
eg. Educators, NUM's, Liaison, students.

10c. Total number of **EN FTE** (*permanent / rostered positions*) include all positions _____
eg. Educators, NUM's, Liaison, students.

10d. Actual Number (headcount) of **ENs** (*permanent / rostered positions*) include all positions _____
eg. Educators, NUM's, Liaison, students.

10e. Please tell us as at 30/6/2003 how many...

RNs working fulltime (full time \geq 35 hours per week of paid employment) _____

ENs working fulltime (full time \geq 35 hours per week of paid employment) _____

Number of vacant **RN FTE** positions funded but unfilled _____

Number of vacant **EN FTE** positions funded but unfilled _____

10f. For the following questions, please place the 'headcount' first, i.e. the number of persons who are employed at varying fractional appointments to fill the FTE positions. I.e., the unit has 40 positions for RN's there are actually 48 RN's who fill those positions, please record this as 48/40

Headcount/FTE

_____/____ Permanently employed RNs with a critical care qualification

_____/____ Post-registration critical care course students who will graduate this year (02/03 financial year)

_____/____ Maximum number of RNs in graduate year rostered in unit at any one time

_____/____ RNs with critical care qualification who have returned to work in your unit from 01/7/02 30/6/03, (following a period of absence from nursing - including maternity leave).

_____/____ RN's who have resigned in the past 12mths
(include those on family leave with no committed re-commencement date)

10g Destination of resigned RNs

	Headcount / FTE	Destination	Headcount / FTE
other permanent critical care position	/	travel	/
other permanent nursing position	/	parenting	/
casual nursing work	/	unknown	/
non-nursing work	/		

10h. Please tell us the average hours per month

Worked by casually employed RN's (include nurse bank / pool / agency) to cover roster shortfalls (not ad-hoc shortfalls such as sick leave). _____

Worked by permanent staff in excess of contracted hours to cover roster shortfalls (as above). _____

Nurse Unit Manager - % time (FTE) on direct patient care. _____

Number of rostered hours per week of ICU nurse educator(s)
(include clinical / lectures on site but not at university / other educational facility) _____

Worked by ACCESS Nurse (as per ACCCN Staffing Guidelines) _____

Safety and Quality overview of ICU for 2002 / 2003: Please tick, circle, or list all applicable items.

- 11a.** Start Date: Medical Emergency Team (MET) / / not applicable
Start Date: Post ICU Discharge Review / / not applicable
Start Date: ICU Outpatients clinic / / not applicable

11b. Do you currently utilise a bedside clinical information system: **yes / no**

If no, do you plan to implement one within:

1 year **yes / no** 2 years **yes / no** 5 years **yes / no**

11c. Does your ICU have formal audit / morbidity & mortality /quality assurance meetings? **yes / no**

If yes Are minutes taken of the proceedings? **yes / no**
Are the meetings proclaimed under relevant QA legislation? **yes / no / unsure**

11d. For an intubated & ventilated patient in your unit would you obtain specific & written consent for the performance of:

Central line insertion	yes / no	Percutaneous tracheostomy	yes / no
Arterial line insertion	yes / no	Haemofiltration	yes / no
Bronchoscopy	yes / no	Chest drain insertion	yes / no

11e. There has been substantial interest in standardising methods of potassium administration in Australian & New Zealand ICUs.

Please indicate the packaged K+ preparations provided to your ICU by pharmacy.

Ampoules yes / no
1 litre premix crystalloid solution with potassium yes / no
100 ml premix bags yes / no
other: Please indicate type _____

11f. Do you have a K+ administration protocol?yes / no If yes, please attach a copy.

11g. Please tick the clinical indicators / key performance indicators utilised by your ICU.

<input type="checkbox"/> Refusal of appropriate admission to ICU	
<input type="checkbox"/> Readmission in less than 72 hours	
<input type="checkbox"/> Out-of-Hours discharge (between 2200 & 0700 hours)	
<input type="checkbox"/> Discharge delay	
<input type="checkbox"/> Patient / Family satisfaction	
<input type="checkbox"/> Infection rates:	<input type="checkbox"/> Patient Outcomes:
<input type="checkbox"/> Nosocomial pneumonia	<input type="checkbox"/> Mortality
<input type="checkbox"/> Line sepsis	<input type="checkbox"/> ICU Outcome
<input type="checkbox"/> Bacteraemia	<input type="checkbox"/> Hospital Outcome
<input type="checkbox"/> MRSA Surveillance	
<input type="checkbox"/> Length of Stay (LOS):	Other, please list
<input type="checkbox"/> ICU LOS	
<input type="checkbox"/> Hospital LOS	

Miscellaneous questions

12a. Information in previous surveys indicates that 25.8% of ICUs were located in centres with a population of < 48,000. We have not asked in the past for an estimate of your ICUs population catchment. If your ICU is located in a population centre of less than 48,000 please give an estimate of your catchment population. _____

12b. Does your hospital provide medical escorts for the interhospital / interfacility transport of patients who require, or potentially may require, admission to an ICU?Yes / No

If Yes, Who coordinates the service? (Please tick appropriate box)

Emergency Department Intensive Care Unit Anaesthetic Department.

This assessment is for the Financial Year 1st July 2002 -- 30th June 2003.

Instructions for completion of Budget Assessment Questions

Please record the budget allocated to the ICU in your hospital.

Please indicate by placing a tick in the appropriate column, which items are included in the total budget for your unit and what the amount is in the \$ column.

If you don't know the cost of an individual item, write *Don't know* in the \$ column. If staff budget figures are unknown, please fill in the FTE for that section so we are able to make an estimate of the costs.

Definitions for these items and references are printed on the facing page.

		Tick if included in ICU Budget	Tick if not included in ICU Budget	\$	Staff FTE
13a Total Budget for your ICU					
13b Budget Over run for your ICU					
13c Clinical Support Services					
	Total				
	Physiotherapy				
	Radiology				
	Lab services and tests				
	Blood Gas Analysis				
13d. Consumables					
	Total				
	Drugs				
	Fluids including colloids				
	Nutrition products				
	Blood products:				
	Disposables				
	Medical Gases				
13e. Staff					
	Total				
	Consultant Medical staff				
	Other Medical Staff				
	Senior Nursing Staff				
	Other Nursing Staff				
	Allied Health				
	Nursing Education				
	Non Clinical Staff				

Note:

Other items that contribute to costs are not included in the list as they are difficult to define or collect and make up <15% of total costs.

13f. Does your unit have a regular capital budget? **Yes / No**

If Yes, what was it for the 02/03 financial year? \$ _____

If no, what was the capital expenditure on items such as monitors, ventilators and haemofiltration equipment. If cost of items is unknown, please list the items purchased (for 02/03 financial year).

Item	Number	Item	Number
Item	Number	Item	Number
tem	Number	Item	Number

13g. Would you be able to help the ARCCCR with a more detailed financial review? **Yes / No**
(eg capital equipment, costs of estates, and non clinical support services) (please circle)

Definitions:

Note: these definitions **only** apply to the questions in the Intensive Care Budget Estimates Survey.

Clinical Support Services:

Physiotherapy: the annual cost of physiotherapy services determined by salaried costs of physiotherapists.

Radiology: the annual cost of radiology including all X-ray and other radiology costs. These costs will include salaried costs.

Laboratory services: costs of tests for ICU patients. Blood gas analysis: annual costs of blood gas analysis expended by the in ICU.

Consumables

Drugs: annual costs of drugs (parental, enteral, tablets etc).

Fluids: all intravenous fluids (including CRRT fluids) including 4% Albumin.

Nutrition products: the costs of enteral and parenteral feeds.

Blood products: the costs of all blood products (Red cells, platelets, clotting factor) excluding 4% albumin.

Disposables: all equipment/supplies used for patient care in the ICU that was for single or very limited use.

Medical gases: actual or a standard apportion of 30% of the total hospital bill for piped and non-piped gases.

Staff:

Staff for the purposes of this part of the survey is defined as all personnel employed partly or fully within intensive care. Include costs for leave (annual, sick, study etc), education, superannuation and insurance.

Consultant Medical: Specialist Medical staff (Intensive care, anaesthesia, medicine, paediatric).

Other Medical: All non-specialists (Registrars, Residents, SHOs, etc).

Senior Nursing: Nurses who coordinate, supervise, educate, teach, manage or lead.

Other Nursing: Nurses who provide direct patient care at the bedside (includes casual, bank & agency costs).

Allied Health: Staff working clinically within the ICU environment. This section would include all clinical staff other than medical, nursing and physiotherapy staff, for example, technicians, dieticians, pharmacists and respiratory therapists.

Non-clinical staff: Staff who work within the ICU environment but who have no clinical responsibilities. These would include secretaries, ward clerks, research and audit personnel and information technologists.

References:

Edbrooke D et al. *Anaesthesia* 1999 (54):110-120. The development of a method for comparative costing of individual intensive care units.

Edbrooke DL, Ridley SA, Hilbert CL, Corcoran M. *Anaesthesia* 2001 (56):208-216. Variations in expenditure between adult general intensive care units in the UK.

Jegers M, Edbrooke DL, Hibbert CL, Chalfin DB, Burchardi H. *Intensive Care Med.* 2002 (28):680-685. Definitions and methods of cost assessment: an intensivist's guide

APPENDIX II

THIS BOOKLET CONTAINS INFORMATION THAT WILL ASSIST YOU WHEN COMPLETING THE ARCCCR SURVEY FOR THE 2002 / 2003 FINANCIAL YEAR.

It includes:

- Glossary
- Abbreviations
- ANZICS Adult Patient Database instructions
- Minimum Standards for ICUs (JFICM document).

Please familiarise yourself with these documents prior to completing the survey form.

Glossary	
<i>Access nurses</i>	These nurses are in addition to bedside nurses, clinical coordinator, unit manager, educators and non-nursing support staff. The ACCESSS nurse provides Assistance, Coordination, Contingency, Education, Supervision and Support 'on-the-floor'
<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 availability may vary on a daily basis, state average number of available beds for financial year 2002/2003.
<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>Catchment population</i>	The number of people who may come to your hospital i.e., the number of people who would see your institution as their usual major hospital.
<i>Critical Care Qualification</i>	A post-registration award at a minimum of certificate level obtained by successful completion of an accredited critical care education program (≥ 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 (≥ 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 the JFICM.
<i>Invasive Ventilation</i>	Ventilatory support via oral/nasal intubation or tracheostomy tube.
<i>JFICM</i>	Joint Faculty of Intensive Care Medicine (Australian & New Zealand College of Anaesthetists / Royal Australasian College of Physicians).
<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>Post-registration</i>	Post-initial nurse registration.
<i>Physical Bed</i>	A single patient care location fully configured to ICU standards, it is an actual bed (or bed equivalent), not a bed space.
<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 ≤ 72 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 practice 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 the ICU: coronary care (CCU), neonatal intensive care (NICU), special care nursery, and other high dependency units e.g. neuro, respiratory, orthopaedic, 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>Ventilator Bed</i>	A physical ICU bed plus ventilator.
<i>Ventilation</i>	The process of respiratory support: Invasive - a patient is intubated (oral / nasal / tracheostomy) and mechanically ventilated. Non-invasive - 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:

ACHS Australian Council on Healthcare Standards
BiPAP Bi-level Positive Airway Pressure
CPAP Continuous Positive Airway Pressure
FTE (EFT) Full Time Equivalent
HDU High Dependency Unit
HECS Higher Education Contribution Scheme
ICU Intensive Care Unit
ICU/CCU Integrated Intensive Care / Coronary Care Unit / High Dependency Unit
JFICM Joint Faculty of Intensive Care Medicine
NICU Neonatal Intensive Care Unit



HOW TO FIND THE INFORMATION YOU NEED TO COMPLETE THE ARCCCR 2002/2003 SURVEY IN AORTIC AND A2A (ACCESS TO AORTIC).

Question 8 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 i.e. start date 01/07/2002 and end date 30/6/2003
5. Click on "Activity" in the "Report Type" option – this will bring up a list of Activity Reports
6. Select the "ICU Admission Numbers" from the Activity Reports list
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. Run the "Nature of Admissions" report. Add the emergency and elective ICU admissions. The total represents the number to complete the box 'general ICU'
10. Run the "Readmissions to ICU" report to obtain the readmissions numbers.
11. Run the "Ventilated" report to obtain the number of patients ventilated.
12. Click on "Stay" in the "Report Type" option – this will bring up a list of Stay reports
13. Run the "ICU Outcome" report. Enter the age range as 0-15 and select Summary for the report type. To obtain the number of patients for this age range total up the three diagnosis types (Post-Operative / Non-Operative / Unknown) listed at the end of this report.
14. Run the "Occupied Bed Days" report. Total these and fill in as number of ICU bed days.
15. Run the "Intubated Days of Care Provided" report. Total and complete these as number of ventilator days.

NB 1: Ventilation 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. 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, Project Manager, ANZICS Adult Patient Database on (03) 9340 3422 or via e-mail at adult.data@anzics.com.au.

Contact Tracey Higlett on (03) 9340 3433 or at tracey.higlett@anzics.com.au for general questions about the survey.

APPENDIX III

THE FOLLOWING IS AN EXTRACT FROM THE JOINT FACULTY OF INTENSIVE CARE MEDICINE, POLICY DOCUMENT REVIEW IC-1 (2003) "MINIMUM STANDARDS FOR INTENSIVE CARE UNITS"

INTRODUCTION

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

LEVELS OF INTENSIVE CARE UNITS

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

1.LEVEL III INTENSIVE CARE UNIT

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

A Level III Unit should have:

1.1 Work practice/caseload

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

1.2 Staffing Requirements

- 1.2.1 A medical director who is a Fellow of the Joint Faculty of Intensive Care Medicine. The medical director must have a clinical practice predominantly in Intensive Care Medicine.
- 1.2.2 Sufficient supporting specialist(s) so that consultant support is always available to the medical staff in the unit. For training units classified as C12 or C24 (refer Document IC-3 "Guidelines for Intensive Care Units seeking Accreditation for Training in Intensive Care Medicine") trainees must be exposed to at least two specialists who are Fellows of the Joint Faculty of Intensive Care Medicine. At least two specialists should have a minimum of 50% involvement in the unit. There should also be sufficient specialist staff to provide for reasonable working hours and leave of all types and to allow the duty specialist to be available exclusively to the unit at all times. The majority of attending specialists in the unit must be Fellows of the Joint Faculty of Intensive Care Medicine.
- 1.2.3 At least one of the specialists exclusively rostered to the unit at all times. During normal working hours this specialist must be predominantly present in the unit, and at all times be able to proceed immediately to it.
- 1.2.4 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience exclusively rostered and predominantly present in the unit at all times.
- 1.2.5 A minimum of 1:1 nursing for ventilated and other similarly critically ill patients, and nursing staff available to greater than 1:1 ratio for patients requiring complex management (e.g. ventricular assist device).
- 1.2.6 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical specialty of the unit.
- 1.2.7 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 1.2.8 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 1.2.9 At least one nurse educator.

1.2.10 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.

1.3 Operational Requirements

1.3.1 Defined management, admission, discharge and referral policies.

1.3.2 Demonstrable and documented formal audit and review of its activities and outcomes with staff who have dedicated time to collect and manage data.

1.3.3 A documented orientation program for new staff.

1.3.4 Educational programs for medical staff, and a formal nursing education program.

1.3.5 An active research program, preferably with staff who have dedicated time to collect and manage data.

1.3.6 Suitable infection control and isolation procedures and facilities.

1.3.7 24 hour access to pharmacy, pathology, operating theatres and tertiary level imaging services, and appropriate access to physiotherapy and other allied health services when necessary.

1.3.8 Appropriate clerical and secretarial support.

1.4 Design

1.4.1 A self-contained area, with easy access to the emergency department, operating theatres and organ imaging.

1.4.2 An appropriate design, providing a suitable environment with adequate space for patient care delivery, storage, staff accommodation (including office space), education and research.

1.5 Equipment and Monitoring

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

1.6 Suitability for training

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

2. LEVEL II INTENSIVE CARE UNIT

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

A Level II Unit should have:

2.1 Work practice/caseload

2.1.1 At least 4 staffed and equipped beds to adequately discharge clinical and teaching functions.

2.1.2 Sufficient clinical workload for maintaining clinical expertise and to provide adequate clinical exposure and education of intensive care staff, including trainees if relevant. This should normally be more than 200 mechanically ventilated patients per annum.

2.2 Staffing requirements

2.2.1 A medical director who is a Fellow of the Joint Faculty of Intensive Care Medicine. The medical director must have a clinical practice predominantly in intensive care medicine.

2.2.2 At least one other specialist who is a Fellow of the Joint Faculty of Intensive Care Medicine¹.

2.2.3 Sufficient specialist staff to provide reasonable working hours and leave of all types and to allow the duty specialist to be rostered and available exclusively to the unit.

2.2.4 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience exclusively rostered and predominantly present in the unit at all times.

2.2.5 A nursing staff: patient ratio of 1:1 for all critically ill patients.

2.2.6 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical speciality of the unit.

- 2.2.7 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 2.2.8 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 2.2.9 Access to a nurse educator.
- 2.2.10 Support staff as appropriate, eg biomedical engineer, clerical and scientific staff.

2.3 Operational Requirements

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

2.4 Design

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

2.5 Equipment and Monitoring

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

2.6 Suitability for training

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

3.LEVEL I INTENSIVE CARE UNIT

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

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

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

3.1 Work practice/caseload

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

A Level I Unit should have:

3.2 Staffing Requirements

- 3.2.1 A medical director who is experienced in intensive care medicine.
- 3.2.2 Consultant support, always available from a specialist with experience in intensive care medicine.
- 3.2.3 In addition to the attending specialist, at least one registered medical practitioner with an appropriate level of experience, rostered for the intensive care unit at all times.

- 3.2.4 A nursing staff: patient ratio of 1:1 for all critically ill patients.
- 3.2.5 A nurse in charge of the unit with a post registration qualification in intensive care or in the clinical specialty of the unit.
- 3.2.6 The majority of nursing staff with a post registration qualification in intensive care or in the specialty of the unit.
- 3.2.7 All nursing staff in the unit responsible for direct patient care being registered nurses.
- 3.2.8 Support staff as appropriate, eg. biomedical engineer, clerical and scientific staff.
- 3.2.9 A minimum of two registered nurses present in the unit at all times when there is a patient admitted to the unit.

3.3 Operational Requirements

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

3.4 Design

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

3.5 Equipment and Monitoring

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

3.6 Suitability for training

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

4. Paediatric Intensive Care Unit

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

A PICU should have:

4.1 Work practice/caseload

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

4.2 Staffing Requirements

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

majority of attending specialists in the unit should be Fellows of the Joint Faculty of Intensive Care Medicine.

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

4.3 Operational Requirements

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

4.4 Design

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

4.5 Equipment and Monitoring

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

4.6 Suitability for training

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

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

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

APPENDIX IV

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, GoldCoast-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

Australia: 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 V

PARTICIPATING HOSPITALS

AUSTRALIAN CAPITAL TERRITORY

Calvary Hospital
John James Memorial Hospital
The Canberra Hospital
National Capital Private

NEW SOUTH WALES

Albury Base Hospital
Armidale Hospital
Auburn Hospital
Bathurst Base Hospital
Blacktown Hospital
Brisbane Waters Private Hospital
Broken Hill Base Hospital
Campbelltown Hospital
Calvary Healthcare
Children's Hospital at Westmead
Coffs Harbour & District Hospital
Concord Repatriation Hospital
Dalcross Private Hospital
Dubbo Base Hospital
Fairfield Hospital
Gosford Hospital
Goulburn Base Hospital
Grafton Base Hospital
Griffith Base Hospital
Hawkesbury District Health Service
Hornsby Ku-ring-gai Hospital
The Hill Hospital
John Hunter Hospital
Kempsey District Hospital
Lake Macquarie Private Hospital
Lingard Private Hospital
Lismore Base Hospital
Liverpool Hospital
Manly Hospital
Manning River Base Hospital
Mater Misericordiae Private Hospital
Mona Vale Hospital
Mount Druitt 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
Shoalhaven District Memorial Hospital
St George Hospital
St George Private Hospital

St Vincent's Hospital (Sydney)
Sutherland Hospital
Sydney Adventist Private Hospital
Tamworth Base Hospital
The Illawarra Hospital
The Nepean Hospital
Tweed Heads District Hospital
Wagga Wagga Base Hospital
Westmead Hospital
Westmead Private Hospital

NORTHERN TERRITORY

Alice Springs Hospital
Royal Darwin Hospital

TASMANIA

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

NEW ZEALAND

Auckland Hospital
Christchurch Hospital
Dunedin Hospital
Gisborne Hospital
Green Lane Hospital
Grey Hospital
Hawkes Bay Hospital
Health Waikato
Hutt Hospital
Mercy Hospital
Middlemore Hospital
Nelson Hospital
North Shore Hospital
Northland Health Ltd
Palmerston North Hospital
Rotorua Hospital
Southland Hospital
Starship Children's Hospital
Taranaki Base Hospital
Tauranga Hospital
Timaru Hospital
Wairarapa Health
Wanganui Hospital
Wellington Hospital
Whakatane Hospital

VICTORIA

Alfred Hospital
Austin & Repatriation Medical Centre
Ballarat Health Services
Bendigo Health Care Group
Box Hill Hospital
Cabrini Hospital
Central Gippsland Health Service
Dandenong Hospital
Epworth Hospital
Frankston Hospital
Knox Private Hospital
Goulburn Valley Health
Monash Hospital – Clayton Campus
Latrobe Regional Hospital
Maroondah Hospital
Melbourne Private Hospital
Mildura Base Hospital
Peter MacCallum Cancer Institute
Royal Children's Hospital
Royal Melbourne Hospital
South West Healthcare - Warrnambool
St John Of God Health Care Ballarat
St John Of God Health Care Geelong
Northeast Healthcare
St Vincent's Hospital Melbourne
St Vincent's Mercy Private
The Northern Hospital
The Valley Private Hospital
Warringal Private Hospital
Western Hospital
Wimmera Health Care Group

QUEENSLAND

Allamanda Private Hospital
Bundaberg Base Hospital
Cairns Base Hospital
Goldcoast Hospital
Greenslopes Private Hospital
Hervey Bay Hospital
Brisbane Private Hospital
Holy Spirit Northside
Ipswich Hospital
John Flynn Private Hospital
Logan Hospital
Mackay Base Hospital
Maryborough Hospital
Mater Adults Hospital
Mater Misericordiae Children's
Mater Misericordiae Private Hospital
Mater Misericordiae Private Hospital Townsville

Caboolture Hospital
Mount Isa Base Hospital
Nambour General Hospital
Pindara Private Hospital
Princess Alexandra Hospital
Queen Elizabeth II Jubilee Hospital
Redcliffe Hospital
Rockhampton Hospital
Royal Brisbane Hospital
Royal Children's Hospital
St Andrew's Hospital Toowoomba
St Andrew's War Memorial Hospital
Sunnybank Hospital
The Prince Charles Hospital
The Wesley Hospital
Toowoomba Base Hospital
Townsville General Hospital

SOUTH AUSTRALIA

Ashford Community Hospital
Calvary Hospital Adelaide
Flinders Medical Centre
Flinders Private Hospital
Modbury Public Hospital
Mount Gambier Hospital
Repatriation General Hospital
Royal Adelaide Hospital
St Andrew's Hospital
The Memorial Hospital
The Queen Elizabeth Hospital
Wakefield Hospital
Whyalla Hospital
Women's & Children's Hospital

WESTERN AUSTRALIA

Fremantle Hospital
Hollywood Private Hospital
Joondalup Health Campus
Mount Hospital
Princess Margaret Hospital For Children
Royal Perth Hospital
Sir Charles Gairdner Hospital
St John Of God Health Care Subiaco
St John Of God Hospital Murdoch