

Annual report



**Australian and New Zealand
Paediatric Intensive Care Registry
2006**



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& Anthony Slater



Australian & New Zealand
Intensive Care Society

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Report of the Australian and New Zealand Paediatric Intensive Care Registry 2006

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Erratum:

Report of the Australian and New Zealand Paediatric Intensive Care Registry 2005

An error was discovered in one variable from one unit in the data used for the 2005 Annual Report. The variable (elective admission) is a variable in the PIM2; therefore this error also affected the expected mortality. The report has been amended and the new version is available on the ANZICS web site.

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Acknowledgments

The Australian and New Zealand Paediatric Intensive Care (ANZPIC) Registry is an international collaborative effort that is possible thanks to the untiring support from dedicated individuals in participating hospitals throughout Australia and New Zealand. This report would not be possible without the hard work and commitment of many people in the intensive care community.

Many of the participating hospitals and people listed below have been associated with the Registry for many years and we thank them for their continued active support. Several others are new contributors in 2006, and we sincerely hope that their contributions will continue so that we are able to present a comprehensive picture of paediatric admissions to intensive care in Australia and New Zealand.

In addition to those listed, we also give our thanks to the many other individuals who are involved in the data collection, collation, cleaning, and submission of data to the Registry.

The ANZPIC Registry is funded by grants from the Ministry of Health (New Zealand), and State and Territory Departments throughout the Australian Health Ministers' Advisory Council (AHMAC). This financial support is gratefully acknowledged.

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Foreword

'Perfection is our goal, excellence will be tolerated'

(J. Yahl)

While quality assurance may often seem at odds with the acute nature of intensive care management, meticulous data collection and interpretation is our most powerful tool in maintaining the high standards of care in paediatric intensive care in Australia and New Zealand. Over the past decade, the Australian and New Zealand Paediatric Intensive Care Registry (ANZPICR) has developed from a small research exercise to a world-renowned resource in data management.

This is the 6th report produced by ANZPICR and continues the excellent standards we have become accustomed to from the team at ANZPICR. This year, data from 17 intensive care units has been collected, collated and presented. This includes 9 paediatric intensive care units and 8 combined intensive care units. This is the most comprehensive data analysis performed in Australia and New Zealand.

Data collected and processed by the ANZPICR has become an important tool for paediatric intensive care teams to :

1. Assess changing demographics in paediatric intensive care
2. To compare trends and outcomes in intensive care units in Australia and New Zealand
3. To ensure standards are maintained
4. To address workforce issues in PICU and
5. To use as an important research tool.

The leadership of Dr. Tony Slater has again been critical in the production of this document and it is a testament to his persistence in maintaining the resources and enthusiasm required. Jan Alexander has taken over Christie Turton's role as registry manager and her work on this document is much appreciated. Jan has done a remarkable job in managing to ensure release of the report despite the disadvantage of coming into the role so recently. We would also like to acknowledge the contribution Christie Turton has made in her time as registry officer. I would also personally like to thank both Jan and Christie and also Lynda Norton for their assistance and support for the ANZICS Paediatric Study Group (PSG) activities.

However, the work of the ANZPIC registry and importantly, this report would not be possible without the dedicated work of data collectors, medical and nursing staff throughout Australia and New Zealand intensive care units caring for sick children. The quality of data collection and continual reassessment of the relevance of data collected is also essential in maintaining the quality of the finished product.

Congratulations to everyone who has contributed to the 2006 report.

Simon Erickson FRACP FFICANZCA FJFICM
Chair, Paediatric Division
ANZICS

1. Introduction

1.1 History of the Australian and New Zealand Paediatric Intensive Care Registry

The Paediatric Study Group (PSG) of the Australian and New Zealand Intensive Care Society (ANZICS) established the Australian and New Zealand Paediatric Intensive Care (ANZPIC) Registry in 1997. The aims of the Registry are:

- To describe paediatric intensive care practices and outcomes in Australia and New Zealand.
- To provide contributing units with efficacy and efficiency reports that compare performance in their units against national and international standards.
- To facilitate research in paediatric intensive care.

The absence of a Registry Manager for six months in 2007 resulted in the delay in production of this report. It is the sixth Annual report describing paediatric intensive care practices and outcomes within Paediatric Intensive Care Units (PICUs) across Australia and New Zealand. Data collected from seventeen intensive care units (ICUs) (nine PICUs, eight general ICUs), during the 2006 calendar year was used to generate this report.

The nine PICUs are tertiary referral centres for children requiring intensive care and are based in university affiliated children's hospitals. Data on all patients admitted to these nine units have been included; their age ranges from birth to young adulthood (16 years).

Eight general ICUs admitting predominantly adults also contributed data on their paediatric admissions (patients < 16 years of age). These ICUs are based in metropolitan or regional hospitals in Australia and New Zealand. The Cairns Base Hospital and John Hunter Hospital both provided data to the ANZPIC Registry for the first time in 2006. Table 1.1.1 lists the contributing hospitals.

Table 1.1.1 Hospitals contributing to the ANZPIC Registry in 2006

Hospital	State	ICU Type
Royal Children's Hospital-Melbourne	VIC	PICU
Children's Hospital at Westmead	NSW	PICU
Starship Children's Hospital	NZ	PICU
Princess Margaret Hospital	WA	PICU
Mater Children's Hospital	QLD	PICU
Sydney Children's Hospital	NSW	PICU
Royal Children's Hospital-Brisbane	QLD	PICU
Women and Children's Hospital	SA	PICU
The Prince Charles Hospital	QLD	PICU - Cardiac
Monash Medical Centre	VIC	Metropolitan
John Hunter Hospital	NSW	Regional
Waikato Hospital	NZ	Regional
Townsville Hospital	QLD	Regional
Royal Darwin Hospital	NT	Metropolitan
The Canberra Hospital	ACT	Metropolitan
Cairns Base Hospital	QLD	Regional
Launceston Hospital	TAS	Regional

1.2 ICU Classification

Table 1.2.1 defines the ICU classifications used by the ANZPIC Registry.

Table 1.2.1 ICU Classifications

Classification	Description
PICU	Paediatric, tertiary referral intensive care units based in a capital city
Metropolitan	All other intensive care units in capital cities
Regional	Intensive care units outside a capital city

2. Data set

2.1 Data set

The minimum data set analysed for this report was the same as for the 2005 Annual Report, and consisted of 38 variables. These variables and their definitions are described in Appendix 1. Information collected for the minimum data set includes demographic data, the diagnosis directly responsible for ICU admission, as well as underlying and additional diagnoses. Additionally, physiologic variables measured at the time of first face to face contact between the patient and the doctor from the ICU (or a specialist retrieval team), the ICU outcome, and the length of stay are recorded. All participating units collect the minimum data set. All variables are routinely measured or recorded in the patients' medical record. The complete data set was expanded at the end of 2004 to include an extra five variables concerning mortality, and nine variables concerning therapies. As the software used by some of the participating units was not altered to collect these new variables for the entire 2006 period, these variables were not analysed for this report.

2.2 Data collection

Data are collected in the hospitals by either completion of the specific ANZPIC Registry form, or by incorporating the ANZPIC Registry data items into the local clinical information system. Participating hospitals maintain unit specific databases and submit electronic copies of the de-identified data in a predefined format to the ANZPIC Registry every six or twelve months. Some of the paediatric units use specially written ANZPIC Registry software for data entry, while the remaining units have incorporated the ANZPIC Registry data fields into their unit specific databases.

In 2004, a paediatric component was added to the Australasian Outcome Research Tool for Intensive Care (AORTIC), software developed by the ANZICS Adult Patient Database (APD). This has allowed the general units already using AORTIC to collect data on any paediatric admissions.

2.3 Data verification

Missing, inconsistent, or unusual data are identified and flagged at the time of submission to the Registry. This initial filtering is performed automatically, and consists of both

logic and range checks. Error reports are then sent to each site, and the data is then cleaned and resubmitted to the Registry before being approved and uploaded into the main database.

2.4 Data Limitations

Limitations to the data are related to the data collection process, the small population of paediatric patients admitted to ICUs in Australia and New Zealand, and the outcome measures used to assess unit performance.

Not all participating units have designated data managers. In the remaining ICUs, data is collected by a range of staff, from clinical nurses to senior medical staff. It has been noted previously that data collection errors are more common in units where a greater number of staff are involved with the collection of data compared to units who have dedicated data collectors/managers.

3. Demographics

3.1 Population

For 2006, the ANZPIC Registry received data from 7,823 paediatric admissions to 17 ICUs in Australia and New Zealand. In 2005, the ANZPIC Registry received data from 7,203 admissions (from 15 ICUs), and prior to this reported from 7,329 admissions (from 15 ICUs) in the 2004 calendar year. The number of admissions to the Registry varies depending on the individual admission numbers and classification of the ICUs submitting data. Admissions by region are displayed in Table 3.1.1. Note that the postcodes of patients admitted to ICUs were used to assign a home state, irrespective of their admission hospital. Overseas admissions ($N=59$) were excluded, as was missing data ($N=24$). The child population (<16 yrs) for each state or territory was obtained from the Australian Bureau of Statistics (ABS) Australian Demographic Statistics (3), and Statistics New Zealand (4).

In 2006, the prevalence rate for paediatric ICU admissions was 1.49 per 1,000 children, a slight increase from the previous reporting year (1.4 per 1,000 children), but included data from more ICUs. The ANZPIC Registry prevalence rate is slightly higher than the rate recorded by the Paediatric Intensive Care Audit Network (PICANet) in the UK (1.28 in 2006) (5). Each year a number of children are admitted to general ICUs in Australia and New Zealand which are not contributing to the ANZPIC Registry. In 2006 the number of children admitted to these units was estimated to be 500 (7).

Table 3.1.1 Regional admission prevalence and sex-specific admissions to ANZPIC Registry hospitals in 2006.

Region	Prevalence (per 1,000)	Males	Females	Population
ACT	1.17	41	37	66,909
NSW	1.38	1145	790	1,402,146
NT	2.28	68	55	53,939
QLD	1.96	980	736	874,683
SA	1.77	293	244	304,179
TAS	0.81	43	41	103,358
VIC	1.39	812	616	1,029,514
WA	1.94	504	337	433,527
NZ	1.07	574	424	931,665
Total	1.49	4460	3380	5,199,920

3.2 Age

The majority of admissions to ICU in 2006 were for children less than 5 years of age (65%), with infants < 12 months of age making up more than half this group (38.8% of all ICU admissions). A greater number of males were admitted (57.5%) than females (42.5%) across the majority of ages as illustrated in figure 3.2.1. Figure 3.2.2 displays the admission numbers for patients under one year of age. Twenty-four percent of infants admitted less than one year old were neonates (< 28 days old).

Figure 3.2.1 ICU admission numbers by age (years) and sex 2006.

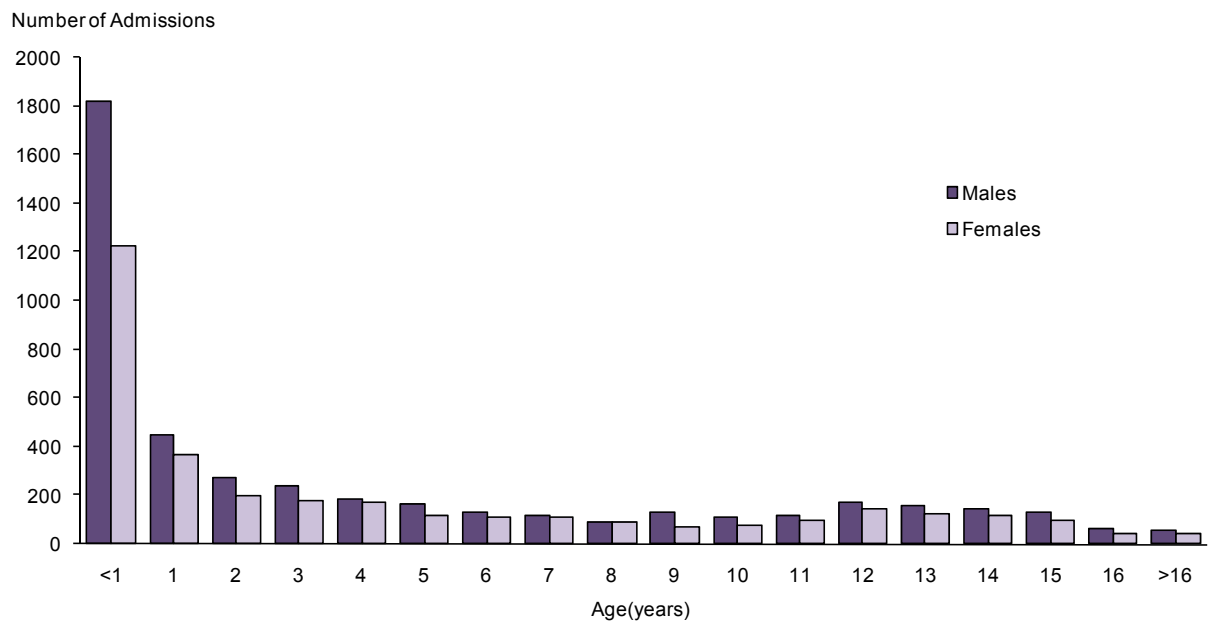
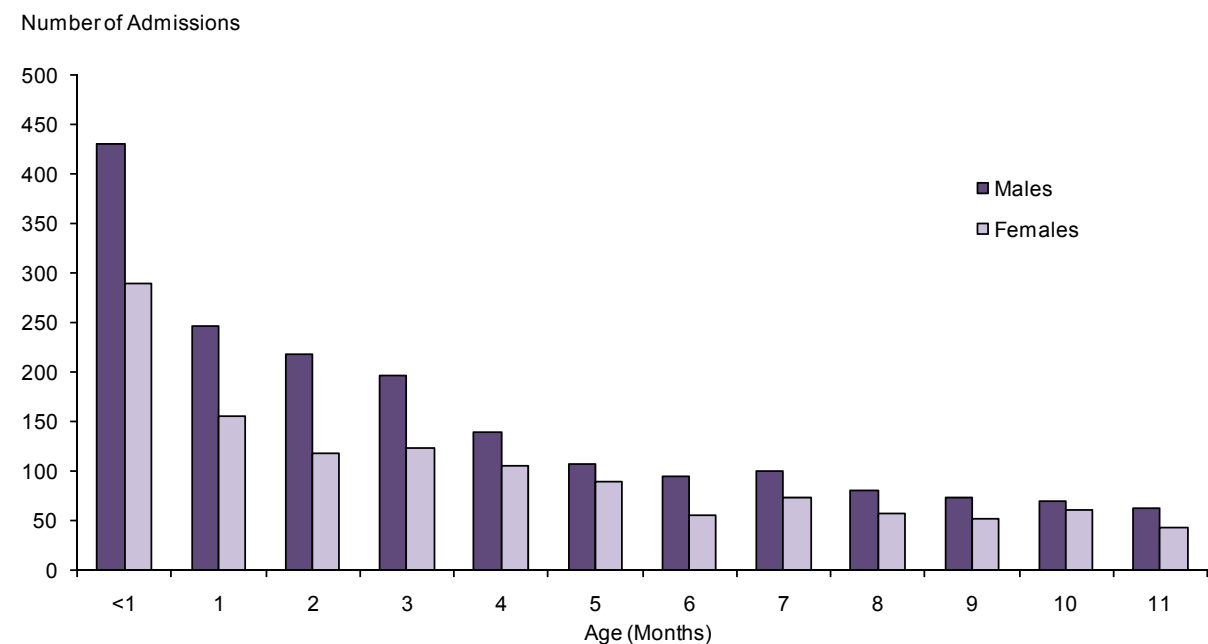


Figure 3.2.2 ICU admission numbers by age (months) and sex, for infants <12 months of age 2006.



4. Admission Characteristics

4.1 ICU Admission Source

Admissions from the operating theatre accounted for 43% of all ICU admissions. Nineteen percent of admissions were from other wards, while 16% of admissions were from the emergency department. Twenty-one percent of paediatric admissions were direct to the ICU from outside the hospital (Table 4.1.1).

4.2 Admission Type

Admissions are classified as either elective or non-elective. An admission is elective if the admission follows elective surgery, is for an elective ICU procedure, is a review of home ventilation, or is for elective monitoring. Surgery or an ICU procedure is considered elective if it could be postponed for more than six hours without an adverse effect.

Nearly 56% of all ICU admissions in 2006 were non-elective (see Table 4.1.1). Direct ICU admissions were the highest percentage of non-elective admissions (18.6%), with only a small percentage (6.6%) coming from other ICUs or NICUs and operating theatre or recovery. In contrast, admissions from the operating theatre or recovery accounted for approximately 83.5% of all elective admissions. Figure 4.2.1 displays elective and non-elective admissions for each hospital.

Table 4.1.1 Intensive care admission source by type, 2006.

Admission Source	% Elective	% Non-elective
Operating Theatre or Recovery	36.80	6.30
Direct ICU Admission	2.60	18.60
Emergency Department	0.40	15.70
Ward	4.10	15.00
Other ICU or NICU	0.20	0.30
Grand Total	44.10	55.90

Figure 4.2.1 Elective and Non-elective admissions for each Hospital, 2006.

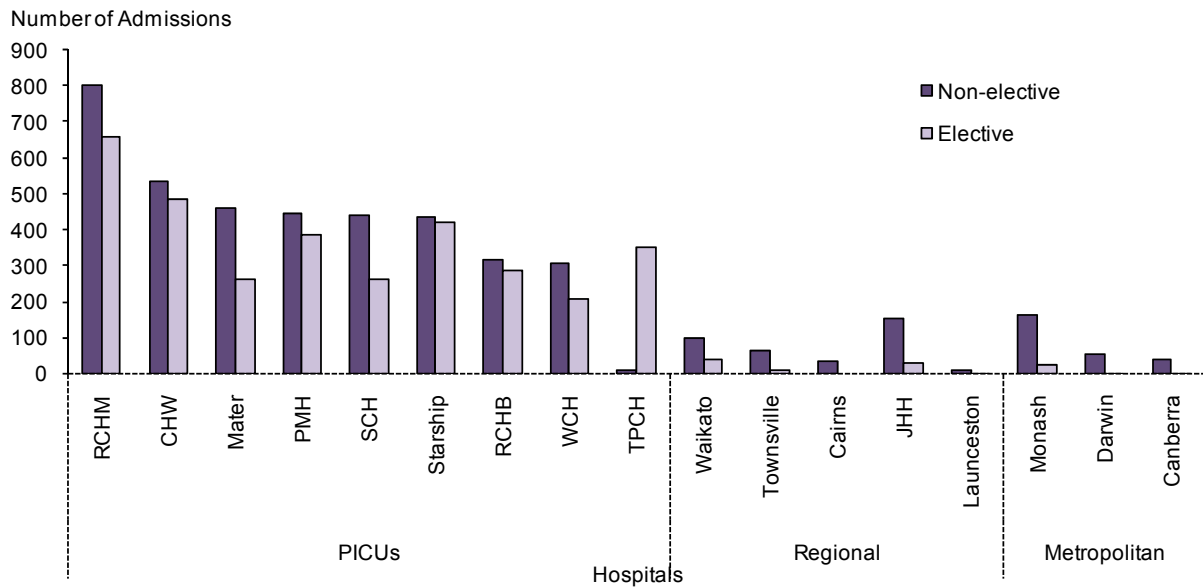
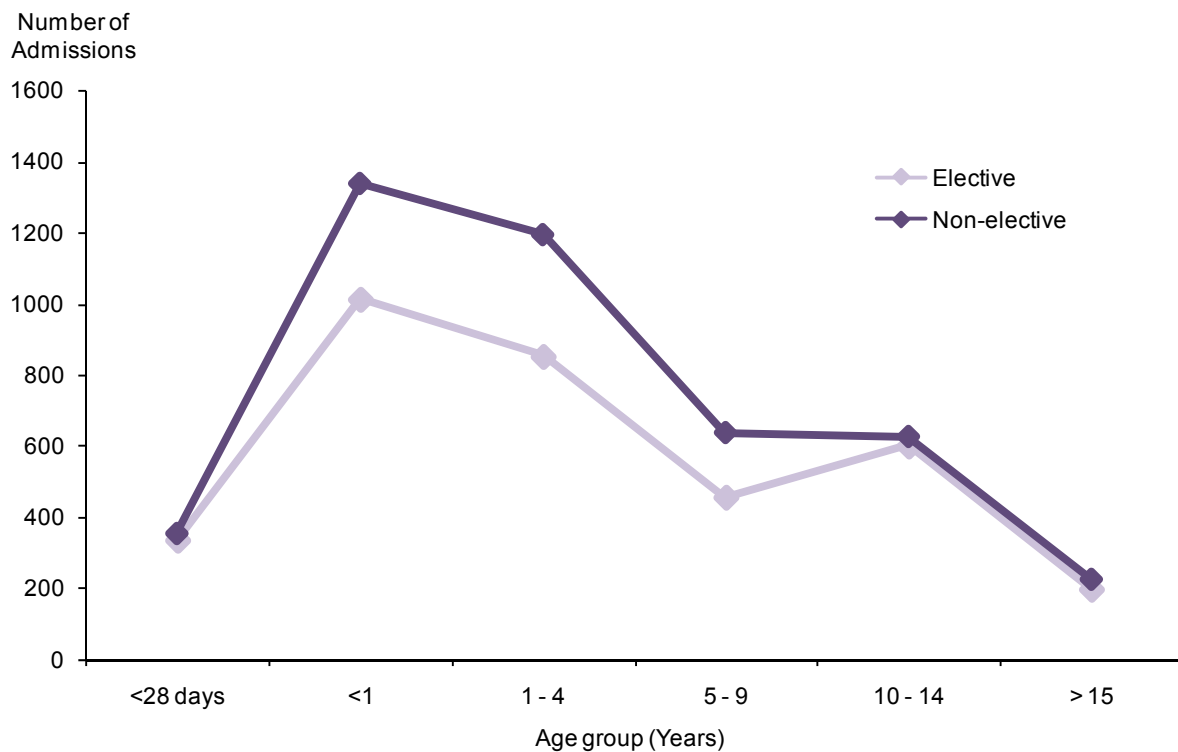


Figure 4.2.1 illustrates that non-elective admissions are the greatest source of admissions for nearly all hospitals, but with the proportion of elective admissions to non-elective admissions varying considerably across hospitals. Ninety-seven percent of admissions to The Prince Charles Hospital (TPCH) were elective in 2006. The PICU at TPCH is a cardiac PICU and this accounts for the high percentage of elective admissions to this unit. Elective admissions for other hospitals ranged from 0 to 49 percent.

Figure 4.2.2 displays the elective and non-elective admissions for each age group. The difference between the number of non-elective and elective admissions is greatest for children in the < 1, and 1 - 4 year old age groups.

Figure 4.2.2 Elective and Non-elective admissions by age, 2006.



4.3 Admission Diagnosis

Diagnosis codes developed by the ANZICS PSG (6) are used to code the principal reason for ICU admission. The underlying diagnosis, and up to five additional diagnoses, can also be assigned for each admission. The ANZPIC Registry diagnosis codes used in 2006 are listed in Appendix II.

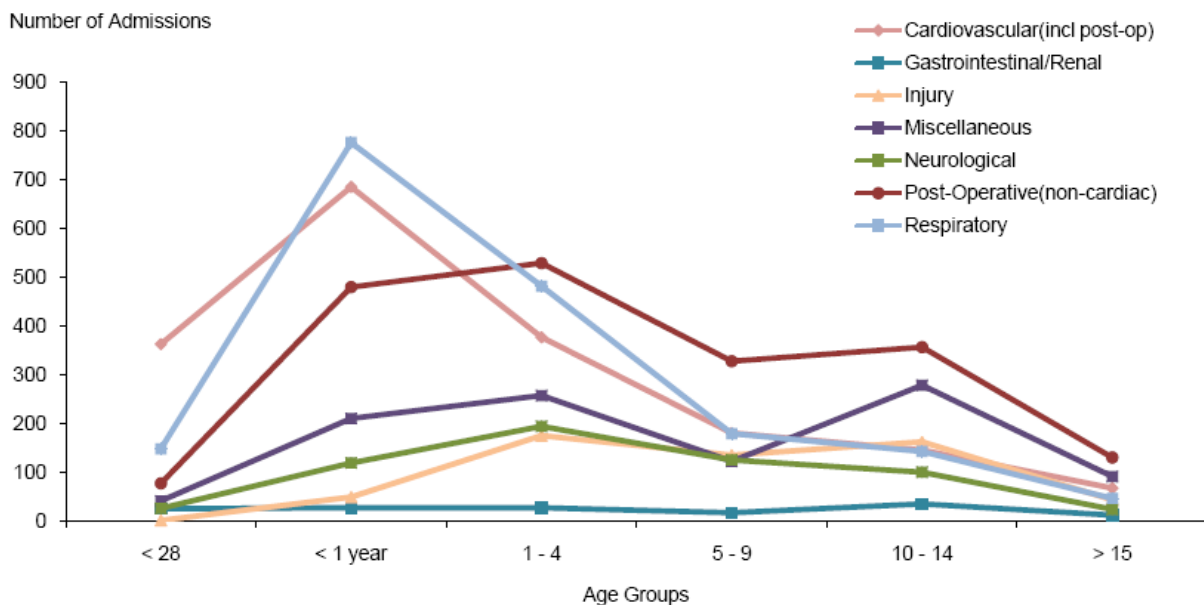
For this annual report, the codes have been aggregated into seven broad diagnostic categories (refer Table 4.3.1). While most post-procedural diagnoses have been coded into one category, all cardiac procedures have been included with other cardiovascular diagnoses in an attempt to provide better information about all cardiac related reasons for admission.

Table 4.3.1 Number of admissions, and mortality rate by diagnostic group, 2006.

Diagnostic Group	Number	% of admissions	Mortality rate (95% CI)
Post-Operative (non-cardiac)	1903	24.3	0.9 (0.5 - 1.3)
Cardiovascular (incl post-op)	1820	23.3	1.9 (1.2 - 2.5)
Respiratory	1777	22.7	2.5 (1.8 - 3.2)
Miscellaneous	1005	12.9	6.8 (5.2 - 8.3)
Neurological	594	7.6	4.4 (2.7 - 6.0)
Injury	571	7.3	5.6 (3.7 - 7.5)
Gastrointestinal/Renal	149	1.9	6.0 (2.2 - 9.9)

The post operative (non-cardiac) category was the most common diagnostic group for the Registry (24.3%) as a whole, followed by cardiovascular (incl post-op) (23.3%). Differing trends can be observed when these diagnostic categories are presented by age groups (see Figure 4.3.1), where respiratory (30.5%) and cardiovascular (34.5%) problems are the most common occurring groups for children under one year of age, while in children greater than 10 years of age, the most common diagnostic group was non-cardiac post-operative (29.7%).

Figure 4.3.1 Diagnostic categories by age group, 2006.



Tables 4.3.2 and Table 4.3.3 display the 10 most common diagnoses for non-elective and elective admissions to ICU respectively. Also displayed are the median length of stay (LOS) for each diagnosis category.

Bronchiolitis (10.9%) was the most common reason for non-elective admissions to ICU, followed by seizures (7.8%).

The most common reason for an elective admissions to an ICU was for an ICU procedure (6.2%). VSD repair was the next most common elective reason (5.6%).

Table 4.3.2 Top 10 reasons for non-elective admission to ICU, the % of all admissions, and median Length of Stay (LOS) in 2006.

Principal Admission Diagnosis	Number	%	Median LOS
Bronchiolitis	477	10.9	2.35
Seizures	339	7.8	1.08
Trauma - Head	247	5.6	1.47
Respiratory Failure	242	5.5	3.67
Asthma	209	4.8	0.80
Pneumonia or Pneumonitis	179	4.1	2.69
Diabetes Mellitus with Ketoacidosis	178	4.1	0.98
Shock - Septic	125	2.9	2.72
Laryngotracheobronchitis (Croup)	117	2.7	0.92
Upper Airway Obstruction - Other	90	2.1	1.67

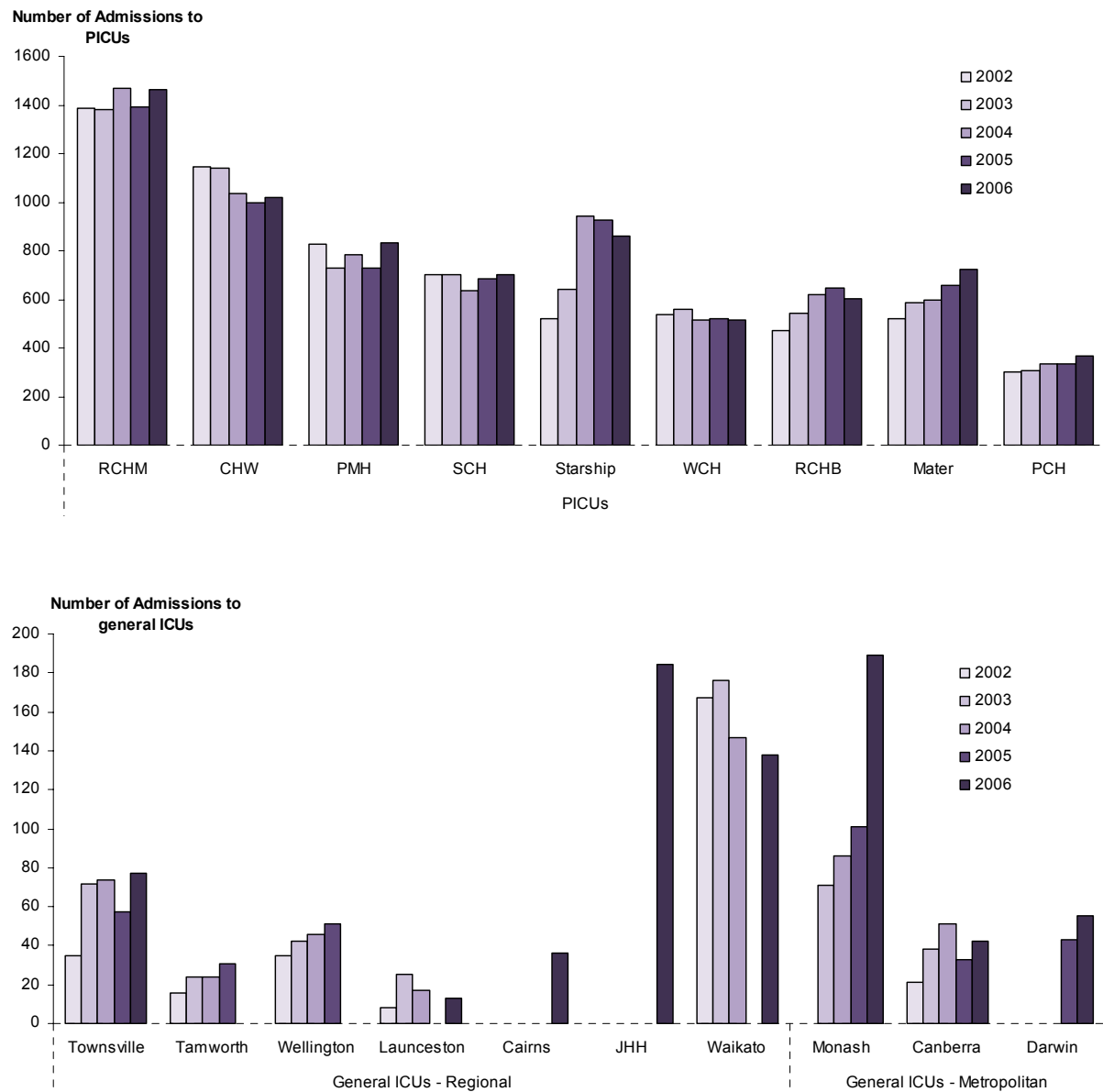
Table 4.3.3 Top 10 reasons for elective admission to ICU, the % of all admissions, and median Length of Stay (LOS) in 2006.

Principal Admission Diagnosis	Number	%	Median LOS
ICU Procedure (eg CVC Insertion)	213	6.2	0.22
VSD Repair	193	5.6	1.78
Spinal Instrumentation	181	5.3	0.94
Adenoidectomy and/or Tonsillectomy	164	4.8	0.81
Valve Repair or Replacement	121	3.5	1.02
Tetralogy of Fallot Repair	110	3.2	1.93
ASD Repair	93	2.7	0.98
Systemic-Pulmonary Shunt	83	2.4	2.58
ENT-Other	79	2.3	0.88
AVSD Repair(AV Canal)	78	2.3	1.92

4.4 Other Admission Characteristics

Annual admission numbers per hospital each year since 2002 are displayed in the two parts of Figure 4.4.1 below, where, to assist readability, the specialist paediatric intensive care units are displayed separately to the general ICUs. Cairns Base Hospital and John Hunter Hospital contributed to the registry for the first time in 2006.

Figure 4.4.1 Number of patients admitted to ICUs (PICUs and general ICUs) participating in the ANZPIC Registry by ICU classification, 2002-2006.



The proportion of children ventilated during ICU admission is considered a simple indicator of admission threshold. The number of admissions in each ICU and the proportion of ventilated admissions are displayed in table 4.4.1. In 2006, the percentage of ventilated patients ranged from 4.8 to 85 percent, which is consistent with preceding reports. The Prince Charles Hospital reported the highest ventilation rate, which is attributed to the cardiac caseload of the ICU.

Table 4.4.1 Number of admissions and ventilated patients by unit in 2006.

Hospital	Admissions	Number Ventilated	%
Royal Children's Hospital-Melbourne	1461	1045	71.5
Children's Hospital at Westmead	1023	<i>not recorded</i>	-
Starship Children's Hospital	860	649	75.5
Princess Margaret Hospital	833	286	34.3
Mater Children's Hospital	723	275	38.0
Sydney Children's Hospital	703	434	61.7
Royal Children's Hospital-Brisbane	603	173	28.7
Women and Children's Hospital	518	184	35.5
The Prince Charles Hospital	365	311	85.2
Monash Medical Centre	189	69	36.5
John Hunter Hospital	184	145	78.8
Waikato Hospital	138	34	24.6
The Townsville Hospital	77	<i>not recorded</i>	-
Royal Darwin Hospital	55	<i>not recorded</i>	-
The Canberra Hospital	42	<i>not recorded</i>	-
The Cairns Base Hospital	36	16	44.4
Launceston Hospital	13	<i>not recorded</i>	-

In Figures 4.4.2 and 4.4.3, the monthly admission numbers by diagnostic group, and monthly admission numbers by age group are displayed. In the first figure, an increase in admissions for respiratory related conditions is apparent during the winter months. This pattern is reinforced by data presented in the second figure, where many of the respiratory admissions during the winter months are for children less than one year old.

Figure 4.4.2 Monthly admission numbers by diagnostic group in 2006.

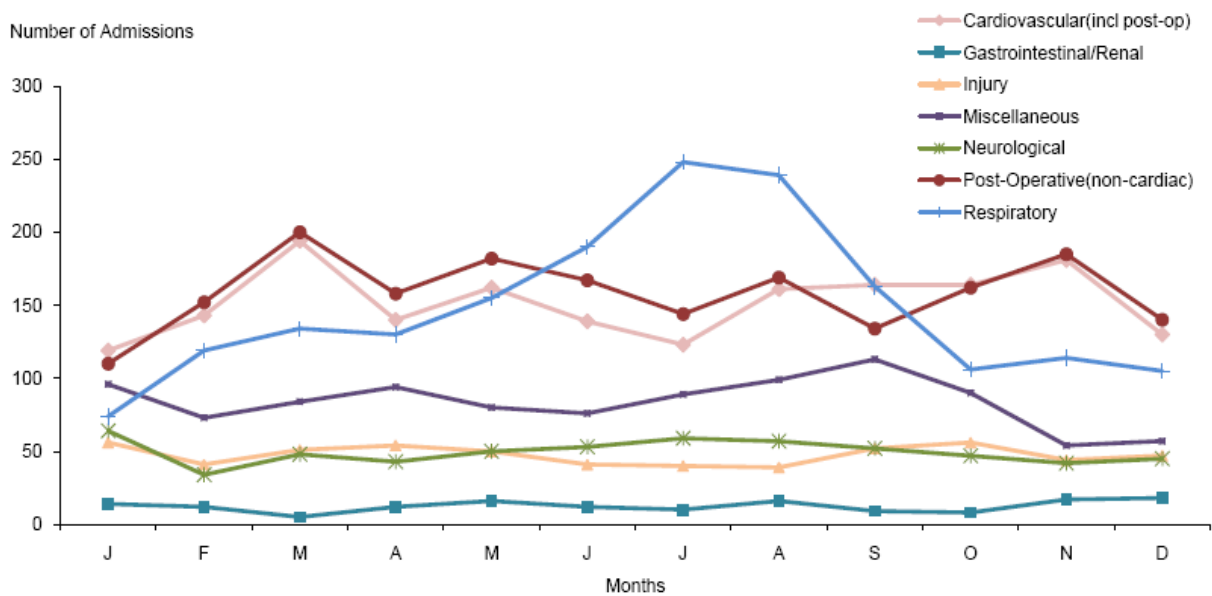
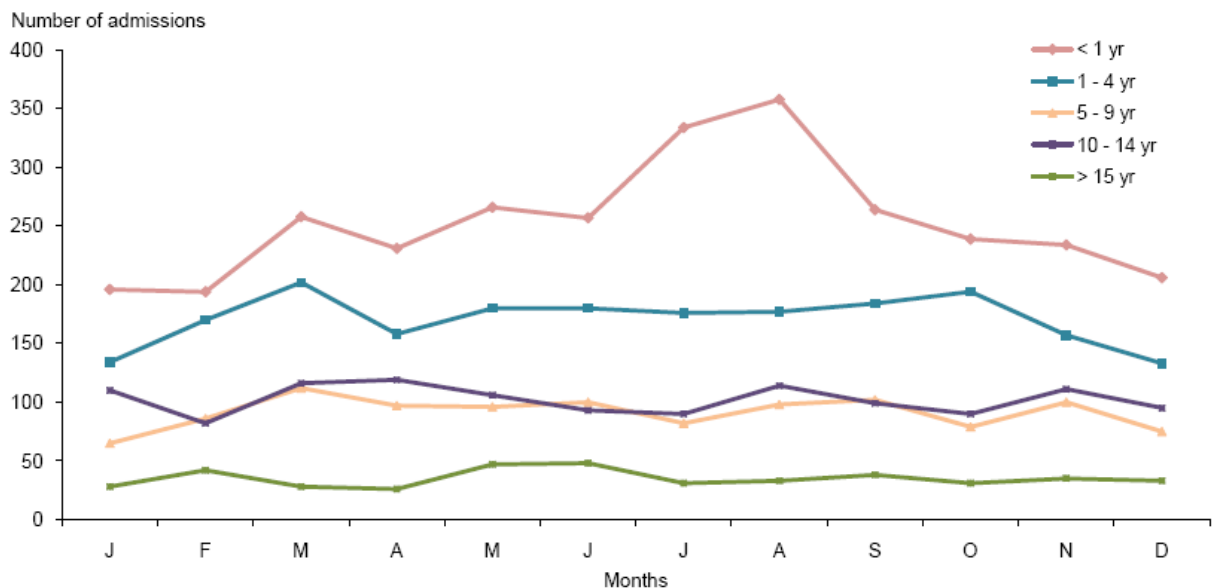


Figure 4.4.3 Monthly admission numbers by age in 2006.



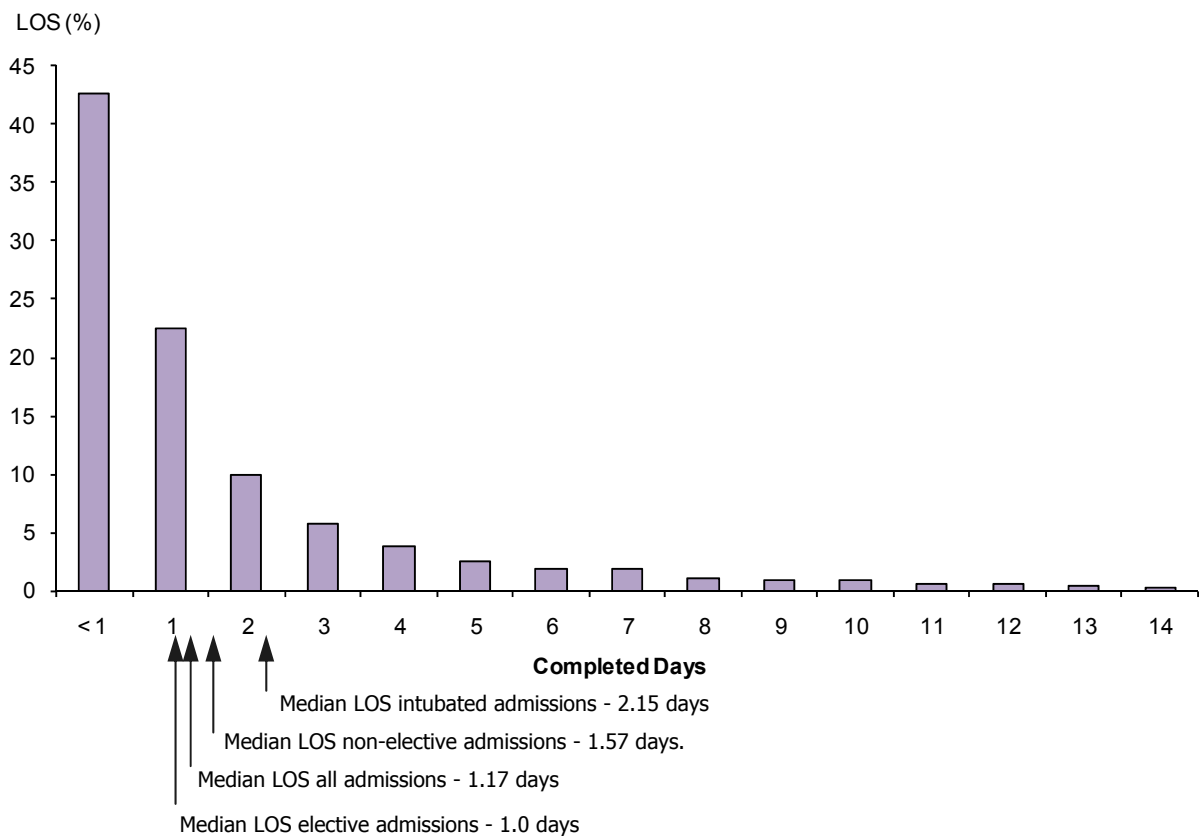
5. Length of Stay

5.1 Median Length of Stay

Length of Stay (LOS) is defined as the difference between discharge date and time, and admission date and time. The ICU LOS is positively skewed with the majority of patients staying less than two days (see Figure 5.1.1).

The median LOS was used to compare the LOS across groups. The median LOS was deemed the most appropriate measure of central tendency as the mean LOS is disproportionately influenced by prolonged admissions. In 2006, 3.7% of patients had a length of stay greater than 14 days. These included 1.2% of patients who stayed longer than 28 days and occupied 19.6% of bed days. Four patients stayed in ICU longer than six months, occupying 4.5% of bed days.

Figure 5.1.1 Length of stay distribution (up to 14 days) in 2006.



The median LOS varied depending on ICU classification (Figure 5.1.2). The median LOS was similar for PICUs and Metropolitan hospitals (1.18 and 1.14, respectively), while the LOS for Regional hospitals was lower (1.03). Expectedly, LOS varied amongst admission type (Table 5.1.1). The median LOS for intubated patients was 2.15 days, compared to 0.88 days for non-intubated patients. Non-elective admissions had a greater median LOS (1.57) compared to elective admissions (1.00).

Figure 5.1.2 Median LOS and Interquartile Range (IQR) for all hospitals by ICU classification in 2006.

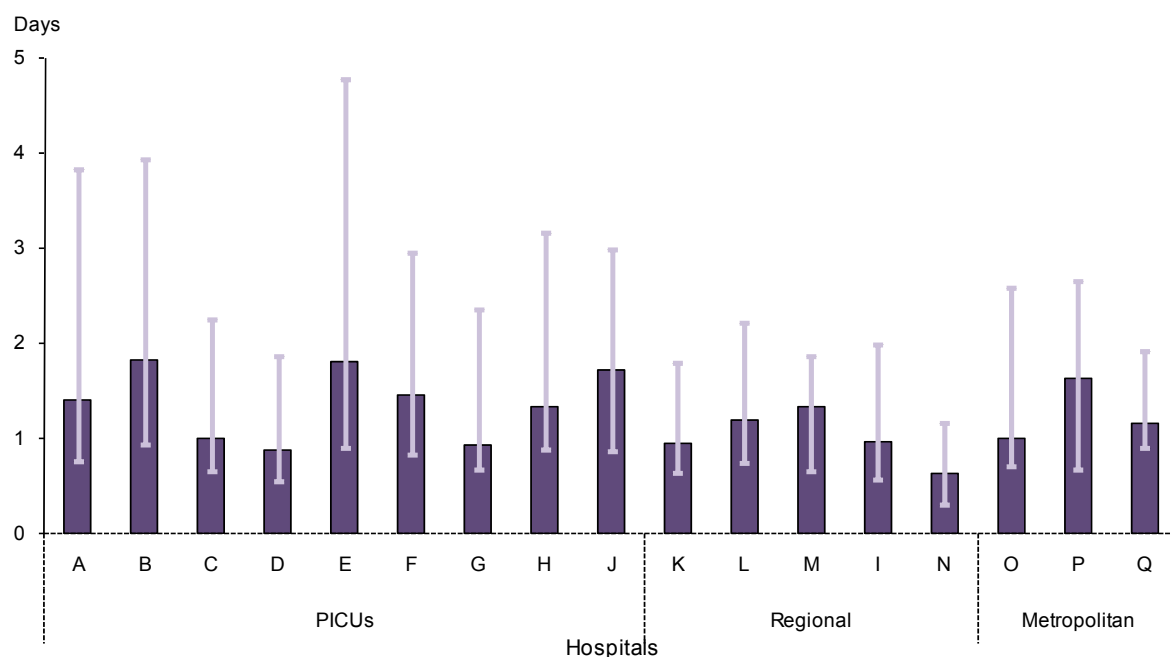
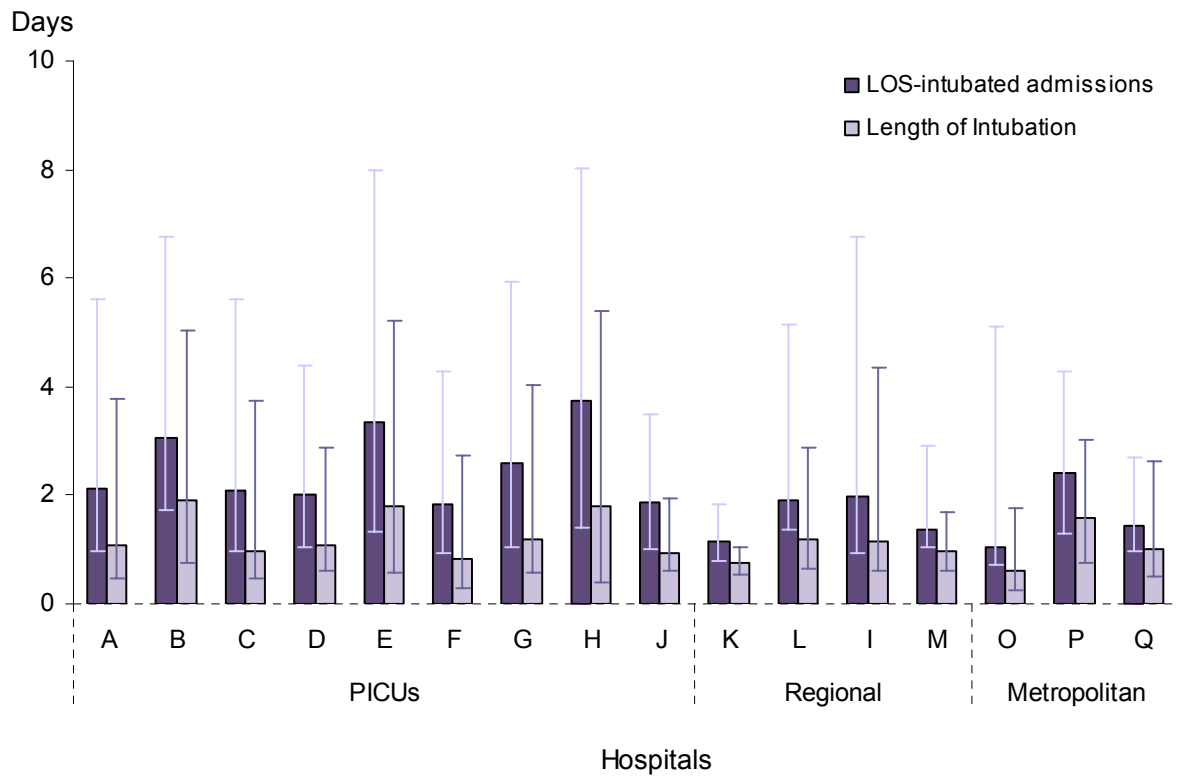


Table 5.1.1 Median LOS, IQR, and percent of occupied bed days (OBD) by admission type, 2006.

	Median LOS	IQR	OBD%
All admissions	1.17	0.8 - 3.0	100.0
Elective admissions	1.00	0.8 - 2.1	34.3
Non-elective admissions	1.57	0.8 - 3.8	65.7
Intubated admissions	2.15	1.0 - 5.5	76.0
Non-intubated admissions	0.88	0.6 - 1.6	24.0

Figure 5.1.3 displays the median LOS for intubated patients, and the median duration of intubation, for hospitals with intubated patients. The Interquartile Range (IQR) is also shown for each of these measurements. Hospitals with < 10 intubated admissions have been excluded ($N = 1$) from this figure.

Figure 5.1.3 Median LOS and IQR for intubated admissions in each hospital, by ICU classification in 2006.



The LOS for each diagnostic group is summarised in Table 5.1.2. The longest LOS was observed in the gastrointestinal/renal diagnostic group (median LOS 2.3 days) followed by the respiratory diagnostic group (1.94 days).

Table 5.1.2 Median LOS, IQR, and percent of OBD by principal diagnostic group, 2006.

Diagnostic Group	Median LOS	IQR	OBD%
Cardiovascular (incl post-op)	1.80	1.0 - 3.7	24.1
Gastrointestinal/Renal	2.30	1.0 - 7.0	3.0
Injury	1.12	0.6 - 2.8	6.8
Miscellaneous	0.87	0.3 - 2.3	11.9
Neurological	1.32	0.7 - 2.8	8.7
Post-Operative (non-cardiac)	0.91	0.7 - 1.7	14.4
Respiratory	1.94	0.8 - 4.4	31.0

5.2 Occupied Bed Days

There were a total of 25,738 Occupied Bed Days (OBD) in 2006. Children aged > 28 days but less than one year occupied 37.5% of ICU bed days (Figure 5.2.1). Intubated admissions utilised 76% of bed days, while non-elective admissions utilised 65.7% of bed days (Table 5.1.1).

Patients who stayed in ICU longer than 28 days (1.2%) occupied a total of 5,035 (19.5%) bed days. Table 5.2.1 displays the admission diagnosis categories for patients who stayed longer than 28 days. Diagnoses associated with a requirement for long term respiratory support occupied the greatest number of bed days (39.6%).

Figure 5.2.1 Occupied Bed Days by age group and sex, 2006.

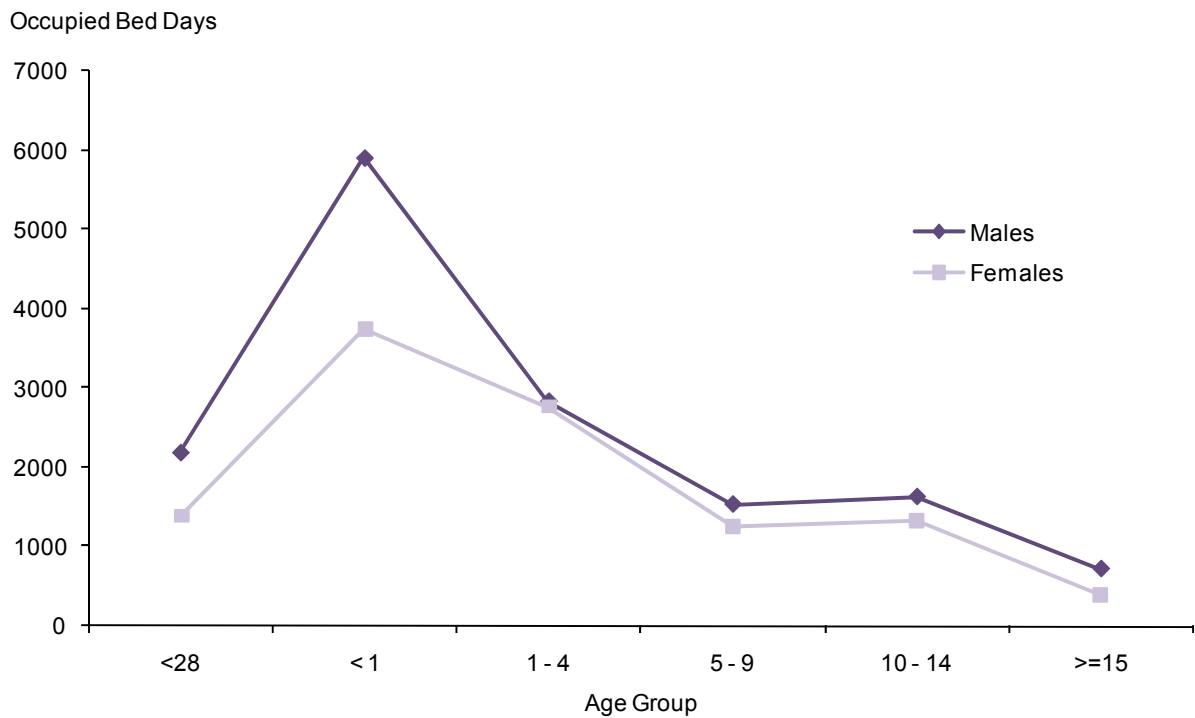


Table 5.2.1 Admission diagnoses for long stay patients (> 28 days), 2006.

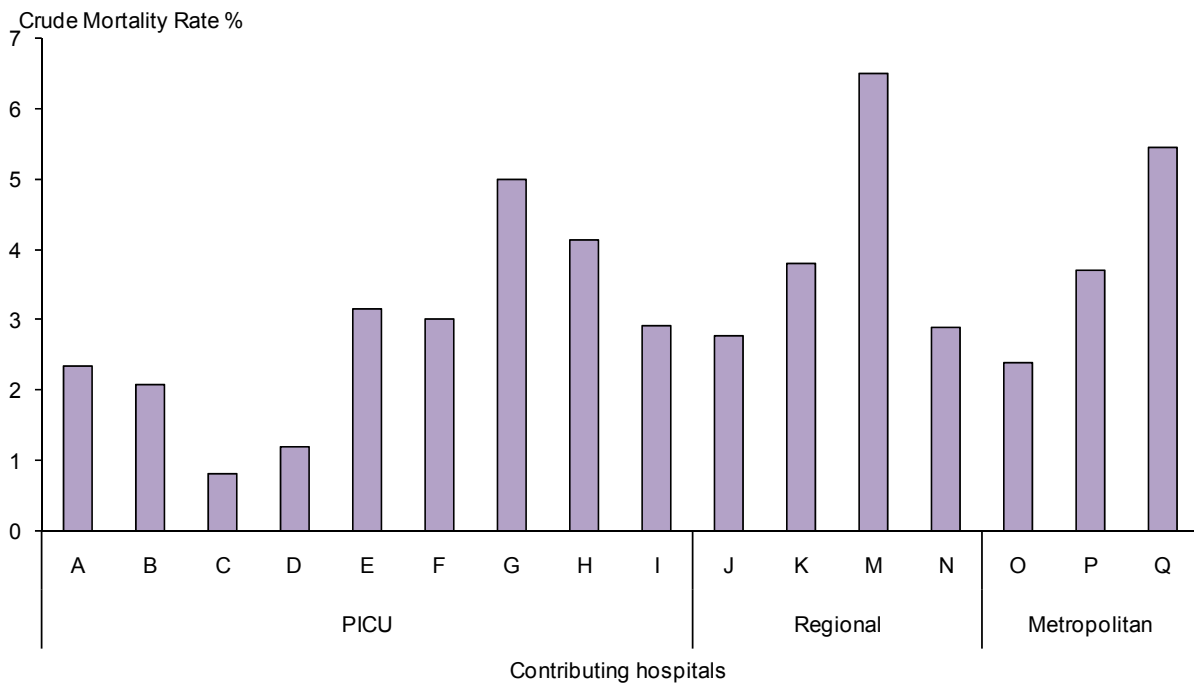
Diagnostic Group	Number of patients	Bed days	(% days)
Cardiovascular (incl post-op)	20	898	17.8
Gastrointestinal/Renal	2	136	2.7
Injury	5	199	3.9
Miscellaneous	13	777	15.4
Neurological	9	663	13.2
Post-Operative (non-cardiac)	9	370	7.3
Respiratory	35	1992	39.6

6. Mortality

6.1 Mortality Rates

The ANZPIC Registry collected data on ICU outcome from all participating units. In addition some units provide data on hospital outcome. In 2006, 230 patients died in ICU. The crude mortality rate was 2.9% (Males 2.9%, Females 2.98%). This rate is lower than has been observed in previous reports where, over the past five years, annual rates have ranged from 3.2% to 3.9%. The crude mortality rates for each unit are shown in Figure 6.1.1. To ensure confidentiality of contributing sites, the hospital codes used in this section are not the same codes used in earlier sections.

Figure 6.1.1 Mortality rate for 16 hospitals by ICU classification in 2006. One unit did not record any deaths.



In 2006 neonates recorded the highest age specific mortality (4.2%), followed by the >15 years age group (3.6%) and >28 days - <1 year category (3.5%). The mortality rates in the other age groups ranged from 1.8 - 2.8% (Table 6.1.1).

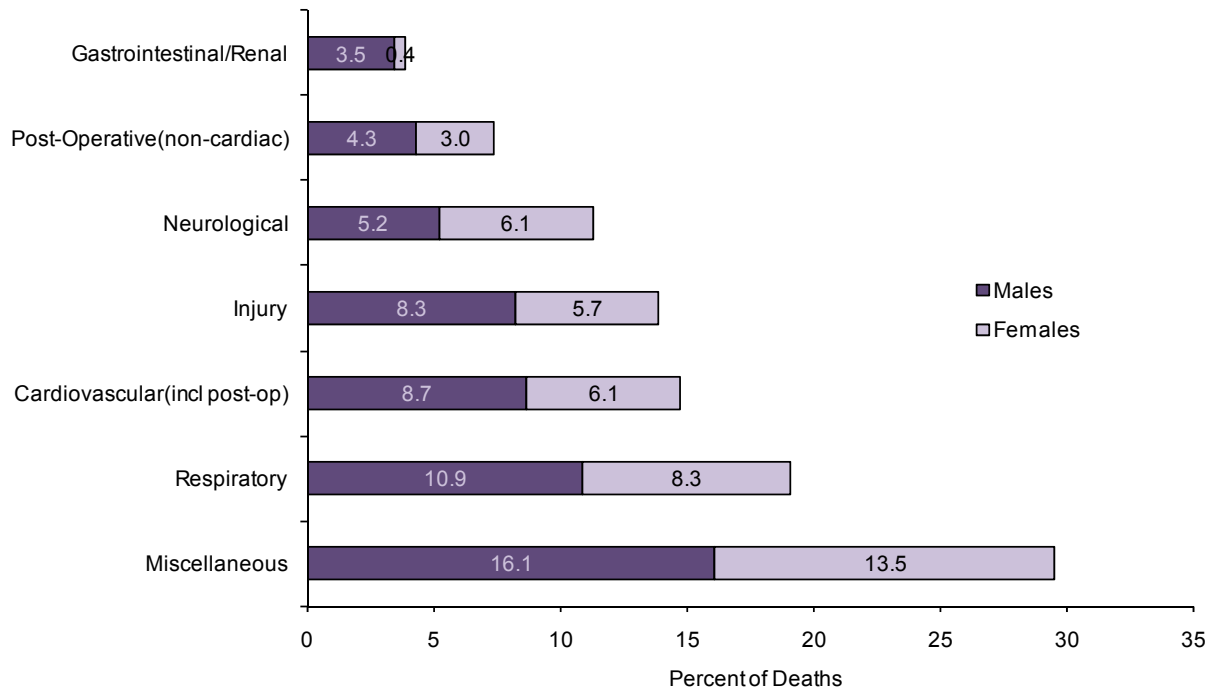
Table 6.1.1 Age specific mortality rates, 2006.

Age group	Number	Deaths	Age Specific Mortality (95% CI)
Neonates	686	29	4.2 (2.7-5.7)
>28 days - <1 year	2350	82	3.5 (2.7-4.2)
1 - 4 years	2045	51	2.5 (1.8-3.2)
5 - 9 years	1094	31	2.8 (1.9-3.8)
10 - 14 years	1227	22	1.8 (1.1-2.5)
>15 years	421	15	3.6 (1.8-5.3)

6.2 Diagnosis Specific Mortality

In 2006, 29.6% of all deaths had a principal diagnosis in the miscellaneous diagnostic category (Figure 6.2.1). Within this category, 30.9% of deaths were for children who had been admitted with septic shock. Other diagnoses in this category leading to death were cardiac arrest out of hospital (23.5%) and cardiac arrest in hospital (16.2%). Children admitted with head trauma comprised 9.1% of all deaths. Excluding the neurological category, mortality rates for males were higher than female mortality rates in all diagnostic categories.

Figure 6.2.1 Diagnostic categories of patients not surviving ICU, by sex in 2006.



The proportion of deaths in specific diagnosis groups varied across age groups. The highest proportion of deaths among infants less than one year old was recorded in the miscellaneous category (35.1%), with septic shock being the most prevalent diagnosis within that category.

Figure 6.2.2 Diagnostic categories of patients aged < 1 year not surviving ICU, by sex, 2006.

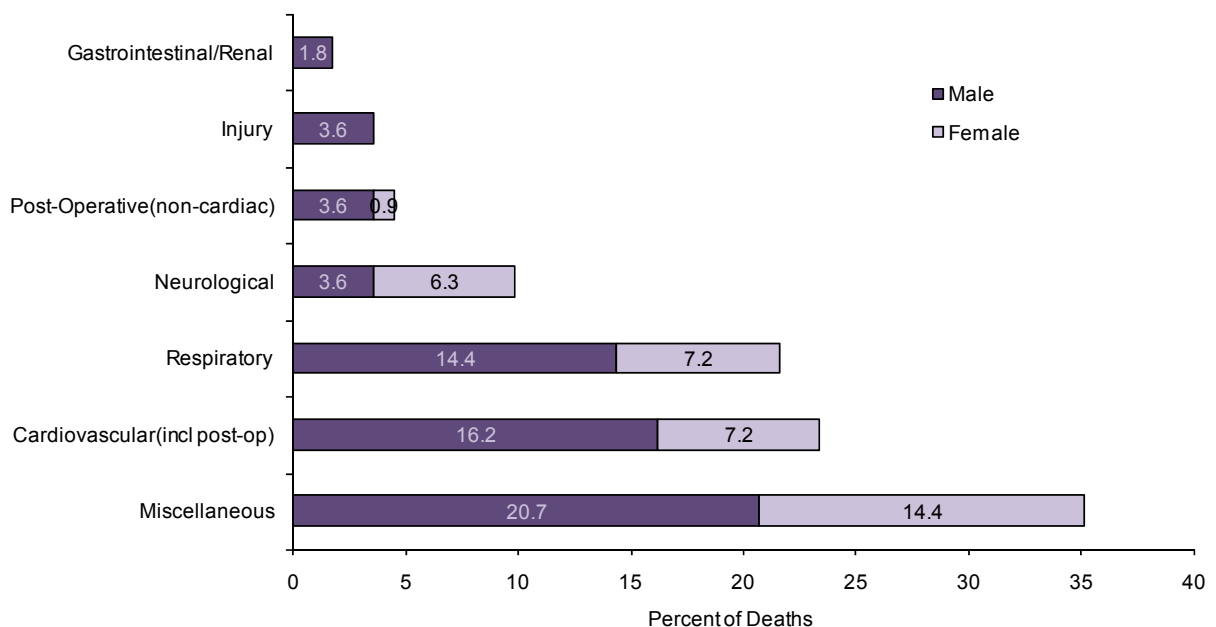
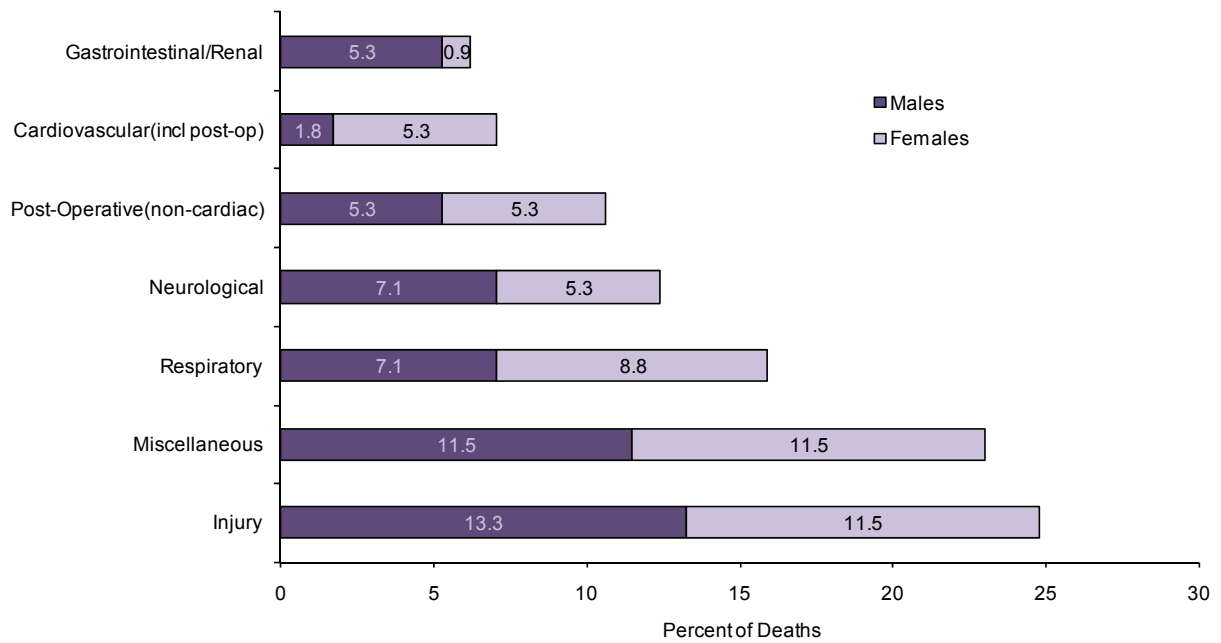


Figure 6.2.3 Diagnostic categories of patients aged 1 - 15 years not surviving ICU, by sex, 2006.



In 2006 the highest proportion of deaths for the 1 - 15 year age group was the injury category (24.8%), with head trauma comprising 60.7% of deaths in this category, and 14.8% of deaths overall in this age group.

6.3 Risk Adjusted Mortality (PIM2)

Risk adjusted standardised mortality ratios (SMR) were calculated for each unit contributing to the ANZPIC Registry. The SMR is the ratio of the number of deaths observed in a given population to the number of deaths predicted for that population.

Risk adjusted mortality prediction models drift in calibration over time. This has occurred with PIM2 risk of death (1) where the SMR for all patient records in the Registry for 2005 and 2006 is 0.89 (95% CI 0.82-0.96). To overcome this drift in calibration the model has been recalibrated using patient records for 2005 and 2006 only. The new model, referred to as PIM2-ANZ06, is described in Table 6.3.1. The variable definitions have not changed from the variable definitions used for PIM2. The recalibration results in new variable coefficients and has the effect of resetting the SMR for the population to 1.0. In this report we have included results using both PIM2 and PIM2-ANZ06. The PIM2 results allow comparison over time against the standard that has been used since 2003. The PIM2-ANZ06 results allow comparison against the standard of care in Australia and New Zealand during 2005 and 2006.

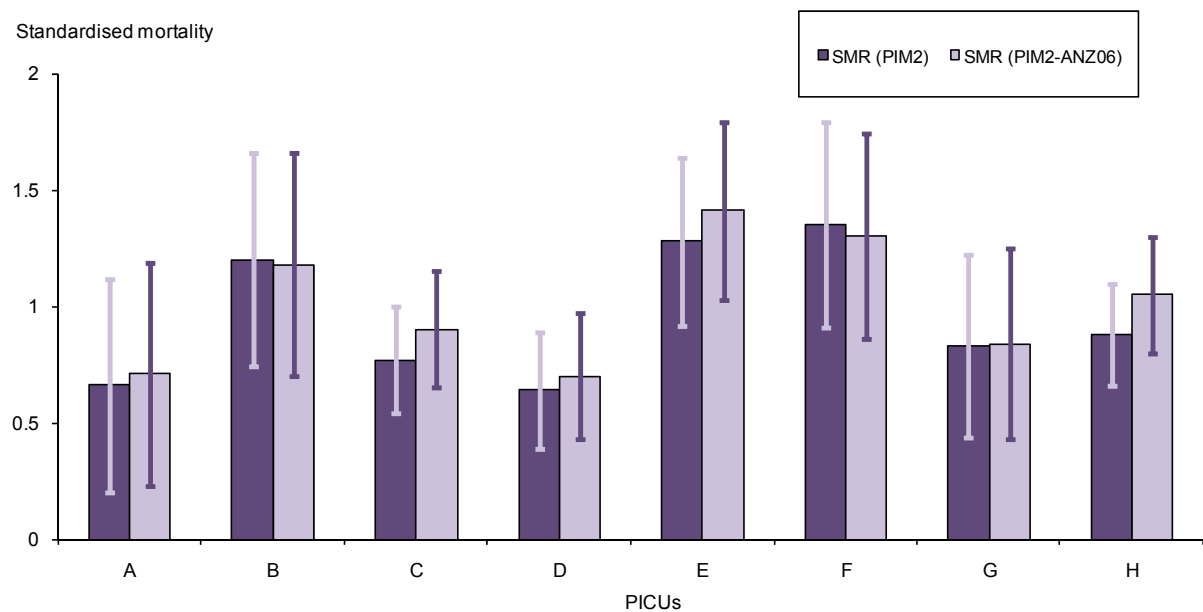
Table 6.3.1 PIM-ANZ06 logistic regression model (n=14751, 493 deaths).

PIM2-ANZ06 Variables	Coefficient	95% CI
Absolute (SBP-120), mmHg	0.0126862	0.0078046 to 0.0175678
Pupils fixed to light (Y/N)	3.309973	2.786238 to 3.833709
100 x FiO ₂ /PaO ₂ , mmHg ⁻¹	0.3832374	0.2209347 to 0.5455401
Absolute (base excess), mmol/l	0.0676317	0.0503129 to 0.0849505
Mechanical ventilation (Y/N)	0.8315759	0.5794353 to 1.083717
Elective admission (Y/N)	-1.04038	-1.465389 to -0.6153696
Recovery post procedure (Y/N)	-1.084323	-1.484517 to -0.6841287
Bypass (Y/N)	-0.0461349	-0.5762119 to 0.4839422
High risk diagnosis (Y/N)	1.583634	1.358982 to 1.808285
Low risk diagnosis (Y/N)	-1.9011	-2.493612 to -1.308587
Constant	-4.306748	-4.561944 to -4.051552

Area under the receiver operator curve = 0.890; Hosmer-Lemeshow goodness-of-fit $\chi^2 = 12.80$, 8df, $p=0.1189$

Figure 6.3.1 displays the SMRs with 95% confidence intervals for PIM2 and PIM2-ANZ06 for eight PICUs in 2006. One PICU, as well as the metropolitan and regional hospitals, were excluded from Figure 6.3.1 as they recorded less than ten deaths. For the seven of the eight remaining PICUs, the 95% confidence interval of the SMRs included the number 1.0, which indicates that for those units, the observed outcome was not significantly different from the expected outcome. The eighth ICU (D) had a significantly lower than expected SMR for PIM2, but not after recalibration to PIM2-ANZ06.

Figure 6.3.1 Standardised mortality rates (based on PIM2 & PIM2-ANZ06) with 95% confidence intervals for eight participating PICUs in 2006.



Funnel plots have been used Figures 6.3.2 and 6.3.3 as an alternative representation of the SMRs for each site. Figure 6.3.2 represents values from each site in 2006, while Figure 6.3.3 combines their data for 2005 and 2006.

Figure 6.3.2 Funnel plot representation of PIM2-ANZ06 SMRs for contributing sites in 2006.

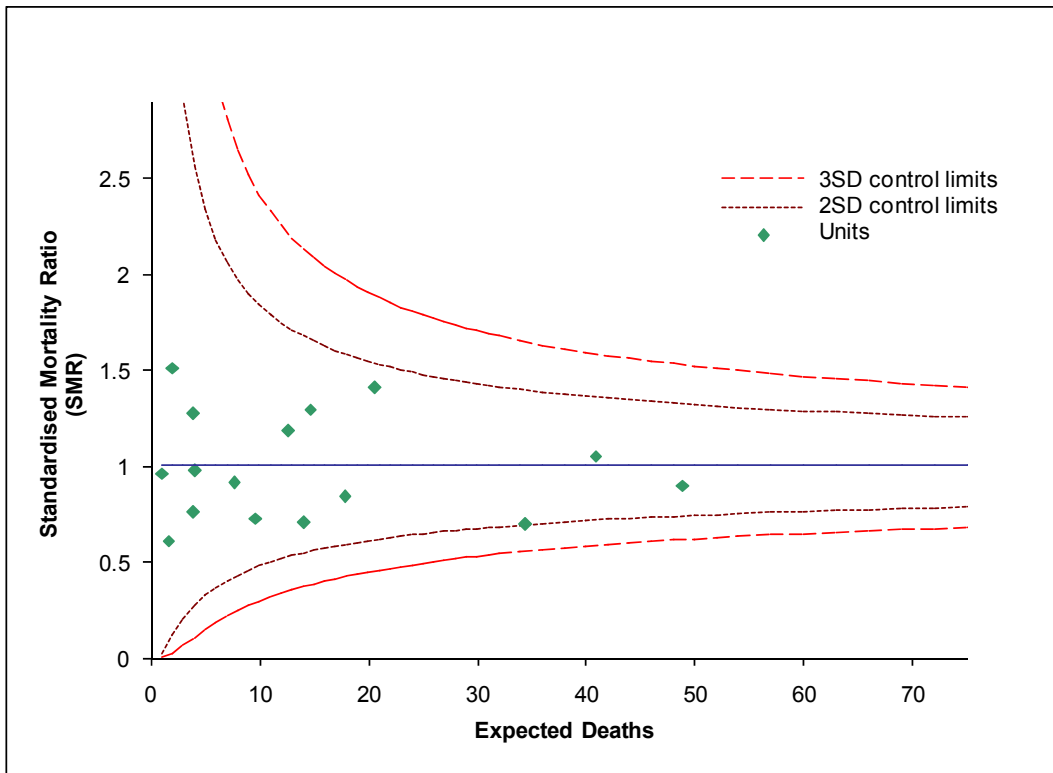


Figure 6.3.3 Funnel plot representation of PIM2-ANZ06 SMRs for sites using combined 2005 and 2006 data.

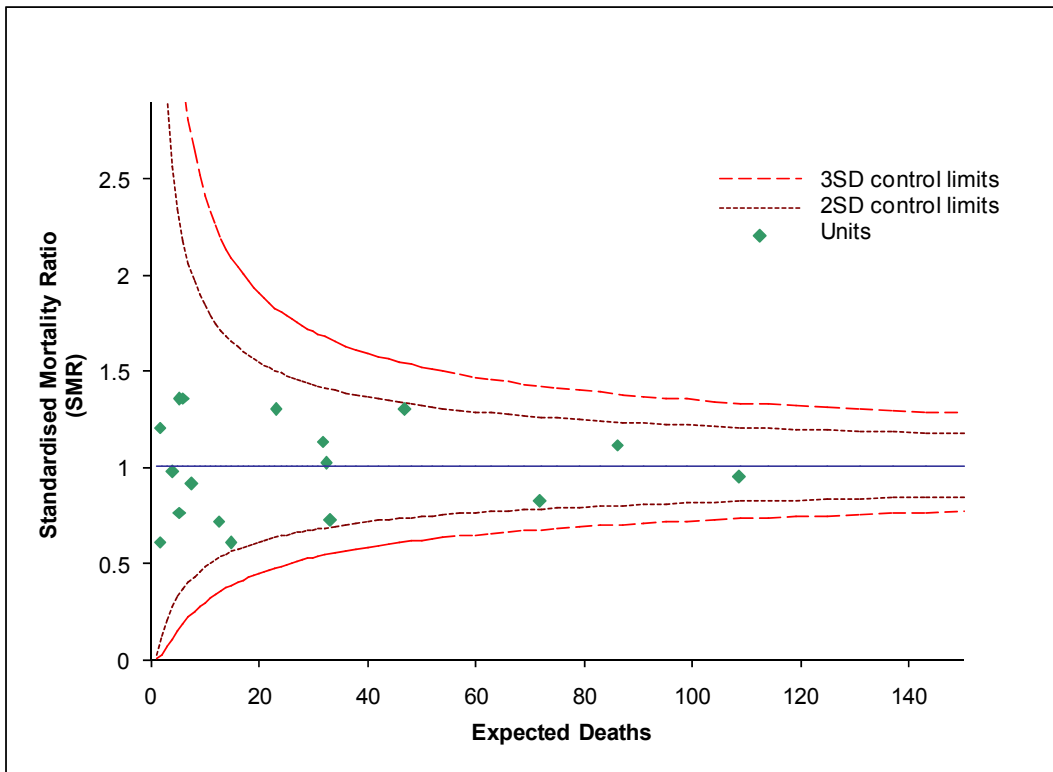


Figure 6.3.4 illustrates the distribution of mortality risk for patients submitted to the Registry. The majority of children admitted to ICU have a low risk of mortality.

Figure 6.3.4 Number of admissions and vital status at discharge by PIM2-ANZ06 mortality risk category in 2006.

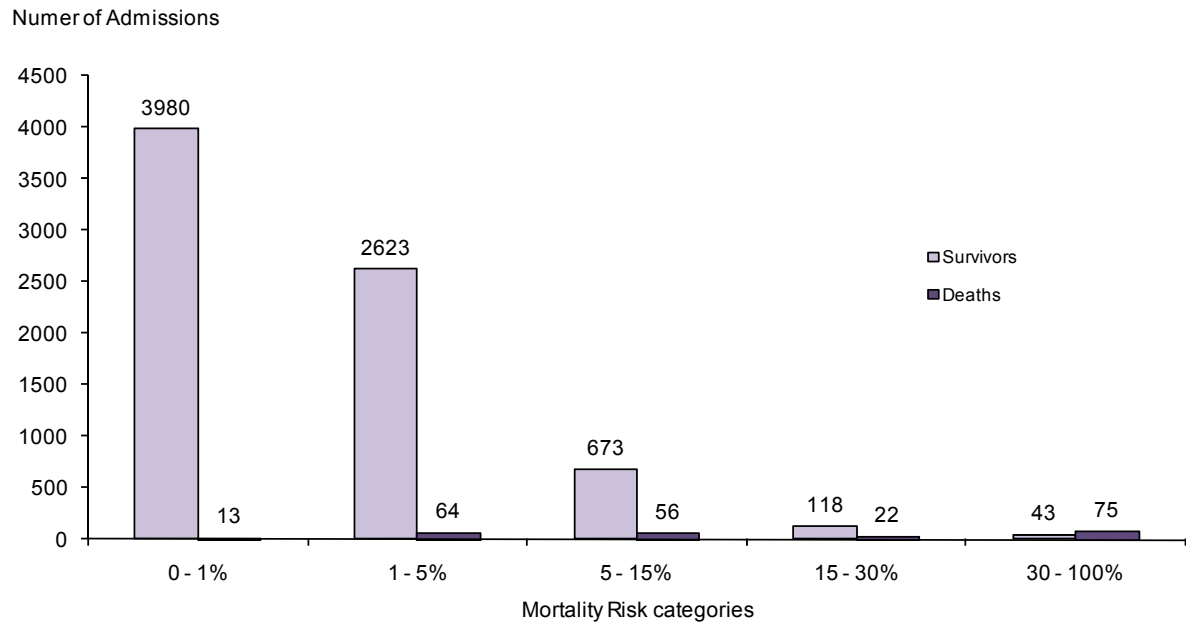
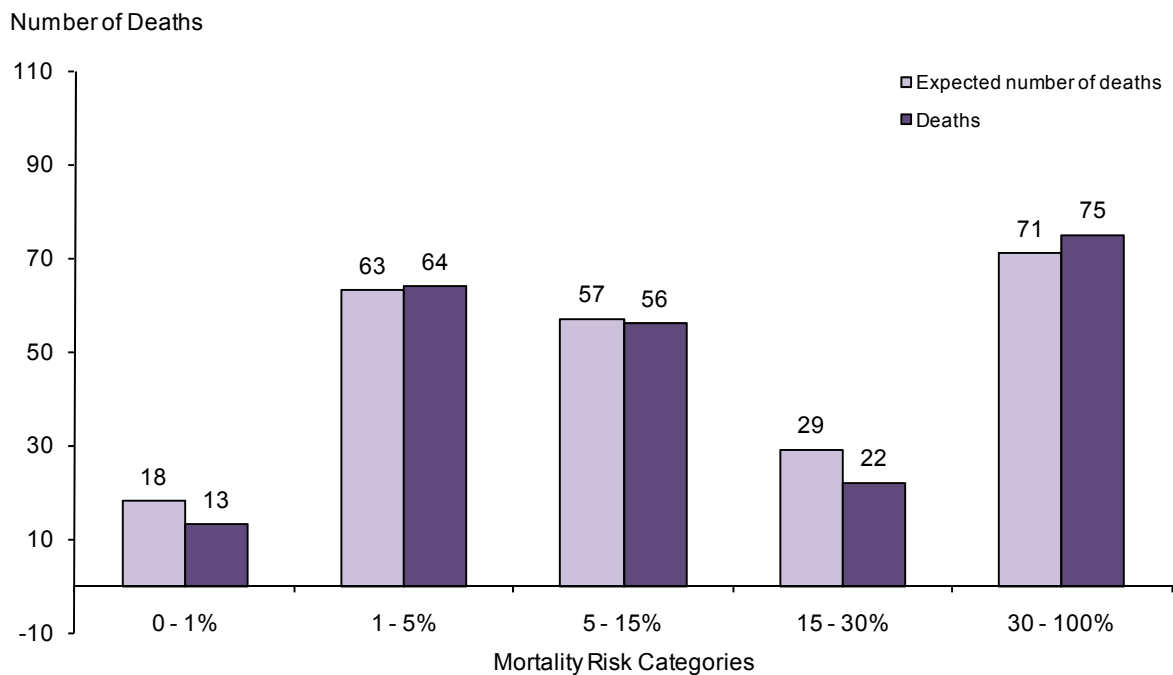


Figure 6.3.5 compares the observed deaths to the expected number of deaths using PIM2-ANZ06 risk of death in the five mortality risk categories.

Figure 6.3.5 Observed vs Expected number of deaths by PIM2-ANZ06 mortality risk category in 2006.

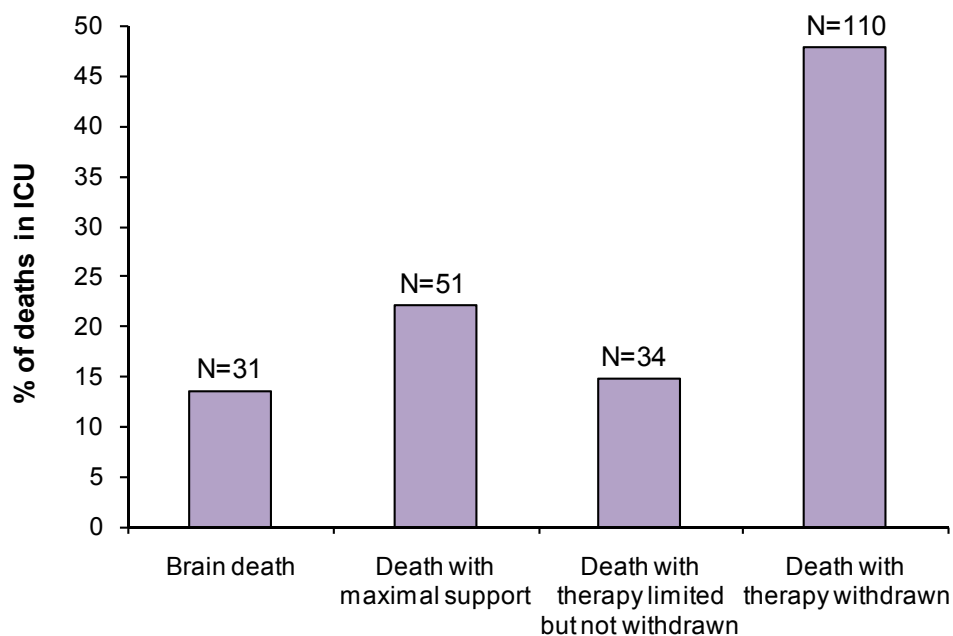


6.4 Mode of Death and Organ Donation

In 2005, five additional items of information were added to the data set for all patients who died in ICUs, however, during 2005, many sites did not have compatible software to allow for a complete collection of these items. Therefore this data is summarized for the first time in this annual report. Items included information on organ donation and the level of intervention in place at the time of death.

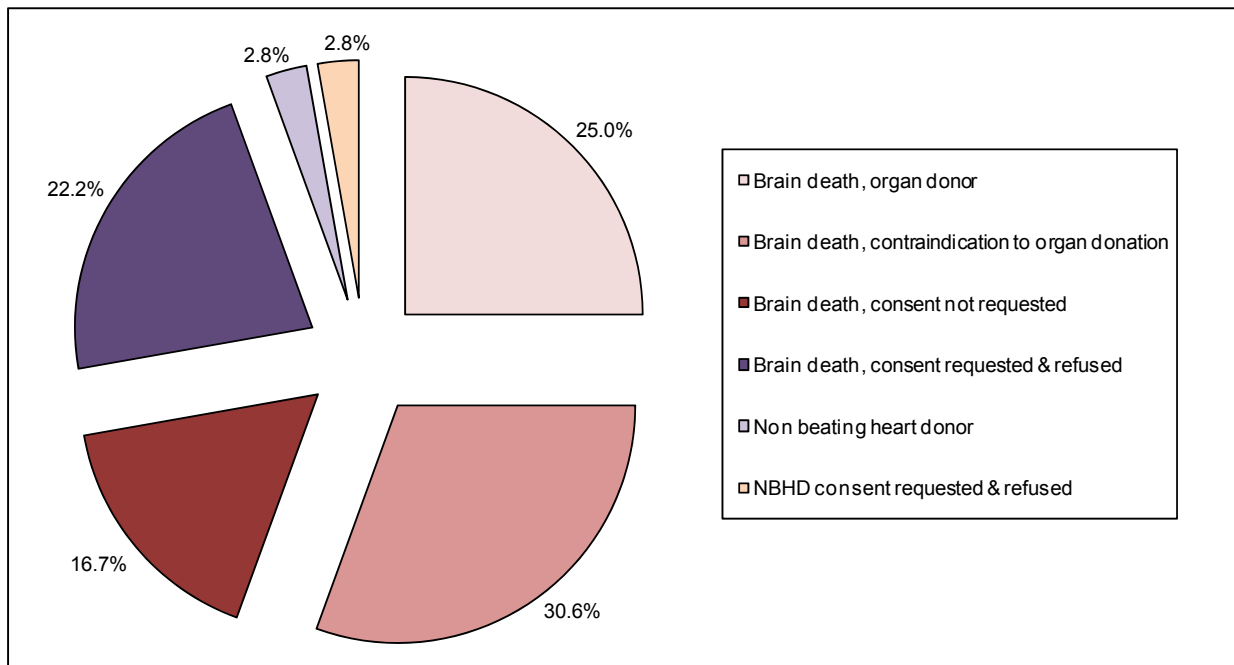
Figure 6.4.1 summarizes the mode of death and level of intervention in place for 226 of the 230 patients who died in 2006. Four deaths had missing information. Over 62% of the deaths occurred after therapy was limited or withdrawn.

Figure 6.4.1 Mode of death for all patients who died in ICU in 2006



When considering organ donation from the children who had died, the majority of deaths (184) were in patients where brain death was not present and were not considered for non-beating heart donors (NBHD). Where brain death was diagnosed, organ donation was contraindicated for 11 of the patients. Of the remaining patients, consent for organ donation was requested in 17 cases and consent obtained in 9 of those cases. In addition to the patients meeting brain death criteria, consent for NBHD was requested in two patients and consented in one of those cases. Ten deaths did not have any details recorded about organ donation. Figure 6.4.2 summarizes the response to organ donation for the 36 patients where organ donation was considered.

Figure 6.4.2 Organ donation responses for 36 deaths in ICU with brain death or potential non-beating heart donation



6.5 Sequential Control Charts

CUSUM charts have been constructed for eight units with greater than 200 admissions per year (Figures 6.5.1 - 6.5.9). To construct the risk adjusted Cumulative sum charts, the PIM2-ANZ06 model was used. Therefore these charts test for 'out-of-control' signals where the loss of control is defined as doubling or halving of the odds of death in the test ICU relative to all paediatric patients admitted to intensive care in Australia and New Zealand during 2005 and 2006 that were reported to the Registry.

The upper chart in each figure represents the cumulative excess deaths. The blue line represents the cumulative number of excess deaths - relative to the number of deaths predicted by PIM2-ANZ06. The green line represents the cumulative number of excess deaths without adjustment for mortality risk, using an expected crude mortality of 3.34%, and illustrates the effect of risk adjustment. The lower chart represents sequential probability ratio testing for an increase or decrease in the odds of death.

For both charts the x axis represents each admission to ICU in sequence for the two year period 2005 - 2006. The y axis in the upper chart represents the cumulative excess deaths that have occurred relative to the number of deaths predicted. The y axis in the lower chart represents 'process control' where the process is the cumulative observed outcome relative to that predicted by PIM2-ANZ06. The chart is designed to test two hypotheses; Hypothesis A (HA) that the odds of deaths in the unit have doubled relative to the population used to derive PIM2-ANZ06, and Hypothesis B (HB) that the odds of death in the unit have halved relative to the PIM2-ANZ06 population.

If the upper line crosses the control limits, HA is accepted, whereas if the lower line crosses the control limits HB is accepted. The control limits of ± 2.9 and ± 4.6 are set arbitrarily. Conceptually the control limits correspond to the hypotheses being accepted at $\alpha = \beta = 0.05$ (± 2.9) or at $\alpha = \beta = 0.01$ (± 4.6). It should be noted, however, that the resetting of the chart and repeated testing mean that the thresholds no longer represent true probabilities, but become more pragmatic thresholds for deciding if the process is in or out of control. For a more detailed explanation of the methods of constructing these charts and their interpretation see reference (8).

For the two year period there were no alarms signalled by the charts for eight of the PICUs (Figures 6.5.1 - 6.5.7, and 6.5.9). The chart for unit H signalled an alarm for an increase in the odds of death (Figure 6.5.8). The unit was notified and is currently investigating possible explanations for this signal. The charts for two units signalled a reduction in the odds of death (Figures 6.5.1, 6.5.6).

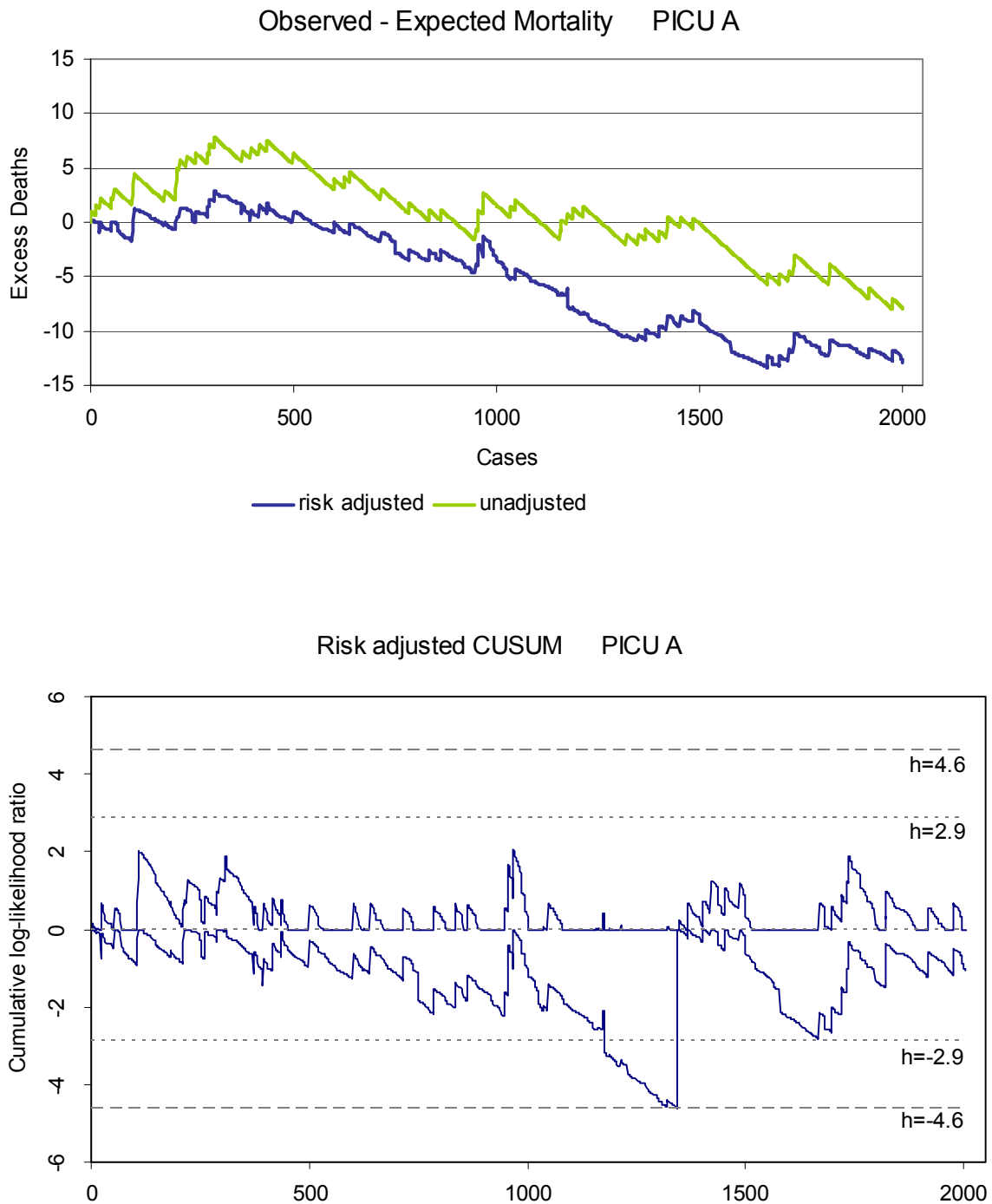


Figure 6.5.1 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU A, 2005 - 2006.

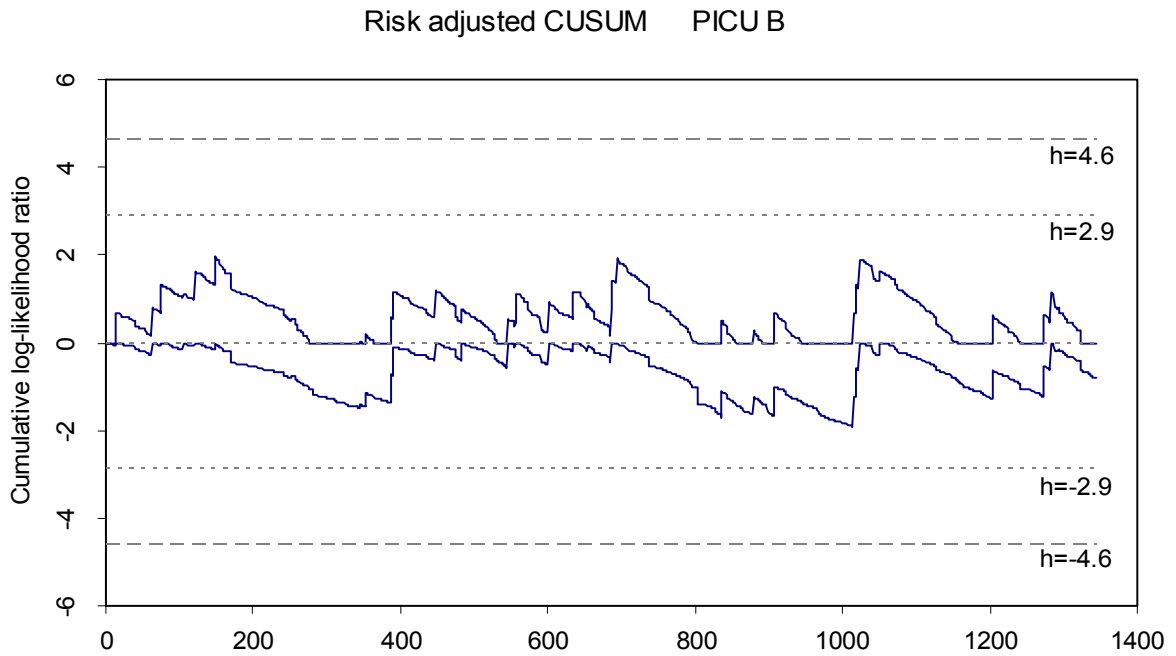
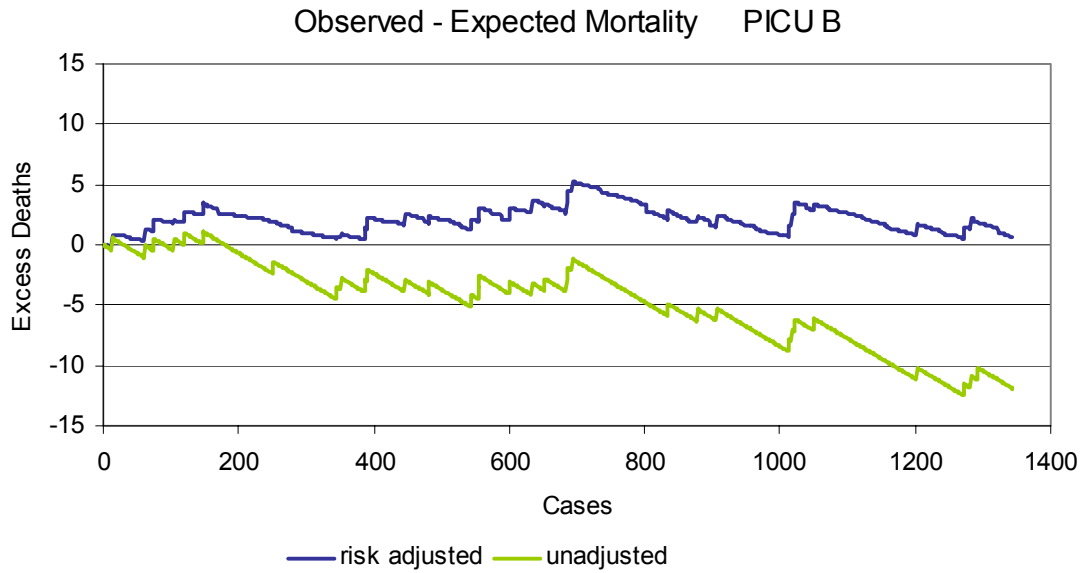


Figure 6.5.2 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU B, 2005 - 2006.

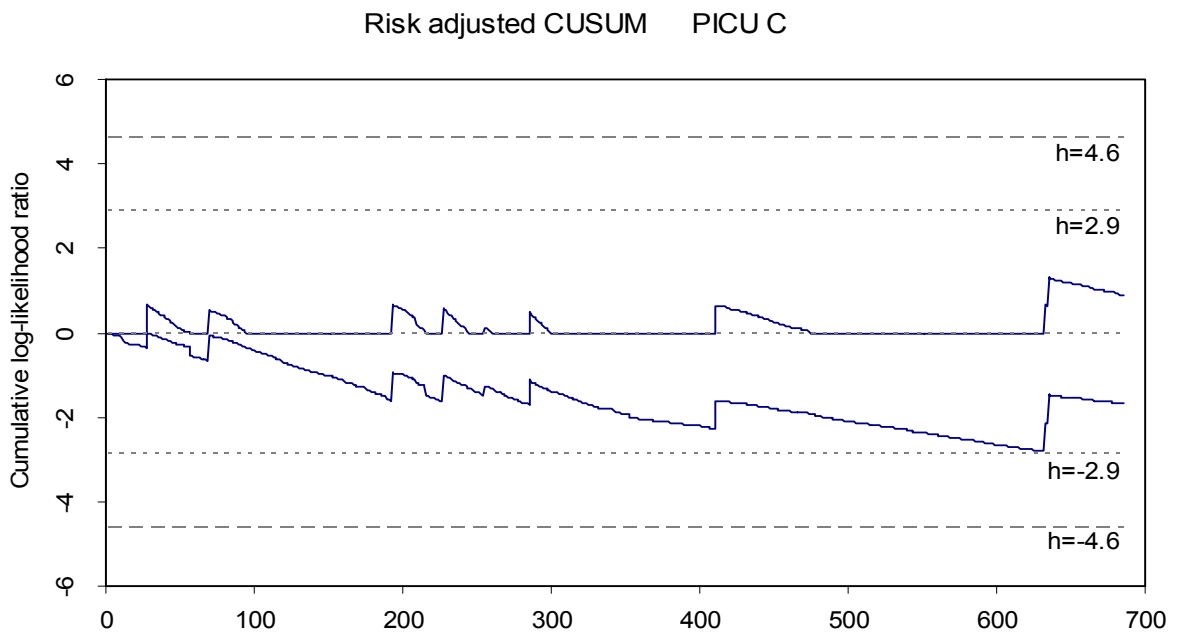
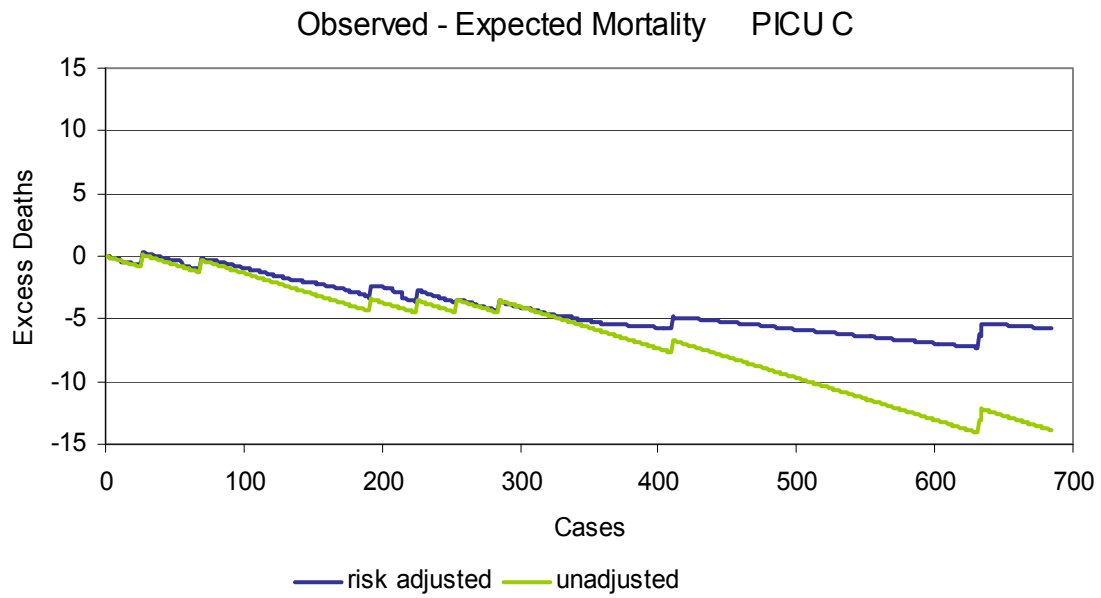


Figure 6.5.3 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU C, 2005 - 2006.

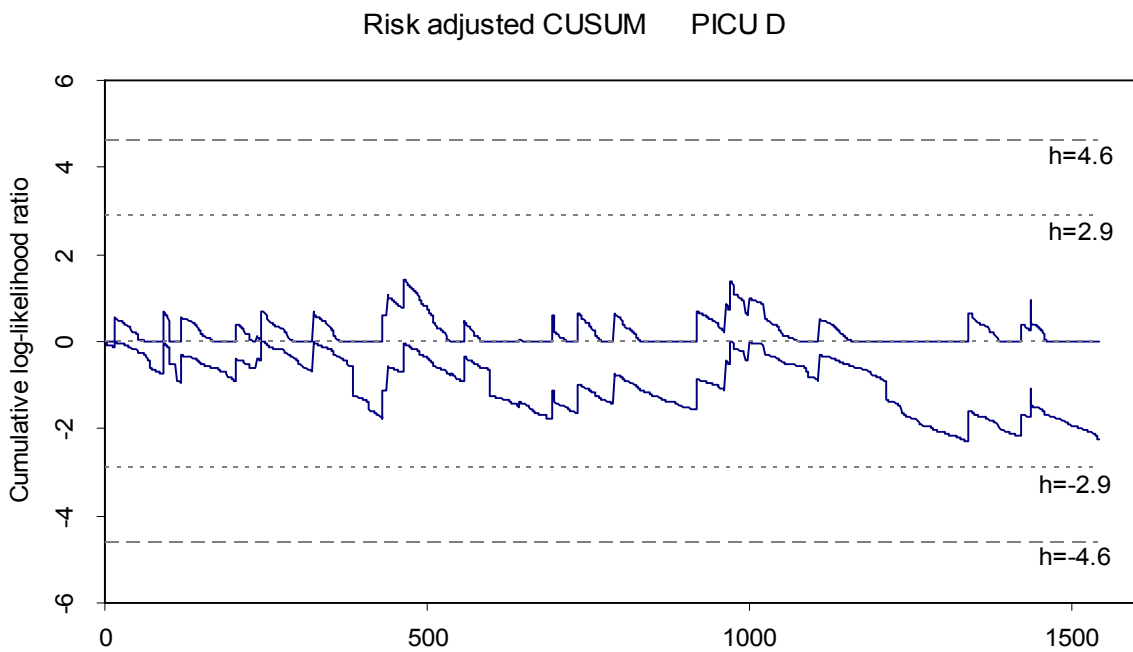
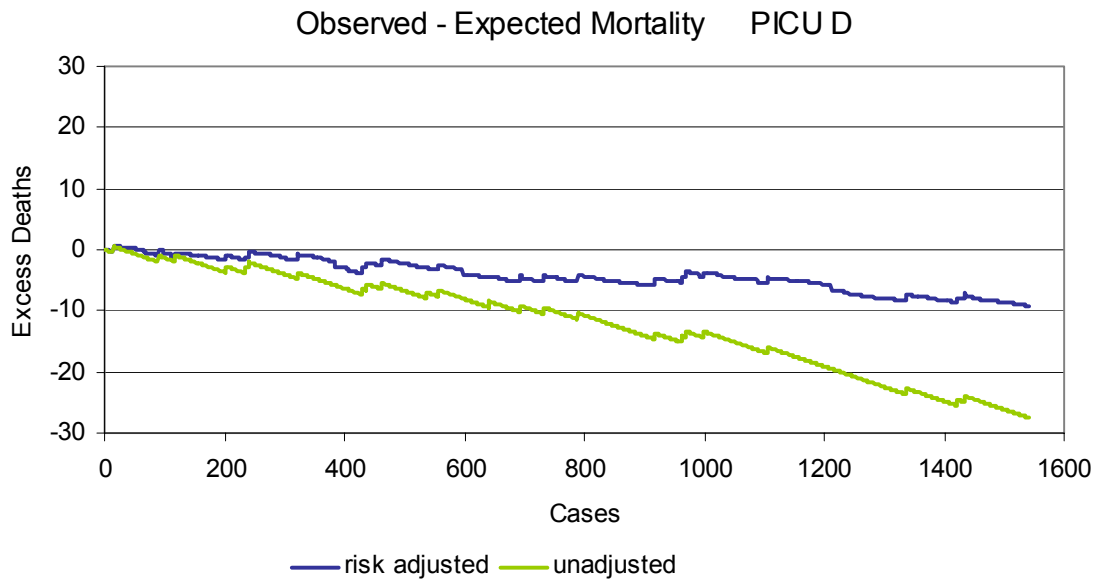


Figure 6.5.4 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU D, 2005 - 2006.

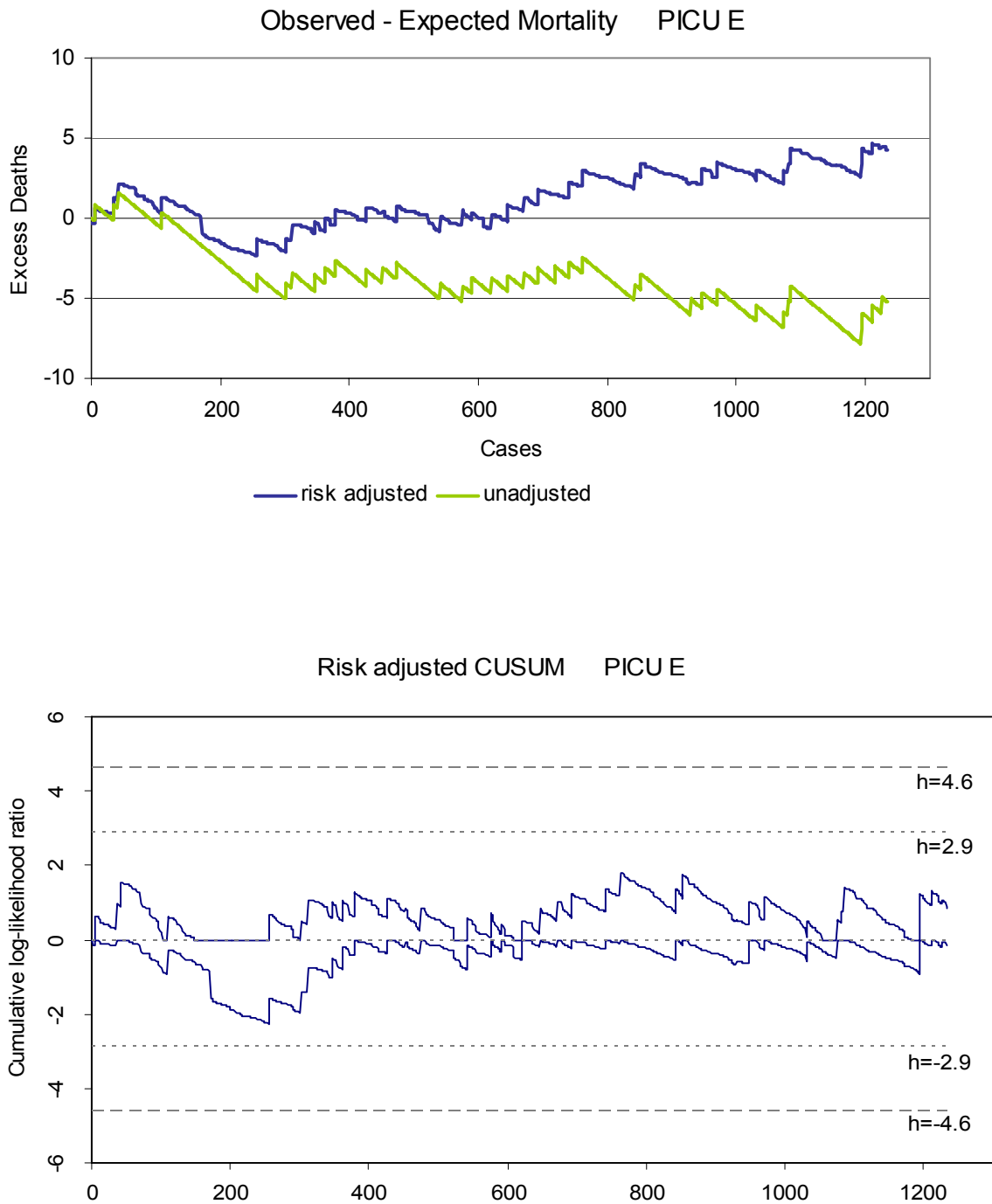


Figure 6.5.5 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU E, 2005 - 2006.

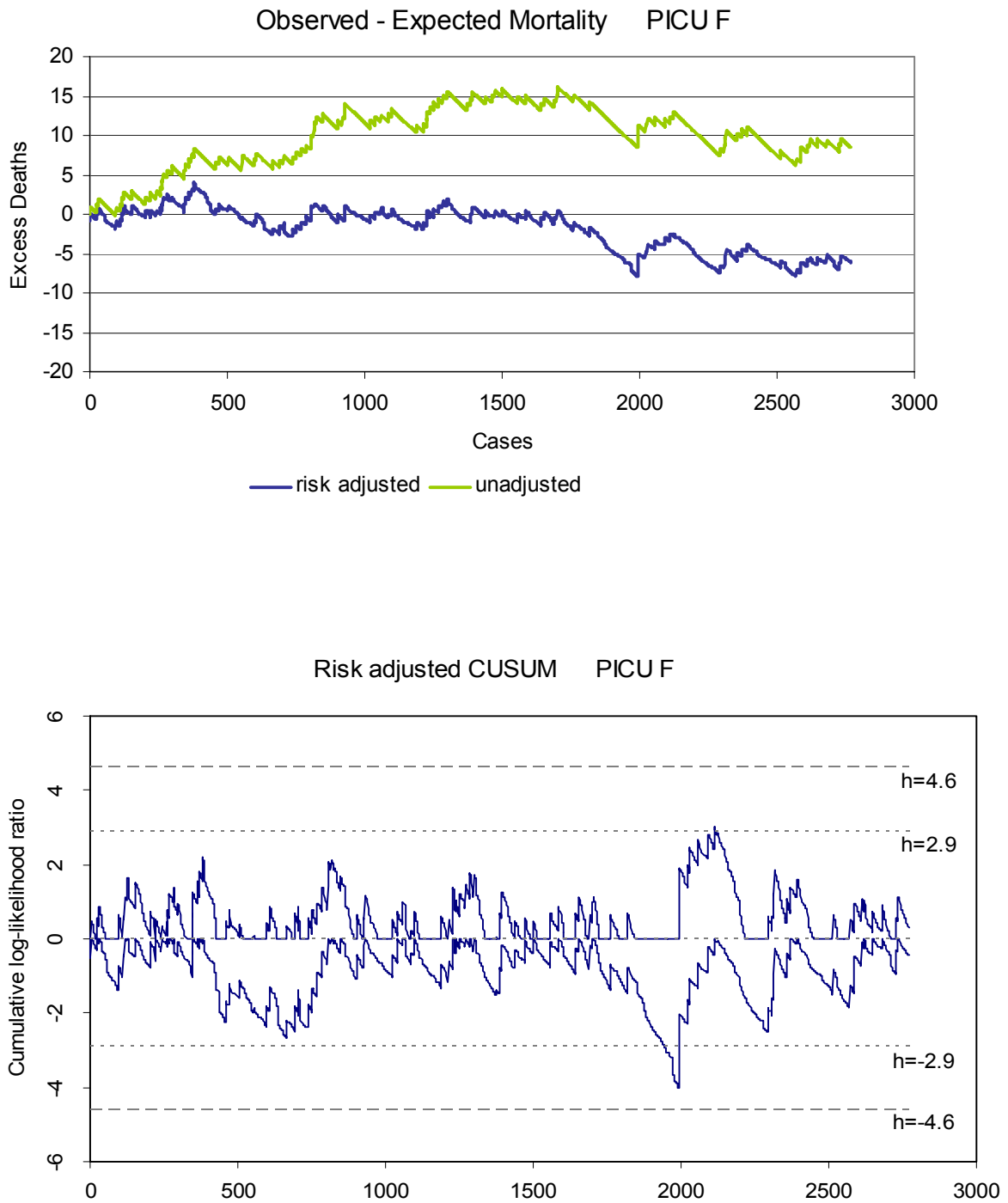


Figure 6.5.6 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU F, 2005 - 2006.

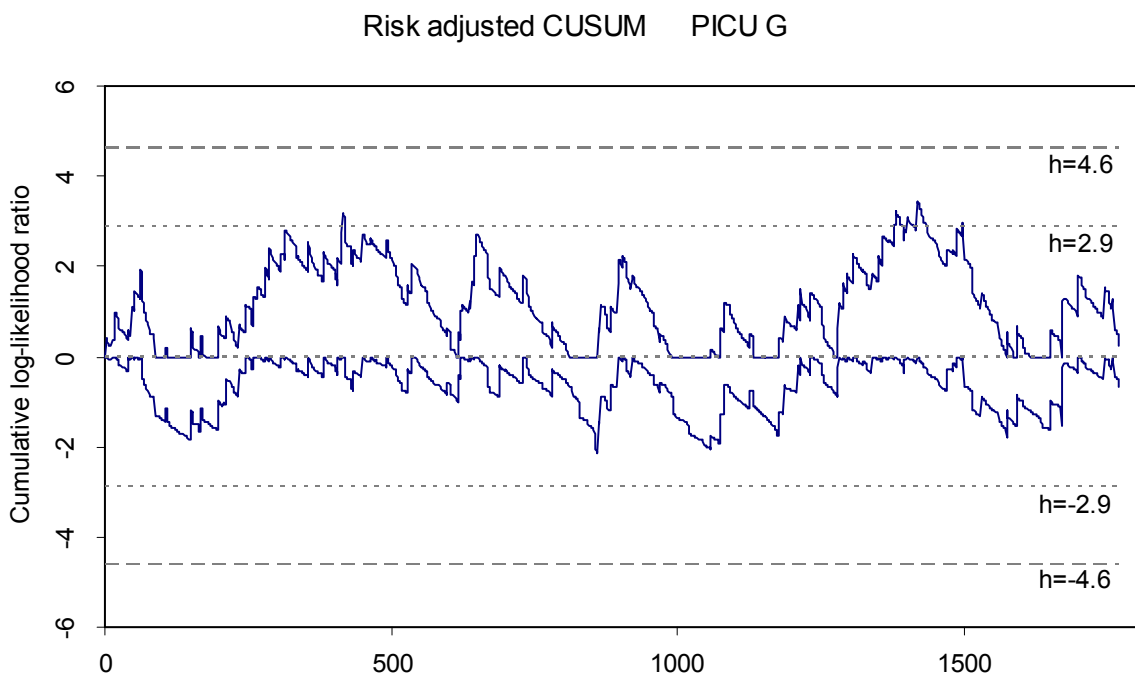
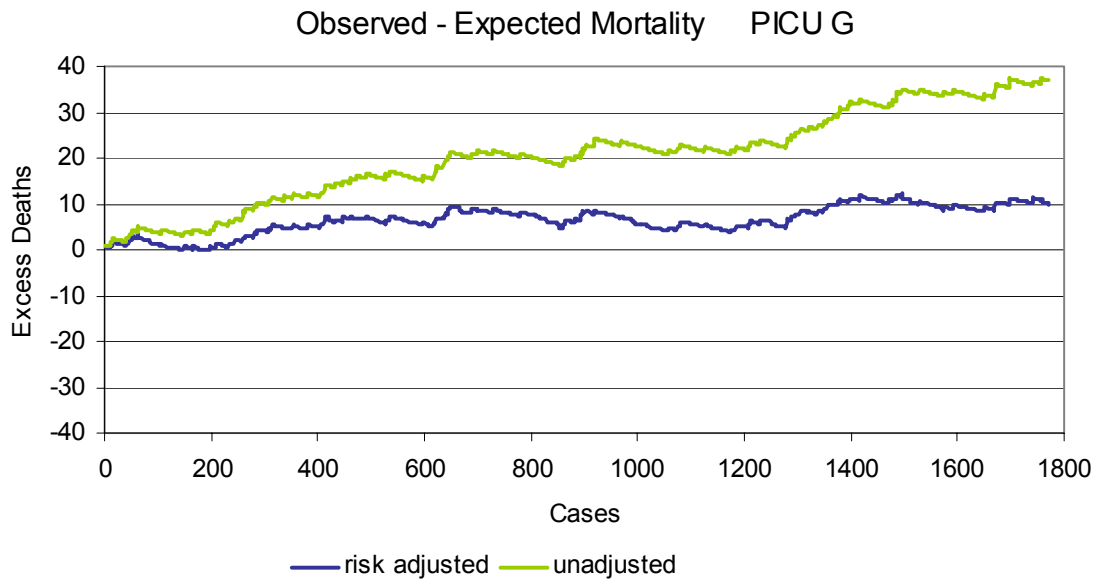


Figure 6.5.7 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU G, 2005 - 2006.

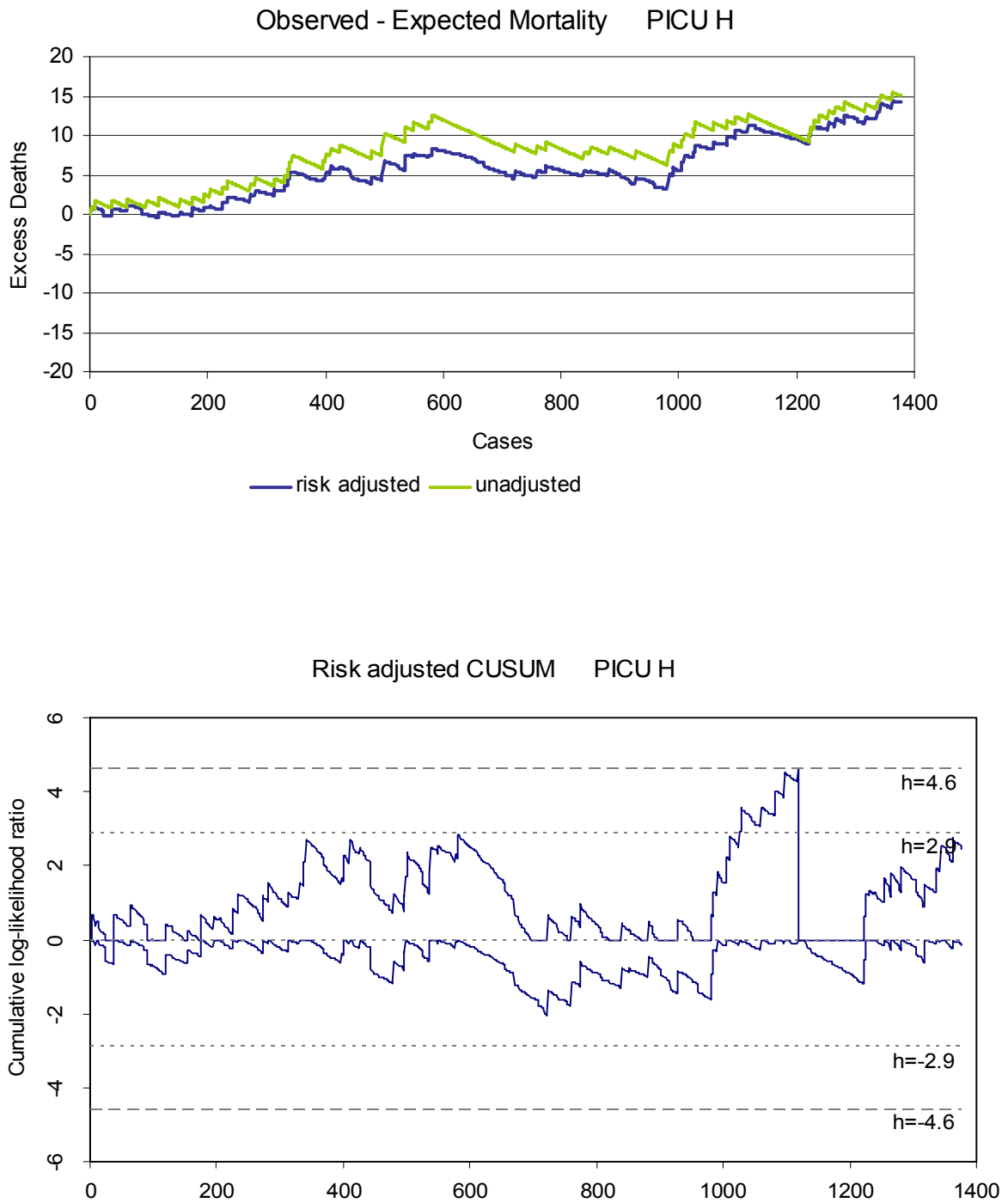


Figure 6.5.8 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU H, 2005 - 2006.

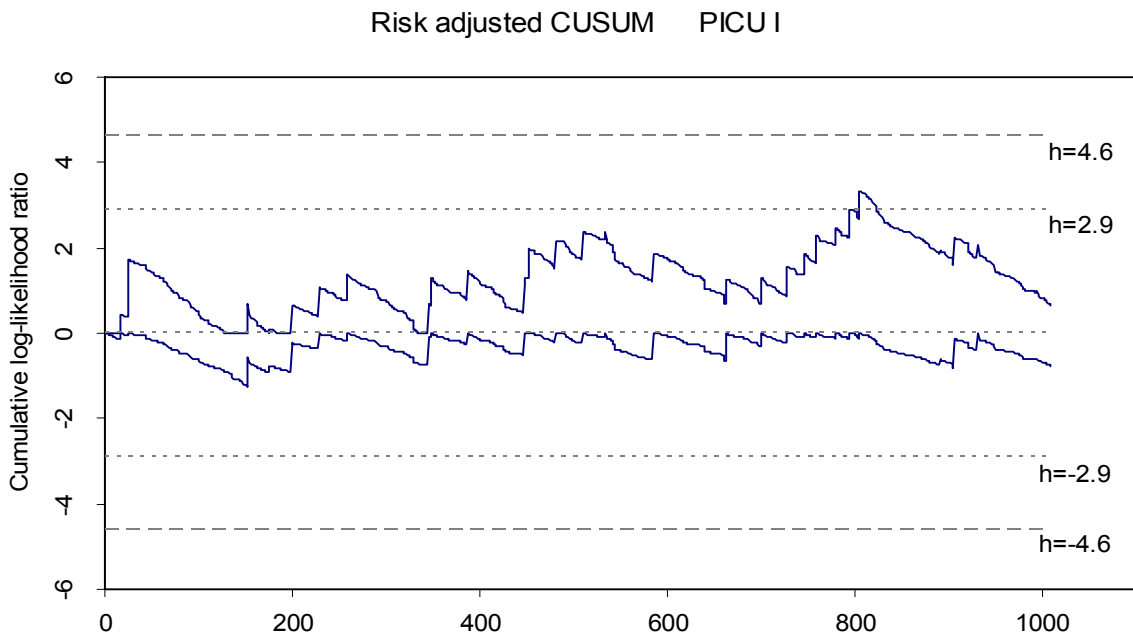
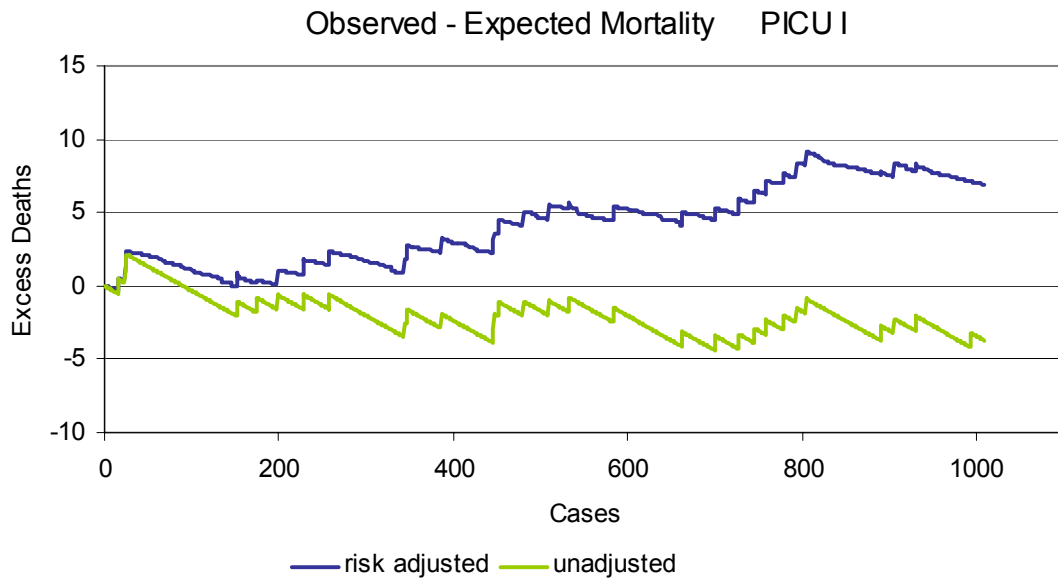


Figure 6.5.9 Sequential cumulative sum control chart for doubling and halving the odds of death for PICU I, 2005 - 2006.

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Appendix I

Minimum data set variables

Date of Birth

Date of Birth of the patient
dd/mm/yy

Gender

Gender of the patient
M Male
F Female

Ethnicity

Ethnic origin of the patient, as identified by the patient next of kin

- 1 Caucasian - of Caucasoid heritage (includes European, Russian, Middle Eastern, and Arabic)
- 2 Aboriginal - of Aboriginal or Torres Strait Islander (TI) descent, who identifies as an Aboriginal or TI, and is accepted as such by the community with which the patient is associated.
- 3 Maori - determined by patient/next of kin self identification.
- 4 Pacific Peoples - patient whose ethnic background originates from the countries of Pacific Oceania, excluding Maori
- 5 Asian - patient whose ethnic background originates from the countries of Asia, South East Asia, and Indian subcontinent.

Weight

The weight of the patient on admission, measured in kilograms (Kg).

Post Code

Post Code of patient's home address.

Hospital Admission Source

Patient's location prior to admission to hospital

- 1 Home/scene - admitted from home or the scene of an injury
- 2 Other Hospital - Emergency Department - patient transferred from the emergency department of another hospital
- 3 Other Hospital - OT/Recovery - patient transferred from the operating theatre or recovery room of another hospital
- 4 Other Hospital - ICU/NICU - patient transferred from the intensive care unit or the neonatal intensive care unit of another hospital
- 5 Other Hospital - Ward - patient transferred from any other in patient area of another hospital
- 6 Inborn - patient was born at this hospital

Retrieval

Describes the mechanism whereby a patient is transported to the hospital by a specialist paediatric IU transport team or equivalent

- 0 No
- 1 Yes

ICU Admission Source

Patients location immediately prior to admission to the ICU

- 1 OT/Recovery - patient admitted to ICU from the operating theatre or recovery room
- 2 Emergency Department - patient admitted to ICU from the emergency department
- 3 Ward - patient admitted to ICU from any other inpatient area
- 4 Other ICU/NICU same Hospital - patient admitted to ICU from another ICU or NICU within the same hospital
- 5 Direct ICU Admission - patient admitted directly to ICU, for example following a retrieval

Previous ICU Admission During this Hospital Admission

Has the patient been previously admitted to intensive care during this episode of care

- 0 No
- 1 Yes - Readmitted within 48 hours post ICU Discharge
- 2 Yes - Readmitted after 48 hours post ICU Discharge

ICU Admission Date and Time

The date and time on which the patient commenced an episode of ICU care.

dd/mm/yyyy hh:mm

ICU Discharge Date and Time

The date and time on which the patient completes an episode of ICU care.

dd/mm/yyyy hh:mm

Principal ICU Diagnosis

Code the diagnosis most directly responsible for the ICU admission. Use the ANZPIC Registry diagnoses codes (Appendix II). For patients admitted primarily for recovery after a procedure, use a Post Procedural Diagnosis for the principal diagnosis. Do not use an infection code or mechanism of injury code for Principal Diagnosis

Principal underlying diagnosis

The underlying diagnosis which has contributed to the need for ICU admission

For example, an ex-premature infant with bronchiolitis will have a principal ICU diagnosis of bronchiolitis with an Underlying diagnosis of prematurity

Associated Diagnoses

The presence of any other conditions in addition to that listed as the principal diagnosis (record up to five associated diagnoses). For patients having an operative procedure during the ICU admission, a Post Procedural Diagnosis should be listed as an associated diagnosis.

Total Hours of Intubation During this Admission

Intubation refers to ETT or Tracheostomy

Total Hours of Respiratory Support During this Admission

Respiratory Support refers to ventilation, CPAP, BiPAP or NPV delivered by ETT, Tracheostomy, nasopharyngeal airway, mask, nasal prongs, or Curass (i.e.. any form of mechanical assistance).

Outcome

The patients destination on completion of the ICU episode of care.

- 1 Discharged to ward (includes transfer to another hospital ward) or home
- 2 Died in ICU
- 3 Transferred to another ICU (includes NICU)
- 4 Still in ICU

ICU/NICU Transferred to

Name of the hospital to which the patient is transferred

Paediatric Index of Mortality Variables

Record the first value of each variable measure at or about the time of first face to face contact between the patient and a doctor from your ICU (or a specialist paediatric retrieval team). Use the first values measured within the period from shortly before first contact to one hour after arrival in your own ICU. The first contact may be in the ICU, the emergency department, another inpatient area of the hospital, or in another hospital (for example on a retrieval). If the variable was not measured record 999.

Elective

An ICU admission or an operation is considered elective if it could be postponed for more than six hours without an adverse effect.

- 0 Non-elective - all other admissions
- 1 Elective - include admission after elective surgery, for an ICU procedure (for example central line insertion), for diagnostic monitoring or review of a home ventilation patient.

Recovery from surgery

Includes a radiology procedure or cardiac catheter. Do not include patients admitted from the operating theatre where recovery from surgery is not the main reason for ICU admission (for example, a patient with a head injury who is admitted from theatre after insertion of an ICP monitor, in this patient the main reason for ICU admission is the head injury).

- 0 No
- 1 Yes

Admitted following cardiac bypass

Also code as recovery from surgery.

- 0 No
- 1 Yes

Mechanical ventilation

Record whether the patient was mechanically ventilated within the first hour of admission to ICU. Mechanical ventilation refers to both invasive (ETT or tracheostomy), and non-invasive (nasopharyngeal airway, mask or nasal prongs) methods of augmenting work of breathing. Using conventional mechanical ventilation (CVM), continuous positive airway pressure (CPAP), biphasic positive airway pressure (BiPAP), or negative pressure ventilation (NPV).

- 0 No
- 1 Yes

Systolic Blood Pressure

Measure in mmHg. If not measured within one hour of admission record 999.

Pupillary Responses to bright light

Pupillary reactions to bright light are used as an index of brain function. Do not record abnormal findings due to drugs, toxins, or local eye injury.

- 0 All other responses including unknown
- 1 Both fixed and > 3mm

PaO₂

The arterial oxygen tension, mmHg, as measured in an arterial blood gas sample. At time of PaO₂ if oxygen via ETT or headbox (unknown = 999)

Base Excess

The base excess measured in arterial or capillary blood, in mmol/l.

FiO₂

The fraction of inspired oxygen being delivered to the patient via endotracheal tube (ETT) or headbox. Measure at the same time as the PaO₂.

PIM2 Low risk diagnosis

Specific conditions associated with reduced mortality risk

- 0 None
- 1 Asthma is the main reason for ICU admission
- 2 Bronchiolitis is the main reason for admission
- 3 Croup is the main reason for ICU admission
- 4 Obstructive sleep apnoea is the main reason for ICU admission include admissions following adenoidectomy &/or tonsillectomy in whom OSA is the main reason for ICU admission
- 5 Diabetic keto-acidosis is the main reason for ICU admission

PIM2 High risk diagnosis

Specific conditions associated with increased mortality risk

- 0 None
- 1 Cardiac arrest out of hospital - requires either documented absent pulse or the requirement for external cardiac massage (do not include past history of cardiac arrest)
- 11 Cardiac arrest in hospital - preceding ICU admission requires either documented absent pulse or the requirement for external cardiac massage (do not include past history of cardiac arrest)
- 2 Severe combined immune deficiency - requires the documented diagnosis of SCID
- 3 Leukaemia or lymphoma after 1st induction
- 4 Spontaneous cerebral haemorrhage - haemorrhage must be spontaneous (for example, from an aneurysm or AVM) (do not include traumatic cerebral haemorrhage or intracranial haemorrhage that is not intracerebral)
- 5 Cardiomyopathy or myocarditis - requires the documented diagnosis of myocarditis or cardiomyopathy
- 6 Hypoplastic left heart syndrome - include only cases where a Norwood procedure, or equivalent is required to sustain life
- 7 HIV infection - requires the document diagnosis of HIV
- 8 IQ <35, (i.e. worse than Downs)
- 9 Neurodegenerative disorder - requires a history of progressive loss of milestones or a diagnosis were this will inevitably occur
- 10 Liver failure - acute or chronic, include patients admitted for recovery following liver transplantation for acute or chronic liver failure

Place of first face to face contact

Place of first face to face contact between the patient and a doctor from your ICU (or a doctor from a specialist paediatric transport team).

- 1 Your ICU
- 2 In your hospital but outside ICU
- 3 Outside your hospital

First contact

Are the values recorded above (i.e. those used in PIM2 calculations) made at or about the time of first face to face contact?

- 0 No
- 1 Yes

Intubation commenced date and time

The date and time at which the patient was intubated. Intubation refers to ETT or tracheostomy. Two separate episodes of intubation can be recorded.
dd/mm/yyyy hh:mm

Intubation ceased date and time

The date and time at which the patient was extubated, or discharged, if the patient has a tracheostomy. Two separate episodes of extubation can be recorded.
dd/mm/yyyy hh:mm

Intubation additional hours

If more than 2 episodes of intubation occur during a patient's ICU admission, summed times of further episodes are recorded as additional hours of intubation. Alternatively, the total number of intubation hours for all episodes can be calculated and recorded in this field, but only when the details for the two intubation episodes are left blank.

Respiratory support commenced date and time

The date and time on which the patient commenced respiratory support. Respiratory support refers to CMV, CPAP, BiPAP or NPV. Two separate episodes of respiratory support can be recorded.
dd/mm/yyyy hh:mm

Respiratory support ceased date and time

The date and time on which the patient ceased respiratory support. Two separate episodes of respiratory support can be recorded.
dd/mm/yyyy hh:mm

Respiratory support additional hours

If more than 2 episodes of respiratory support occur during a patient's ICU admission, summed times of further episodes are recorded as additional hours of respiratory support. Alternatively, the total number of respiratory support hours for all episodes can be calculated and recorded in this field, but only when the details for the two respiratory support episodes are left blank.

Mode of Death

Mode of death of patient

- 1 Brain death
- 2 Death with maximal support
- 3 Death with therapy limited but not withdrawn
- 4 Death with therapy withdrawn

External Cardiac Massage

External cardiac massage performed as the terminal event

- 0 no
- 1 yes

Limitation of Therapy

Limitation of therapy order in the notes

- 0 no
- 1 yes

Date of Limitation Order

Date of limitation of therapy order was documented in the patients case notes. If more than one order, record date of first order if order preceded ICU admission, record ICU admission date dd/mm/yyyy.

Organ Donation

- 1 Brain death not present (NBHD not considered)
- 2 Brain death, organ donor
- 3 Brain death, contraindication to organ donation
- 4 Brain death, consent not requested
- 5 Brain death, consent requested and refused
- 6 Non beating heart donor
- 7 Non beating heart donation consent requested and refused

Specific Therapies

To be completed at the time of patient discharge from ICU.

CVVH or CVVHD

Specifies whether the patient received renal therapy support in terms of continuous haemodialysis at any time during their admission to ICU.

- 0 no
- 1 yes

Haemodialysis

Specifies whether the patient received renal therapy support in terms of intermittent haemodialysis at any time during their admission to ICU.

- 0 no
- 1 yes

Peritoneal dialysis

Specifies whether the patient received renal therapy support in terms of peritoneal dialysis at any time during their admission to ICU.

0 no,
1 yes

Plasma filtration

Specifies whether the patient received renal therapy support in terms of plasma filtration at any time during their admission to ICU.

0 no
1 yes

HFO

Specifies whether the patient received high frequency oscillation (HFO) therapy at any time during their admission to ICU.

0 no
1 yes

Inhaled nitric oxide

Specifies whether the patient received inhaled nitric oxide therapy at any time during their admission to ICU.

0 no
1 yes

ECMO

Specifies whether the patient received extra corporeal membrane oxygenation (ECMO) therapy at any time during their admission to ICU.

0 no
1 yes

Ventricular assist device

Specifies whether the patient received support from a ventricular assist device (VAD) at any time during their admission to ICU.

0 no
1 yes

ICP Monitoring

Specifies whether the patient had an intra cranial pressure monitor inserted at any time during their admission to ICU.

0 no
1 yes Complete specific therapy data at the time of ICU discharge

Appendix II ANZPIC Diagnostic Codes

Australia and New Zealand Paediatric Intensive Care Registry, 2006

<u>INJURY</u>	<u>NEUROLOGICAL</u>	<u>RENAL</u>
100 Injury - Other	300 Neurological – Other	500 Renal - Other
101 Anaphylaxis	301 Botulism	501 Haemolytic Uraemic Syndrome
102 Burns	302 Brain Abscess	502 Nephrotic and/or Nephritic Syndrome
103 Carbon Monoxide Poisoning	303 Brain AV Malformation	505
104 Drug Toxicity - Iatrogenic	304 Brain Death	503 Previous Renal Transplant
105 Electrocutation	305 Brain Infarction or Stroke	504 Renal Failure - Acute
106 Envenomation	306 Brain Tumour	506 Renal Failure - Chronic
107 Hanging or Strangulation	324 Cerebral Aneurysm	Urinary Tract Infection
108 Hyperthermia	307 CSF Shunt Malfunction or Infection Encephalitis	<u>GASTROINTESTINAL</u>
109 Hypothermia	308 Encephalopathy, Acute – Hypoxic	600 Gastrointestinal – Other
110 Immersion (Near Drowning)	309 Ischaemic	620 Biliary Atresia
111 Ingestion	310 Encephalopathy, Acute – Other	601 Bowel Obstruction
112 Smoke Inhalation	311 Encephalopathy, Chronic Degenerative (eg Leigh’s Syndrome)	621 Bowel Perforation
113 Trauma - Other	312 Encephalopathy, Chronic Static (eg Cerebral Palsy)	602 Colitis
114 Trauma - Abdominal	313 Guillain Barre Syndrome	603 Gastroenteritis
115 Trauma - Chest	314 Hydrocephalus	604 Gastrointestinal Haemorrhage
116 Trauma - Facial	315 Intracranial Haemorrhage – Spontaneous	605 Gastroschisis or Exomphalos
117 Trauma - Head	316 Intracranial Hypertension (Raised ICP)	606 Hepatitis
118 Trauma - Skeletal	317 Meningitis	622 Hirschsprung’s Disease
119 Trauma - Spinal	318 Meningocele or Spina Bifida	607 Intussusception
<u>INJURY MECHANISM¹</u>	325 Muscular Dystrophy	608 Liver Disorder – Other
150 Injury Mechanism – Other Crush	326 Myasthenia Gravis	609 Liver Failure – Acute
162 Injury	319 Myopathy	610 Liver Failure – Chronic
151 Cyclist	320 Neuropathy	611 Necrotising
152 Fall	321 Seizures	623 Enterocolitis
153 Farm Equipment	322 Spinal Cord Lesion	612 Neonatal Jaundice
154 Firearm Injury	327 Tetanus	624 Oesophageal Atresia
161 Motor Bike Rider / Passenger	323 Venous Sinus Thrombosis	613 Oesophageal Foreign Body
155 MVA – Passenger		614 Pancreatitis
156 MVA – Pedestrian	<u>RESPIRATORY UPPER AIRWAY</u>	625 Peritonitis Portal Hypertension
157 Non Accidental Injury	400 Upper Airway – Other	626 Previous Liver Transplant
158 Self Injury	401 Choanal Atresia or Stenosis	615 Pyloric Stenosis
159 Sports Injury	402 Epiglottitis	616 Short Gut Syndrome
160 Stab Injury	403 Foreign Body – Inhaled	617 Ulcer – Duodenal
<u>CARDIOVASCULAR²</u>	404 Laryngotracheobronchitis (Croup)	618 Ulcer – Gastric or Gastritis
200 Cardiovascular - Congenital - Other	405 Obstructive Sleep Apnoea	619 Varices – Oesophageal or Gastric
201 Absent Pulmonary Valve	406 Pierre Robin Syndrome	627 Volvulus
202 Anomalous Coronary Artery	407 Retropharyngeal Abscess	<u>INFECTION¹</u>
203 Aortic Insufficiency	413 Subglottic Haemangioma	700 Infection – Other
204 Aortic Stenosis	408 Subglottic Stenosis	701 Adenovirus
224 AP Window	409 Tracheitis	702 Bacterium – Other
205 ASD	410 Upper Airway Obstruction – Other	703 Bacterium – Gram Negative -Other
225 AV Malformation	411 Upper Respiratory Infection – Other	704 Bacterium – Gram Positive - Other
206 AVSD (AV Canal)	412 Vocal Cord Paresis	705 Candida
207 Coarctation	<u>LOWER AIRWAY</u>	706 Clostridium
208 Cortriatriatum	430 Lower Airway – Other	707 CMV
226 Double Outlet Right Ventricle	431 Asthma	708 EBV
209 Ebstein’s Anomaly	432 Bronchiolitis	730 E Coli
210 Hypoplastic Left Heart Syndrome	433 Chronic Lung Disease (Includes BPD)	709 Enterovirus
211 Interrupted or Hypoplastic Aortic Arch	434 Malacia - Trachea and/or Bronchi	710 Fungus – Other
227 LV Outflow Obstruction	435 Mediastinal Mass	711 Haemophilus Influenzae Type b
212 Mitral Insufficiency	436 Stenosis - Trachea and/or Bronchi	712 Hepatitis – Viral
213 Mitral Stenosis	437 Tracheo-oesophageal Fistula	713 Herpes Simplex Virus
214 PDA	438 Vascular Ring	714 HIV
215 Pulmonary Atresia or Stenosis	<u>OTHER</u>	715 Influenza Virus
228 Pulmonary Insufficiency	450 Respiratory – Other	731 Klebsiella
229 RV Outflow Obstruction	451 Air Leak Syndrome	716 Legionella
216 Single Ventricle	452 Apnoea – Central	732 Malaria
217 APVD	453 ARDS	735 Measles Virus
218 Tetralogy of Fallot	454 Aspiration	717 Meningococcus
219 Transposition of Great Arteries (dTGA)	455 Chylothorax	718 Mycoplasma
220 Tricuspid Atresia or Stenosis	456 Congenital Diaphragmatic Hernia	719 Parainfluenzae Virus
221 Tricuspid Insufficiency	457 Congenital Lung Anomaly	720 Pertussis
222 Truncus Arteriosus	458 Cystic Fibrosis	721 Pneumococcus
223 VSD	459 Empyema	722 Pneumocystis Carinii
<u>AQUIRED</u>	460 Hyaline Membrane Disease	733 Pseudomonas
250 Cardiovascular – Acquired – Other	461 Hypoventilation – Central	723 Rotavirus
251 Cardiac Failure	469 Lower Respiratory Infection – Other	724 RSV
252 Cardiac Tumour	462 Lung Abscess	725 Salmonella
253 Cardiomyopathy	463 Meconium Aspiration Syndrome	726 Staphylococcus
254 Dysrhythmia – Supraventricular	470 Pertussis Syndrome	734 Streptococcus Group B
255 Dysrhythmia – Ventricular	464 Pleural Effusion	727 Streptococcus – Other
256 Endocarditis	465 Pneumonia or Pneumonitis	728 Varicella
257 Hypertension – Pulmonary	471 Previous Lung Transplant	729 Virus – Other
258 Hypertension – Systemic	466 Pulmonary Hypoplasia	799 No Organism Identified
259 Kawasaki’s Disease	467 Pulmonary Oedema	
260 Pericardial Effusion or Tamponade	468 Respiratory Failure	
263 Previous Heart Lung Transplant	472 Transient Tachypnoea of the Newborn	
264 Previous Heart Transplant		
261 Vascular Thrombosis		
262 Vasculitis		

¹ DO NOT USE FOR PRINCIPAL DIAGNOSIS
² CONGENITAL

Australia and New Zealand Paediatric Intensive Care Registry, 2006

<u>MISCELLANEOUS</u>		<u>POST PROCEDURAL DIAGNOSES</u>		<u>THORACIC SURGERY</u>
801	Acute Life Threatening Event			
802	Cardiac Arrest - In Hospital	1100	Post Procedure - Other	1400 Thoracic Surgery - Other
803	Cardiac Arrest - Out of Hospital	1101	Anaesthetic Complication	1401 Diaphragm Plication
804	Chromosomal Anomaly	1106	Cardiac Catheter - Balloon Septostomy	1402 Diaphragm Repair
805	Coagulopathy	1102	Cardiac Catheter - Diagnostic	1403 Lung Biopsy
839	Craniosynostosis	1107	Cardiac Catheter - Interventional	1404 Lung Decortication
806	Dehydration	1103	Ex-prem, Post GA	1405 Oesophageal Atresia Repair
807	Dermatological Disorder	1104	Invasive Radiology Procedure	1406 Pneumonectomy or Lobectomy
808	Diabetes Insipidus	1105	Massive Intraop Transfn (> 1 blood vol)	1407 Thoracic Tumour Resection
809	Diabetes Mellitus with Ketoacidosis			1408 Tracheo-oesophageal Fistula Repair
810	Diabetes Mellitus without Ketoacidosis			1409 Tracheopexy
811	Electrolyte Disorder		<u>CARDIAC SURGERY</u>	
812	Endocrine Disorder	1200	<u>CLOSED</u>	<u>ENT SURGERY</u>
813	Gas Gangrene	1201	Cardiac Surgery Closed - Other	ENT - Other
847	Haematological Disorder	1202	Coarctation Repair	1500 Adenoidectomy and/or Tonsillectomy
814	Home Ventilation Patient	1203	PA Band	1501 Choanal Atresia Repair
815	Hypoglycaemia	1204	Pacemaker Insertion or Revision	1502 Cricoid Split
816	ICU Diagnostic Monitoring - Elective	1205	PDA Ligation	1503 Laryngeal Reconstruction
817	ICU Procedure (eg CVC Insertion)	1206	Systemic-Pulmonary Shunt	1504 Laryngobronchoscopy
818	Immunodeficiency - Congenital	1206	Valvotomy - Closed	1505 Tracheostomy
819	Immunosuppression - Acquired	1230	<u>OPEN</u>	1506 Tracheostomy
820	Inborn Error of Metabolism	1231	Cardiac Surgery Open - Other	
821	Leukaemia or Lymphoma	1232	Aortic Arch Reconstruction	<u>ABDOMINAL / GENERAL SURGERY</u>
822	Necrotising Fasciitis	1232	Arterial Switch	1600 General Surgery - Other
840	Neonate - Hydrops Fetalis	1233	ASD Repair	1601 Abdominal Tumour Resection
841	Neonate - Infant of Diabetic Mother	1234	AVSD Repair (AV Canal)	1602 Appendicectomy
842	Neonate - IUGR	1235	Cardiac Tumour Resection	1603 Bladder Extrophy Repair
823	Neutropenia	1236	Cavo-Pulmonary Shunt	1604 Burns Surgery
848	Organ Donor	1252	Conduit Repair or Replacement	1605 Fundoplication
824	Pancytopenia	1253	Coronary Artery Repair	1606 Gastroschisis or Exomphalos Repair
825	Phaeochromocytoma	1237	Fontan	1607 GI Endoscopy and/or Sclerotherapy
826	Prematurity	1238	LV Outflow Reconstruction	1608 Intussusception Repair
843	Previous Bone Marrow Transplant	1254	MAPCA's Surgery	1609 Kasai
827	Respiratory Arrest - In Hospital	1239	Norwood - Stage I	1610 Laparotomy
828	Respiratory Arrest - Out of Hospital	1240	PA Plasty or Repair	1615 Laparotomy - Bowel Obstruction
844	Scoliosis	1241	RV Outflow Reconstruction	1616 Laparotomy - Bowel Perforation
829	Sepsis	1242	Senning	1617 Laparotomy - GI Haemorrhage
830	Shock - Cardiogenic	1243	TAPVD Repair	1618 Laparotomy - Necrotising Enterocolitis
831	Shock - Hypovolaemic	1244	Tetralogy of Fallot Repair	1619 Laparotomy - Peritonitis
832	Shock - Septic	1245	Transplant - Heart	1620 Laparotomy - Trauma
833	SIRS	1246	Transplant - Heart Lung	1611 Transplant - Kidney
834	Solid Neoplasm - Malignant (not Lymphoma)	1247	Transplant - Lung	1612 Transplant - Liver
835	Solid Neoplasm - Non Malignant	1248	Truncus Repair	1613 Transplant - Small Bowel
836	Syndrome or Malformation (not Chromosomal)	1249	Valve Repair or Replacement	1614 Urogenital Surgery - Other
837	Toxic Shock Syndrome	1250	Valvotomy - Open	
838	Transplant - Bone Marrow	1251	VSD Repair	<u>CRANIOFACIAL SURGERY</u>
845	Tumor Lysis Syndrome			1700 Craniofacial Surgery - Other
846	Wound Infection	1300	<u>NEUROSURGERY</u>	1706 Cleft Palate Repair
		1301	Neurosurgery - Other	1701 Cranial Vault Reshaping
		1302	Craniotomy - Anterior Fossa	1702 Dental Surgery
		1303	Craniotomy - Posterior Fossa	1703 Facial Cleft Repair
		1304	CSF Shunt Insertion or Revision	1801 Fracture Fixation
		1305	Decompression - Cranial	1802 Spinal Instrumentation
			Decompression - Spinal Cord	

Instructions for using the ANZPIC registry diagnostic codes

Code the reason most directly responsible for ICU admission as the *Principal Diagnosis*.

Code up to 5 *Associated Diagnoses*.

For patients admitted primarily for recovery after a procedure, use a *Post Procedural Diagnosis* for *Principal Diagnosis*.

For patients having an operative procedure during the admission code the *Post Procedural Diagnosis* as an *Associated Diagnosis*.

Do not use *Injury Mechanism* or *Infection* codes for the *Principal Diagnosis* (eg for RSV bronchiolitis code bronchiolitis as the *Principal Diagnosis* and RSV as an *Associated Diagnosis*).

If new information (eg a test result) becomes available during the admission that allows more accurate coding, amend the original codes but ensure that the *Principal Diagnosis* still indicates the reason most directly responsible for ICU admission.

¹ DO NOT USE FOR PRINCIPAL DIAGNOSIS

² CONGENITAL

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