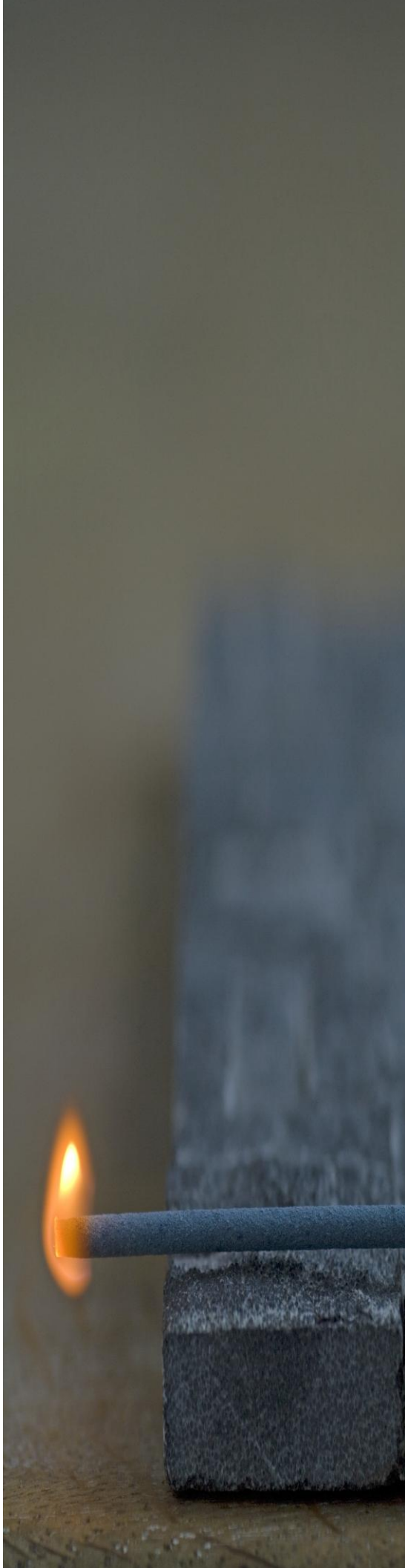
BI-NATIONAL BURNS REGISTRY

ANNUAL REPORT

1st July 2009 – 30th June 2010



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Introduction

The Australian and New Zealand Burns Association (ANZBA) was formed in 1976 and incorporated in 1991 with the principal objective to encourage higher standards of both burn injury prevention and patient care through research and education. Australia and NZ have regionalised burns care with 17 designated burns units across the two countries (Figure 1). The initial Bi-National Burns Registry (Bi-NBR) was launched in 2004 with strong support from the ANZBA community. The registry was predominately an epidemiological data repository and was not able to meet the association's primary aim for the registry of improving quality of care.

As a result of the limitations identified, ANZBA collaborated with Monash University in late 2007, to assist with registry enhancements. In 2008, an opportunity was provided to participate in a project funded by the Australian Commission on Safety and Quality in Health Care (ACSQHC) to test and validate the 'Draft Operating Principles and Technical Standards for Australian Clinical Quality Registries'[1]. Participation in this project came at a critical time and enabled the development of the registry as a clinical quality registry. The Bi-NBR clinical quality registry was launched in July 2009.

Figure 1: Designated burns units across Australia and New Zealand

Executive Summary

This is the first annual report from the revised Bi-National Burns Registry (Bi-NBR.) The Bi-NBR provides valuable information on the incidence and aetiology of burn injury across Australia and New Zealand. The overall goal of the registry is to collect data on all burn patients admitted to a Bi-NBR burns unit who meet the inclusion criteria.

Data are presented for 2103 burn patients treated at 11 burns units over the 12 month period from 1 July 2009 to 30 June 2010. It is estimated this corresponds to 97 per cent of all admissions for the ten out of 11 sites that submitted hospital admission data for this reporting period.

Consistent with data reported by the American Burn Association, National Burn Repository, 74 per cent of cases overall were adults with males accounting for 69 per cent of all cases. Children aged 12 to 24 months accounted for 37 per cent of paediatric cases while 20 to 29 year olds accounted for 25 per cent of adult cases. Flame (35.7 per cent) and scald burns (35 per cent) were the primary cause of burn injury for all age groups. For paediatric patients 10 years and under, scald burns were the predominant cause of burn. For 11 to 15 years old paediatrics and 16 to 59 year old adults, flame burn was the predominant cause. In the 60 and over age groups, scald burns was the predominant cause. Nearly all burns were considered accidental (93 per cent).

The data presented indicates that for cases admitted to Australian burns units, 79 per cent were born in Australia, with 9.3 per cent Australian Aboriginal. For New Zealand cases, 40 per cent were considered a New Zealander with 40 per cent of these identified as a New Zealand Maori. Most Australian cases were funded by the Australian Health Care Agreement (83 per cent) with ten per cent of cases classified as work cover. Nearly all New Zealand cases (98 per cent) were funded under the Accident Compensation Corporation.

A burn of less than ten per cent Total Body Surface Area (TBSA) was recorded for 74 per cent of all cases. Seventy four per cent of paediatric cases and 80 per cent of adult cases underwent a burn wound management procedure in theatre. Approximately 65 per cent of all cases going to theatre required skin grafting, signifying the importance of adequate initial burn assessment, management and referral to the appropriate burns units for definitive treatment of burns that meet the ANZBA endorsed referral criteria (Appendix 7).

The initial burn management data suggests that cool running water (considered the most appropriate technique) is the primary burn cooling strategy used in the majority of cases at the scene of injury (89 per cent). Cool running water was documented as being applied for ten to twenty minutes within three hours of the burn for 27 per cent of all cases. Alternative techniques that are considered ineffective or detrimental to burn wound recovery such as application of ice, aloe vera, butter and toothpaste which continue to be used at the scene of the burn injury for burn cooling.

Nearly 50 per cent of paediatric and adult cases were transferred to the burns unit from another hospital. The median length of stay (LOS) for paediatric patients (where LOS is > 24 hours and excluding deaths) was four days (range 2-9) and seven days (range 3-13) for adults. The overall death rate was 1.6 per cent amongst the hospitalised burn patients. The majority of cases (82 per cent) were discharged to their usual residence.

One hundred and ten paediatric cases (20 per cent) were readmitted within 28 days of discharge and the majority (96.4 per cent) were reported as planned readmissions with only four unplanned re-admissions. The readmission rate was less for adults where only 69 (4.5 per cent) cases recorded a re-admission, however nearly half (48 per cent) of these cases were reported as 'unplanned'.

The results of this annual report suggest most burn injuries are preventable and injury prevention campaigns should be tailored to specific age groups and mechanisms of injury. Injury prevention campaigns tailored to the indigenous populations across the region should also be considered. The data suggest that while there appears to be a community understanding that water is the most appropriate cooling technique, whether water is used adequately as a cooling technique is unclear. Further community education on adequate burn cooling is an ongoing requirement.

The hospital process and quality of care data presented in this report provides a baseline from which future monitoring of care can be undertaken. During 2011 and 2012, the focus for the registry will be to increase registry participation to ensure near complete case capture and the ability to provide definitive data for monitoring and benchmarking the quality of burn care across Australia and New Zealand.

About this report

This is the first annual report of the revised Bi-National Burns Registry (Bi-NBR) and it is a significant milestone for the registry.

Data collected during the first year of the registry implementation (1st July 2009 – 30th June 2010) is summarised in this report. During this period 11 of the 17 Bi-NBR sites (10 out of 14 Australian sites and one out of four New Zealand sites) contributed data with 2,103 cases entered during the 12-month period. Of the 11 sites, eight burn units admit adult patients and six burn units admit paediatric patients. Two of these sites commenced data collection mid-way through the year. Only sites with Institutional Ethics Committee (IEC) approval to participate and a local data collector were able to contribute data to the registry.

The report describes the registry and its achievements and summarises the epidemiology of burns unit admissions from 1 July 2009 to 30 June 2010. Quality of care data related to processes of care is also provided. Where possible, data has been compared with the American Burn Association's National Burn Repository (NBR) 2010 [2] report of data from 2000 to 2009, as this is the only other burn database that reports comparable summary data. While comparison of summary epidemiological data was possible, consideration of the different health systems and potential different development and governance processes of the registries is required when interpreting the comparison data. Limitations and caveats associated with the present data are outlined and the Appendix includes a comprehensive summary of data item completeness for the reporting period.

About The Bi-National Burns Registry

What is the Bi-National Burns Registry?

The Bi-National Burns Registry (Bi-NBR) is a clinical quality registry capturing epidemiological and quality of care outcomes for adult and paediatric burn patients across Australian and New Zealand burns units. The registry is a collaboration between the Australian and New Zealand Burn Association (ANZBA) and Monash University, Melbourne. The registry has been co-funded by ANZBA and the Julian Burton Burns Trust with additional funding received from the Australian Commission on Safety and Quality in Health Care (2008-2009) and the Helen Macpherson Smith Trust (2010).

The purpose of the registry is to monitor burn injury incidence, burn injury causation, and to identify objective and verifiable data on treatment, outcomes and quality of care with the principal objective to encourage higher standards of both burn injury prevention and patient care.

Participating Burns Units

Only sites with Institutional Ethics Committee (IEC) approval and able to provide resources for local data collection submit data to the Bi-NBR. For the 2009 to 2010 period, 12 of the 17 Bi-NBR sites (60 per cent) contributed data.

Aims

i. Describe the epidemiology of burn injuries and inform the development of burn injury prevention strategies in Australia and New Zealand

ii. Monitor the type and quality of burn care management

iii. Establish the clinical outcomes of burn patients

iv. Improve service planning

v. Develop best practice clinical guidelines and initiatives

vi. Benchmark performance indicators on a state, national and international level.

Project Achievements

Key project outcomes achieved are summarised below:

Ethics approval obtained

The primary Institutional Ethics Committee (IEC) approval was obtained from Monash University with the stipulation of individual site approval. Seeking site IEC approval to contribute data to the Bi-NBR has been pivotal in sites being able to participate. Sites individually applied for local ethics approval, with support from the Bi-NBR staff members. For the first year of reporting, 13 out of 17 sites had obtained ethics approval to submit data to the Bi-NBR.

Governance structure established

A formalised governance structure was established, consisting of a Steering Committee, Reference Committee, Management Committee and sub-committees to oversee and develop the Bi-NBR. The terms of reference and membership of the Steering Committee have been reviewed since the launch of the Bi-NBR and now includes a consumer representative and funding body representatives.

Updated minimum dataset and data dictionary

A thorough review of the utility of the original minimum dataset relative to the aims of the registry was conducted and redundant items were removed. Existing international burn registry and Australian Institute of Health and Welfare data items were utilised where possible and new data definitions were only developed where none previously existed. A further extensive review process was completed following the second quarterly report and the revised dataset was implemented from April 2010.

Development of quality indicators

Key quality of care indicators were developed for the Bi-NBR to allow the quality of health care provided to burn patients to be monitored and benchmarked across services. Nineteen quality indicators are embedded within the Bi-NBR and reported on in this report.

Development of a revised centralised web-based information system

The Bi-NBR has evolved from a simple one-page web-based interface with no validation, to a web-based information system with in-built data management processes, extensive validity checks and robust security processes. Data entry has been streamlined to minimise manual effort and improve the user experience, and search and completeness functions incorporated.

Established Routine Reporting Schedule and content

Quarterly reports are routinely produced and provide summary aggregate data from the registry. Sites have the facility to access their own data for local analysis and reporting via the registry website. Sites can also request ad-hoc reports of aggregate data for local use. Requests from external sources must comply with the Bi-NBR Data Access Policy and be approved by the Bi-NBR Steering Committee.

Pilot collection of quality of life and functional instruments

The increased survival of patients with severe burn injury has resulted in a focus on measuring long term outcomes for this group. A pilot project was commenced in October 2009 collecting quality of life and functional outcomes for adult burn survivors. This project will span four years with the outcomes of the study informing recommendations for the future collection of long term outcomes as a routine component of the Bi-NBR.

How does the Bi-NBR operate?

Inclusion / Exclusion criteria

i. All first admissions to an Australian or New Zealand Burns Unit where a burn injury is the principal reason for admission and the following criteria are met:
   a. The first admission is within 28 days of the burn injury
   b. All transfers from another hospital irrespective of the time of injury to admission
   c. The patient is admitted under the Burns Unit or admitted to another hospital unit but requires a Burns Unit consult

ii. Admission to hospital for greater than 24 hours ***or*** the patient is admitted for less than 24 hours but requires a burns management procedure in theatre; ***or*** the patient dies within 24 hours of admission

iii. All readmissions to the Burns Unit within 28 days of the date of discharge from the first admission.

Medical cause cases such as Steven Johnson Syndrome and toxic epidermal necrolysis (TENS) are excluded from the registry.

Data Capture

Data collection is the responsibility of participating burn units. Patient data are retrieved via medical records and existing hospital information systems and entered into the web-based database on-site. A data collection form is used to assist this process. International Classification of Disease version 10, Australian Modification (ICD-10-AM) diagnostic and procedural codes are predominantly retrieved electronically from hospital information systems, de-identified and submitted to the Bi-NBR.

Registry Data Quality Assurance

To ensure all burns data coordinators and collectors designated to collect data for the registry are collecting data in a standardised manner, formal training sessions are held. Annual 'refresher' training sessions and ad hoc informal training sessions are available as required.

Data completeness reports are provided to sites prior to extracting data for the quarterly and annual reports to maximise data completeness. Routine quality assurance review and checks for reliability and validity are planned to ensure the Bi-NBR produces high quality data.

Data Analysis

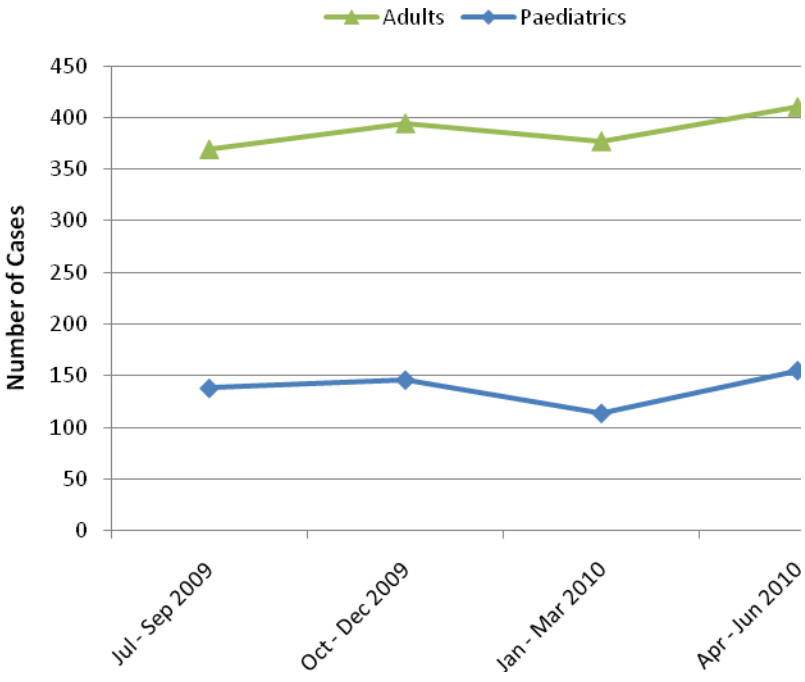
The number of burn cases

This section provides information about the number of patients admitted to a participating burns unit that meet the Bi-NBR inclusion criteria.

Bi-NBR burn cases

The overall number of burn cases recorded on the Bi-NBR for the period 1st July 2009 to 30th June 2010 was 2103, with 1550 adult cases (16 years of age and older) and 553 paediatric cases (15 years of age and under). Figure 2 shows the numbers of adult cases and paediatric cases by quarter. Seasonal trend analysis will be possible in future reports when another yearly cycle has been completed.

Figure 2: Quarterly trends in burn patients



Registry capture rate

By the end of the first year of reporting, 12 sites had commenced registry data submission; however one site was excluded from analysis due to low numbers. Of the 11 Burns Units, six sites treat paediatric patients (55 per cent) and eight sites treat adult patients (62 per cent). Table 1 outlines the case numbers entered by each site by quarter. One site did not commence data entry until midway through the October to December 2009 quarter. This reduced the case capture rate for the year.

The Bi-NBR excludes burn patients that died before reaching hospital, or who died after discharge from hospital. The National Coroner's Information System will be utilised to report this data in the future and will enable a more comprehensive profile of burn-related mortality in Australia and New Zealand.

Case capture analysis was completed by requesting that all sites retrieve ICD-10-AM and admission data from their hospital administrative systems. Ten (90 per cent) sites provided this data. Cases that did not meet the Bi-NBR inclusion criteria were excluded. It is estimated that the Bi-NBR captured 97 per cent of the cases admitted to the ten burn units that provided the hospital administrative data.

Table 1: Site case numbers per quarter

Site	Jul-Sep 2009	Oct-Dec 2009	Jan-Mar 2010	Apr-Jun 2010	Total
A	55	71	69	79	274
B	60	46	64	67	237
C	54	64	46	42	206
D	21	20	16	15	72
E	58	59	42	62	221
F	24	27	29	36	116
G	63	86	79	73	301
H	39	46	36	57	178
I	66	59	39	65	229
J	-	*	5	-	7
K	0	9	20	26	55
L	67	53	51	43	214
TOTAL	506	540	496	558	2,110

* Denotes less than five cases

Note: Site J was excluded from analysis due to small case numbers.

Demographic profile of hospitalised burn patients

Figures 3a and 3b show the age distribution by gender for paediatric and adult cases. Consistent with data reported from the American NBR (nearly 70 per cent males), males represented 69 per cent of all cases, with one to two year olds accounting for almost 37 per cent of paediatric cases and 20 to 29 year olds nearly 25 per cent of adult cases.

Figure 3a: Age distribution by gender – Paediatric cases

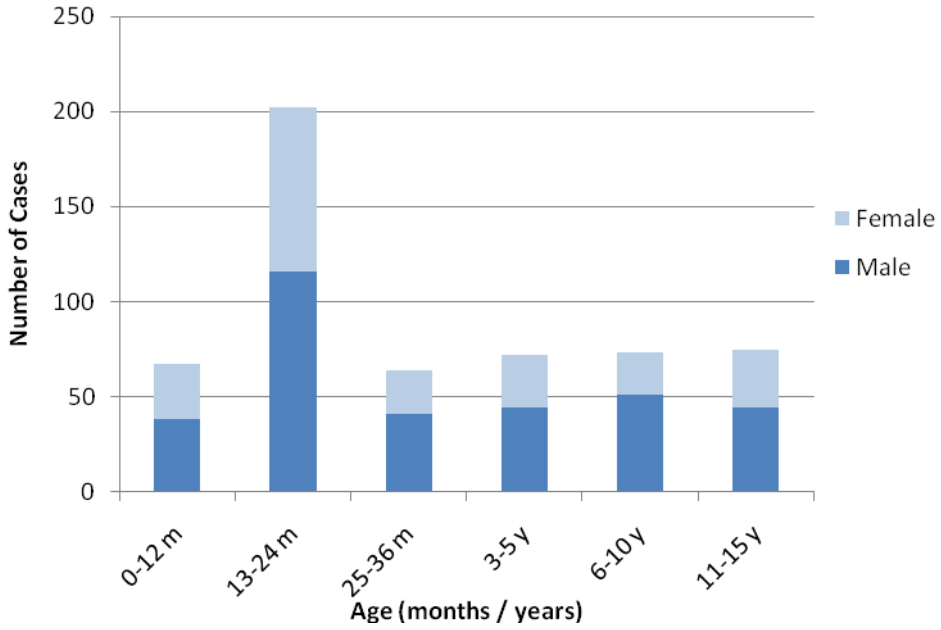


Figure 3b: Age distribution by gender – Adult cases

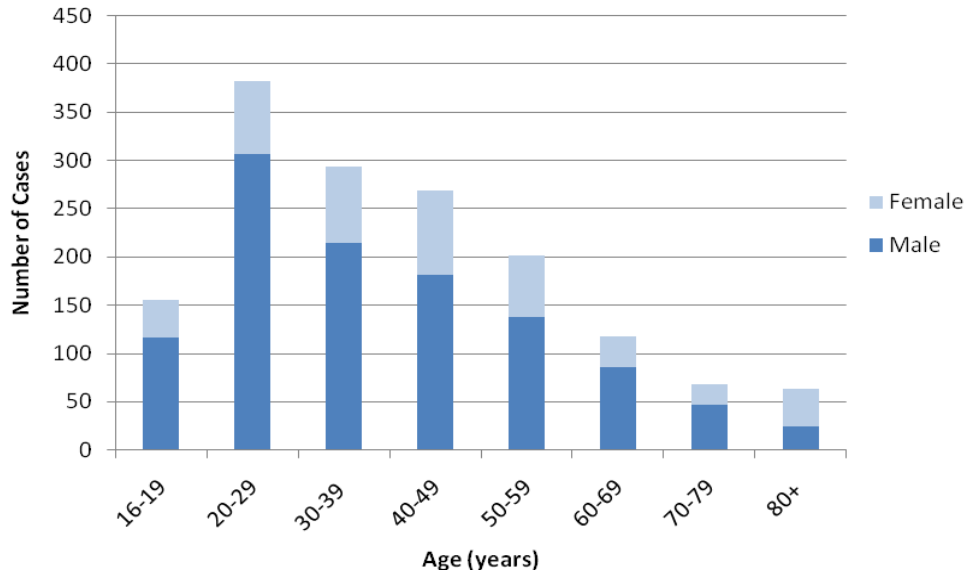


Table 2 outlines the region of birth for patients admitted to Australian units and the ethnicity by region for New Zealand units. The difference in reporting accounts for Australian hospitals routinely collecting 'country of birth' whereas New Zealand hospitals record the 'ethnicity' of their patients.

Of the patients admitted to Australian Burn Units, the majority of cases (79 per cent) were born in Australia. Australian Aboriginals accounted for 17 per cent (n=55) paediatric patients and eight percent (n = 80) adult patients born in Australia. There were 392 patients admitted to Australian burn units who were born overseas. These patients were evenly distributed between European, Asian, North African and Middle Eastern countries.

Of the New Zealand Burn Unit admissions, 56 per cent were classified as a "New Zealander", of which 46 (40 per cent) were New Zealand Maori. A further 55 (27 per cent) patients were of other Oceanian descent; predominantly Samoan (n=25, 46 per cent).

Table 2: Region of birth for Australian and Ethnicity by region for New Zealand Burn Units

Region of birth - Australian Units	n	Per cent
Australia	1,461	79.0
North West Europe	73	3.9
South East Asian	68	3.7
North African and Middle Eastern	62	3.3
Southern and Eastern European	55	2.9
Southern and Central Asian	45	2.4
New Zealand	29	1.6
North East Asia	28	1.5
Sub-Saharan Africa	11	0.6
Oceanian (other)	11	0.6
Peoples of the Americas	10	0.5

Region of Ethnicity - New Zealand Units	n	Per cent
New Zealander	115	**56.1**
Oceanian (other)	55	**26.8**
South East Asian	12	**5.9**
Southern and Central Asian	6	**2.9**
North West European	5	**2.4**
Sub-Saharan African	*	**2.0**
North East Asian	*	**2.0**
Peoples of the Americas	*	**0.9**
Southern and Eastern Europe	*	**0.5**
North Africa and Middle Eastern	*	**0.5**

* Denotes less than five cases

The vast majority of cases admitted to Australian burn units were funded by the Australian Health Care Agreement (n=1569, 83 per cent) with just under 10 per cent (n=184) covered under the workers compensation scheme in each State or Territory. Almost all New Zealand cases were funded by the Accident Compensation Corporation (n=201, 98 per cent).

What was the cause and location of the events leading to a burn injury?

This section outlines the cause of burn injury, the activities leading to injury, the places of injury, and the geographical region of the injury across Australia and New Zealand.

Burn Injury Cause

Flame and scald burns were the most common cause of burn injury with flame burns accounting for 36 per cent and scalds 35 per cent of all burn injuries. This is consistent with the American NBR where fire/flame and scald burns accounted for 7 out of 10 reported burn causes.

Tables 3a and 3b outline the cause of injury by paediatric and adult age groups. Scald burn was the most common cause of injury for paediatric cases aged ten years or less. For the 11-15 age group, flame burn was the most common cause of injury. Contact burns accounted for 21 per cent of paediatric burns. For adults 16–59 years of age, flame burn was the most common cause of injury while scalds were predominant in those aged 60 years and over (Table 3b).

Table 3a: Primary cause of burn by Paediatric age group

Primary Cause of Burn	Paediatric Age Group (months & years)						Total	Per cent
	0-12m	1324 m	25-36m	3-5y	6-10y	11-15y		
Scald	47	137	36	34	35	16	305	55.4
Contact	8	49	10	16	15	16	114	20.7
Flame	6	5	6	10	13	33	73	13.2
Friction	*	6	11	12	8	7	45	8.2
Radiant Heat (no contact to source)	*	*	-	-	-	*	7	1.3
Electrical	*	*	-	-	*	-	*	0.7
Chemical	*	*	-	-	-	-	*	0.5
Cooling	-	-	-	-	-	-	-	-
Pressurised gas/air (non-flame)	-	-	-	-	-	-	-	-
Total	66	202	63	72	73	75	551	

* Denotes less than five cases

Table 3b: Primary cause of burn by Adult age group

Primary Cause of Burn	Adult Age Group (years)								Total	Per cent
	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80+		
Flame	79	180	131	116	88	36	25	19	674	43.7
Scald	30	79	85	77	62	37	26	32	428	27.7
Contact	20	51	40	36	20	20	10	7	204	13.2
Chemical	7	22	7	17	15	7	*	*	79	5.1
Friction	13	28	13	10	8	7	-	-	79	5.1
Electrical	*	8	9	5	*	*	*	*	35	2.3
Radiant Heat (no contact to source)	5	9	*	6	*	*	*	*	34	2.2
Pressurised gas/air (non-flame)	-	*	*	*	*	*	-	-	8	0.5
Cooling	-	*	*	-	-	-	-	*	*	0.2
Total	155	379	292	268	201	118	68	63	1544	

* Denotes less than five cases

The 10 most common sub-causes of paediatric and adult burn injuries are shown in Tables 4a and 4b. These 10 sub-causes comprise 72 per cent of the sub-causes of injury for paediatric cases and 54 per cent of the adult cases. In paediatric cases, hot beverages were the most common cause of scald injury followed by water from a saucepan/kettle/jug/billy/urn/thermos and scald injury from food.

In adult cases, campfire/bonfire/burn-off causes of flame injury were the most common followed by scald from fat/oil and flame injury with the source unclear. Of the flame injuries with source unclear, these cases were predominantly related to intentional self-harm events or house fires where the source of the fire was not known.

In the 16-59 year age group, flame burns accounted for 46 per cent of burn injuries. An accelerant was used to ignite/enhance the flame in over half (52 per cent of these cases. Engine fuel (petrol/diesel/methanol) was the most common accelerant used (66 per cent), followed by methylated spirits (11 per cent).

Table 4a: Primary sub-causes of burn injury in paediatric cases

Cause	Sub Cause	Number of cases	Per Cent
Scald	Hot beverages (e.g. Tea/coffee)	101	18.3
Scald	Water from Saucepan/Kettle/Jug/Billy/Urn/Thermos	76	13.8
Scald	Food (liquid/solid)	49	8.9
Contact	Coals/Ashes	32	5.8
Scald	Water from Tap/Bath/Shower	32	5.8
Friction	Friction via treadmill	26	4.7
Contact	Vehicle exhaust	23	4.2
Flame	Campfire/bonfire/burn off	22	4.0
Flame	Lighter/matches	19	3.5
Contact	Iron	16	2.9

Table 4b: Primary sub-causes of burn injury in adult cases

Cause	Sub-Cause	Number of cases	Per cent
Flame	Campfire/bonfire/burn off	205	13.3%
Scald	Fat/Oil	104	6.7%
Flame	Flame source unclear	101	6.5%
Scald	Water from Saucepan/Kettle/Jug/Billy/Urn/Thermos	97	6.3%
Friction	Friction via vehicle/motorbike	66	4.3%
Flame	Gas/Gas Bottle	65	4.2%
Flame	Vehicle Engine/Parts	57	3.7%
Flame	Other	47	3.0%
Scald	Hot beverages (eg. Tea/Coffee)	45	2.9%
Contact	Vehicle exhaust	44	2.8%

Intent, place and activity of injury

The vast majority (93 per cent) of burn patients sustained their injury during unintentional events. Intentional self-harm accounted for three per cent of all cases and the remainder were assaults, an event of unspecified intent or adverse effects or complications of medical treatment.

The most common place of injury was the home or usual place of residence for both paediatric (82 per cent) and adult cases (56 per cent). The burn occurred in the kitchen for 30 per cent and in the garden/yard for 20 per cent of all injuries sustained at the home or usual place of residence. The place of injury is summarised in tables 5a and 5b and is consistent with the American NBR reporting 66 per cent of admissions occurring at home.

Table 5a: Place of injury – Paediatrics

Place of injury	Number of cases	Per cent
Home (usual place of residence)	446	81.7
Place for recreation	52	9.5
Street and highway	16	2.9
Farm	12	2.2
Other residence (eg. friend's home)	9	1.6
School, other institution & public administrative area	7	1.3
Sports or athletics area	*	0.2
Trade and service area	*	0.2
Other specified place	*	0.2
Industrial and construction area	*	0.2

* Denotes less than five cases

Table 5b: Place of injury – Adults

Place of injury	Number of cases	Per cent
Home (usual place of residence)	823	55.5
Street and highway	156	10.5
Place for recreation	153	10.3
Trade and service area	130	8.8
Industrial and construction area	78	5.2
Other residence (eg. friend's home)	43	2.9
Farm	40	2.7
School, other institution & public administrative area	30	2.0
Residential Institution	19	1.3
Sports or athletics area	10	0.7
Other specified place	*	0.1

* Denotes less than five cases

Tables 6a and 6b outline the ten most common activities being performed at the time of injury for paediatric cases and adult cases. The ten most common activities account for 96 per cent of all paediatric, and 88 per cent of all adult injuries. Playing and being near a person preparing food/drink were the most common activities at the time of injury for paediatric cases with nearly half (45 per cent) of burned one-year olds sustaining a scald injury while near a person preparing food or drink. Over 80 per cent of these incidents occurred in the kitchen.

Participating in a leisure activity, cooking/preparing food and working for income were the most common activities in adult cases. For adults aged 20 to 29 years, a flame burn injury that occurred during a leisure activity accounted for nearly 30 per cent of cases either in the home or at a place for recreation. In the 60 years and over group, the most common activity at the time of injury was cooking (20 per cent) followed by sleeping/resting (11 per cent) and household maintenance (10 per cent).

Table 6a: Activity at the time of injury - Paediatrics

Activity at the time of injury	Number of cases	Per cent
Playing	168	30.6
Near person preparing food/drink	159	29.0
Leisure activity(excluding sporting activity)	67	12.2
Bathing	29	5.3
Eating/drinking	25	4.6
Cooking/preparing food/drink	22	4.0
Driving/Passenger	21	3.8
Sleeping/resting	17	3.1
Suspected illegal activity	8	1.5
Other vital activities	8	1.5

Table 6b: Activity at the time of injury - Adults

Activity at the time of injury	Number of cases	Per cent
Leisure activity (excluding sporting activity)	296	19.6
Cooking/preparing food	243	16.1
Working for income	240	15.9
Household maintenance	115	7.6
Sleeping/resting	101	6.7
Driving/passenger	98	6.5
Other specified activity	64	4.2
Self harming	61	4.0
Vehicle maintenance	58	3.8
Suspected illegal activity	49	3.2

Drug/Alcohol Involvement

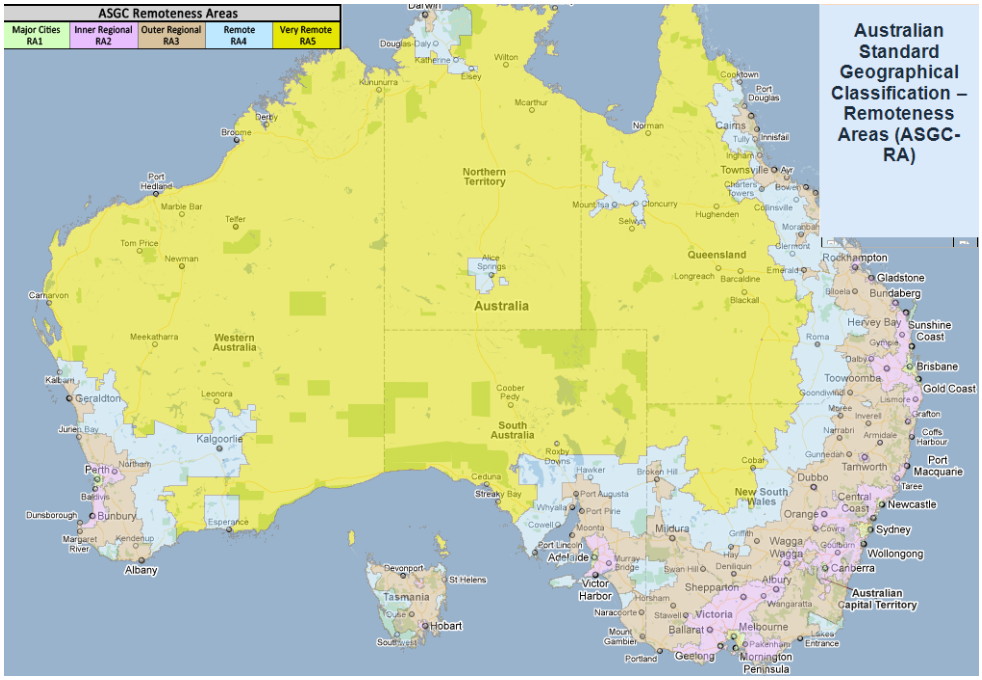
For the majority of cases (75 per cent), there was no documented suspicion of drug and alcohol involvement. Documented suspicion of alcohol involvement was recorded in 20 per cent of cases with drugs in just fewer than two percent and a combination of drugs and alcohol in less than four per cent of cases. Blood testing for alcohol or drug involvement is not completed routinely for all burn patients and therefore the information capture is based on medical record documentation of suspicion or known alcohol or drug involvement. Whether there is underreporting of drug or alcohol involvement in the medical record requires further investigation.

Location of burn injury by region (Australian Sites)

Over half (53 per cent) of burns admissions to Australian units occurred in major cities according to the Australian Bureau of Statistic Classification of Remoteness [3] (Appendix 8). A further 37 per cent occurred in regional Australia and 9.3 per cent in remote areas. However when the population is considered, the rate per 100,000 population is almost ten times less in major cities than for very remote areas which comprise almost half indigenous Australians. Table 7 shows the total rate per 100,000 population, and the rate for non-indigenous and indigenous Australians. The indigenous population had more than three times the rate per 100,000 population overall than the non-indigenous population.

Table 7: Total rate of injury per 100,000 population and the rate of non-indigenous and indigenous Australians

Remoteness Category	Rate per 100,000 population		
	Total	Non-indigenous	Indigenous
Major Cities of Australia	7.0	6.9	16.8
Inner Regional Australia	7.0	7.1	1.3
Outer Regional Australia	25.6	24.2	48.8
Remote Australia	26.1	25.0	32.2
Very Remote Australia	68.5	62.1	75.5
Total	9.2	8.7	31.4



Remoteness Areas (See Appendix 8)

Burn injury severity

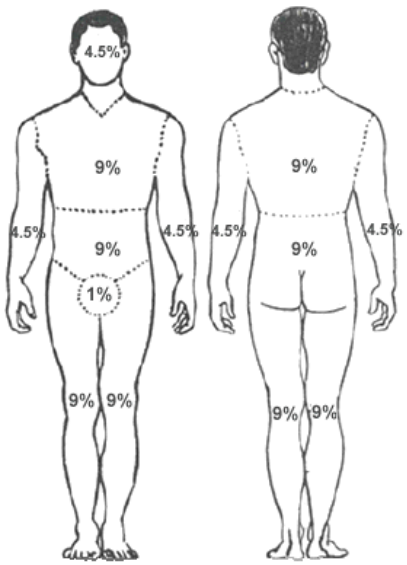
This section outlines the severity of burn by burn size (percentage total body surface area burnt, per cent TBSA), burn depth and the presence of an inhalation injury.

Total Burn Surface Area (per cent TBSA)

A burn less than ten per cent TBSA was recorded for 80 per cent of adult and paediatric cases. This is consistent with the American NBR which reported 71 per cent of admissions to US burn units had sustained an injury with a total burn size less than ten per cent. For the paediatric patients, 87 per cent sustained a burn of less than ten per cent TBSA and fewer than four per cent sustained a burn greater than 20 per cent TBSA. For adult patients, three quarters (77 per cent) experienced a burn less than ten per cent TBSA, with approximately ten percent sustaining a burn greater than 20 per cent TBSA. Just over two percent of adults were burnt greater than 50 per cent of their total body surface area. Table 8 outlines the percentage TBSA for paediatrics and adults cases.

Table 8: Percentage Total Body Surface Area Burnt – Paediatrics and Adults

Per cent TBSA group	Paediatrics		Adults	
	Number of cases	Per cent	Number of cases	Per cent
0-9%	478	86.5	1,199	77.4
10-19%	56	10.1	197	12.7
20-49%	15	2.7	120	7.7
≥ 50%	*	0.7	34	2.2
TOTAL	553		1550	



Rule of Nines – example of a burn assessment tool

Burn Depth

Modifications to the methods of collecting burn depth in the registry were made during the 12-month period due to inaccurate entries or inadequate data, limiting the ability to use this information in this report. Instead, hospital clinical coding (ICD-10-AM diagnosis codes) were retrieved to identify the percentage of cases with a coded full thickness burn.

For the majority of cases (n=1562, 74 per cent), a full thickness burn was not specified or was less than ten per cent. Table 9 outlines the number of cases where the percentage TBSA full thickness burn was coded. In the future, ICD-10-AM data will be cross-referenced with data collected from the medical record by the registry collector to determine the compatibility of the coding sources.

Table 9: Percentage of TBSA with full thickness burns coded using the ICD-10-AM

Per cent TBSA and full thickness	Number of cases	Per cent
< 10 %full thickness	1562	91
10-19 % full thickness	89	5.2
20-29% full thickness	18	1.0
30-39% full thickness	15	0.9
40-49% full thickness	10	0.6
50-59% full thickness	*	0.1
60-69% full thickness	5	0.3
70-79% full thickness	*	0.2
80-89% full thickness	7	0.4
≥90% full thickness	6	0.3
Total	1716	

* Denotes less than five cases

A full thickness burn is characterised by its whitish leather appearance. It can also be brown, cherry red or charred black.

Inhalation injury

A documented inhalation injury was recorded for 8.5 per cent of adults and 1.5 per cent of paediatric cases. Approximately 70 per cent of patients who died experienced an inhalation injury.

Co-morbidities (Pre-existing medical conditions)

ICD-10-AM data were received from ten of the 11 sites contributing to this report. At least one co-morbidity was coded for 702 cases with an overall total of 1435 co-morbidities reported. Appendix 6 describes the methodology for developing the co-morbidity codes.

Only eight per cent of paediatric cases and 48 per cent of adult cases had a co-morbidity recorded. Males accounted for 70 per cent of cases with co-morbid conditions, consistent with the overall burn gender distribution. The 16 to 34 year age group was the most represented with 248 (35 per cent) cases having a documented co-morbid condition followed closely by 223 (32 per cent) cases in the 35 to 54 year age group. Table 10 shows the ten most common co-morbidities.

Table 10: Ten most common co-morbidities

Co-morbidity	No. of cases	Per cent
Tobacco use	362	19.2%
Dementia	124	6.6%
Hypertension	88	4.7%
Socioeconomic/psychosocial health hazards	68	3.6%
Diabetes	58	3.0%
Cardiac arrthythmias	39	2.1%
Stress and adjustment disorders	39	2.1%
Urinary tract infection	37	2.0%
Moderate or severe renal disease	36	1.9%
Delirium	33	1.8%

Current tobacco use was coded for 362 (19.2 per cent) cases and 124 burn cases had a pre-existing diagnosis of dementia recorded (6.6 per cent). Cardiac, renal conditions and diabetes were also recorded in the ten most common co-morbidities as was socio-economic/psycho-social and stress related conditions. Tobacco use was the only comorbidity in 61 per cent of the 16 to 34 year age group and 40 per cent of the 35 to 54 year age group.

Further work is planned to more accurately distinguish co-morbidities from complications, by reviewing the use of a qualifying prefix in some jurisdictions, as well as the identification and review of overlapping codes. This analysis will provide further scope to understand the influence of co-morbidities on burn care provided and outcomes.

How were the burns patients managed prior to admission to the burns unit?

This section describes the pre-hospital phase and burn cooling response, the referral process and transfer times. Quality indicator data associated with the standard of care documented are also provided. Data in this section is limited by changes made to registry data collection procedures over the 12-month period to improve completeness and data quality. Data from this and future reports will guide the establishment of suitable standards of care across Australia and New Zealand.

Burn Cooling

Burn cooling is critical in the initial first aid response to a burn injury. Applying cool running water to the burn for 20 minutes within three hours of the injury is considered best practice in terms of reducing the area of skin affected by the burn, the depth of the burn and for pain management [9-11]. While applying water for a longer period than 20 minutes can have an analgesic effect on small burns, the symptoms of hypothermia need to be monitored, particularly in larger burns [9, 10, 12, 13].

Inadequate burn cooling treatments continue to be used at the scene of the burn injury such as application of ice, aloe vera, butter, creams and toothpaste. Burn cooling techniques other than cool running water are not recommended for the first aid management of a burn injury.

Most of the paediatric cases (80 per cent) and over half of the adult cases (60 per cent) had documented burn cooling at the scene of the burn injury. Of these cases, cool running water was documented as being used in 91 per cent of paediatric cases and 88 per cent of adult cases. Table 11 outlines the nature of documented burn cooling completed at the scene of injury.

Table 11: Documented Burn cooling completed at the scene of injury

Scene of injury	Paediatrics cases	Adult cases
Cool running water	386 (91%)	681 (87.5%)
Within three hours of injury	376 (99.7%)	653 (97%)
Applied 11-20 minutes	90 (25%)	163 (29%)

Water was documented as being applied to the burn within three hours of injury in 98 per cent of cases. Water was applied for eleven to 20 minutes in 25 per cent of paediatric cases and 29 per cent of adult cases. For 40 per cent of paediatric cases and 47 per cent of adult cases, cool running water was applied for greater than 20 minutes. Of these cases, 76 per cent were burns less than ten per cent TBSA.

Techniques other than water were documented for burn cooling in 23 per cent of cases. In some cases this is because cool running water was not available.

For example, hydrogel was the predominant cooling technique (72 per cent) used by paramedics which could be explained by the inability to apply running water during transit.

The most common 'other' cooling techniques documented as used at the scene of injury included; application of wet cloths such as towels, dressings and blankets, immersion in water. Use of ice and ice packs, aloe vera, butter, and toothpaste were also reported but are not recommended as effective or appropriate first aid for burn injury.

What was the referral source to the burns unit?

Direct transport from the scene of injury via ambulance to the burns unit occurred for 30 per cent of paediatric cases and 32 per cent of adult cases. Self-referral to the burns unit, where the injured person self presented to the hospital emergency department accounted for approximately eight per cent of both paediatric and adult cases. Just under half of both paediatric (46 per cent) and adult cases (49 per cent) were referred to the burns unit from another hospital.

How long did it take for the burn patient to be admitted to a burns unit?

The time taken for a burn patient to be admitted from the scene of the burn injury to the burns unit is considered critical for the initial medical and surgical management of burn injuries. Given the centralised structure of burn care services across Australia and New Zealand, and the geographical size and distances required to travel to a burns unit, identifying a standardised acceptable transfer time for benchmarking has been challenging. The registry therefore collects data on the length of time taken to admission from time of injury and reasons why admission to a burns unit is greater than two hours. This data will assist in developing an acceptable time frame for transfer to a burns unit, identify if pre burn unit care was appropriate and monitor outcomes of care where there have been transfer delays.

The median time in hours from injury to admission to the burns unit for cases with complete date and time data was nine hours (range 3-229) for paediatric patients and eight (range 3-50) hours for adult patients.

There were 356 paediatric cases (64 per cent) and 754 (49 per cent) adults cases with complete data who were admitted to the burns unit more than two hours after injury. For those patients transferred from another hospital, 706 (70 per cent) were admitted two hours or greater after injury. Nearly half (41 per cent) of these patients were transferred greater than 24 hours after injury. For patients transferred from the

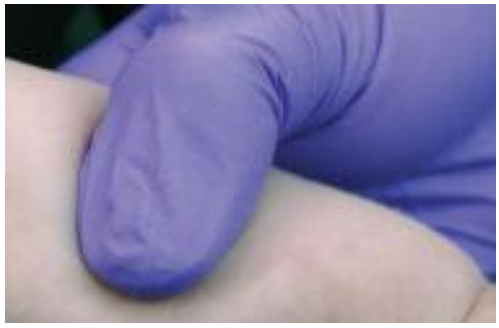
scene of injury to the burns unit, 38 per cent were admitted within two hours of injury with 60 per cent of all cases transported within 24 hours of injury. The most common reason (20 per cent) for delay in admission was reported to be the distance between the geographical locations of the burn injury to the burns unit.

For the 2010 to 2011 reporting period, more detailed data are being collected to establish the reasons for delays in transport to burn units. This will assist in informing the standardised time frame for admissions that care can be measured against.

Burn unit performance

The following section outlines burns until performance and reports quality of care data for established processes of care. Data from this and future reports will be instrumental in developing standards of acceptable performance for burns care across the region.

Wound assessment



The definitive burn wound assessment is defined as the burn assessment documented by the most senior burns clinician within 72 hours of admission.

Over three quarters (76 per cent) of paediatric cases and 64 per cent of adult cases had their definitive burn wound assessment documented within 72 hours of admission to hospital. For paediatric cases, the burn registrar recorded the burn wound assessment within 72 hours of admission for 40 per cent of cases, followed by the burn consultant (19 per cent) and the senior burn nurse (16 per cent. For adult cases, the burn registrar documented the burn wound assessment for 23 per cent of cases followed by the burn consultant (20 per cent) and the burn clinical nurse specialist/nurse practitioner (15 per cent).

Burns surgeon assessment

It is common practice that more serious burns are assessed and managed by a senior burn clinician. For paediatric patients with large burns (defined as greater than 10 per cent TBSA) a senior burn clinician assessment was documented in 63 per cent of cases. Documentation of this assessment occurred within 24 hours of admission for 44 per cent of paediatric cases. For adult cases with large burns (defined as greater than fifteen per cent TBSA), a senior burn clinician assessment was documented in 77 per cent of cases. This assessment occurred within 24 hours of admission for 51 per cent of adult cases. Where there was a documented inhalation injury, a senior burn clinician assessment was recorded for 71 per cent of paediatric cases and 73 per cent of adult cases.

Theatre for burn wound excision

Nearly three quarters (71 per cent) of paediatric cases underwent a burn wound management procedure in theatre. Of these cases 64 per cent had skin grafting. For adult cases, 80 per cent underwent a burn wound management procedure with 65 per cent receiving skin grafts. Further analysis of the type of grafting will be possible in future reports.

The 10 most common burn wound management procedures

The ICD-10-AM procedure codes provide information about the wound procedures used for management of admitted burn patients (Table 12). These procedures include those completed outside theatre and those completed when the patient was re-admitted. Burn wound management procedures during re-admission accounted for only five percent of all procedures with all but five of these procedures occurring within 28 days of discharge of the first admission.

Table 12: Ten most common ICD-10-AM Burn Wound Management Procedure Codes

ICD-10 Block Procedure Code	Block description	No. of instances	Per cent of procedures
1644	Split skin graft to burn of other sites	806	25
1600	Dressing of burn	672	21
1640	Allograft, xenograft or synthetic skin graft	543	16.8
1627	Debridement of burn	540	16.7
1643	Split skin graft to burn of specific sites	474	14.6
1648	Full thickness skin graft to burn	88	2.7
1641	Split skin graft to granulating burn site	42	1.3
1607	Release of skin and subcutaneous tissue	30	0.9
1448	Amputation of wrist, hand or digit	18	0.6
1533	Amputation of ankle or foot	7	0.2

Comparison with the ten most common procedure codes reported by the American NBR is limited as American health services use version 9 of the Internal Classification of Disease and Procedures (ICD-9) while across Australia and New Zealand, ICD-10 is used.

Physical functioning assessment

Rehabilitation following burn injury requires a coordinated approach from a specialised multi-disciplinary team to minimise complications from burns such as scarring, contractures and loss of function [14-16]. Dedicated allied health burn clinicians are responsible for assessing burns patients and commencing rehabilitation as close to admission as possible.

Of the paediatric patients with greater than ten per cent TBSA (n=54), 73 per cent had documentation of a physical functioning assessment by a Physiotherapist or Occupational Therapist within 48 hours of admission. For adult patients with greater than fifteen per cent TBSA (n=184 12.8 per cent), 84 per cent had documentation of a physical functioning assessment within 48 hours of admission.

Of the patients that did not have an assessment documented within 48 hours of admission, 85 per cent of paediatric cases and 80 per cent of adult cases had a length of stay of less than 24 hours, indicating they had a short hospital stay or were admitted for theatre only.

Enteral / parenteral feeding

Burn injury increases the body's metabolic requirements and the provision of adequate supply of nutrients as close to the time of the burn injury is considered crucial in reducing the effects of metabolic abnormalities [15, 17-19].

Of the paediatric cases with greater than ten per cent TBSA, supplementary feeding (either enteral or parenteral) was documented as commencing within 48 hours of admission for 75 per cent of patients. For adult cases with greater than 20 per cent TBSA, supplementary feeding was documented as commencing within 48 hours for 66 per cent of patients.

In-hospital outcomes of burn injury

This section describes the hospital outcomes of the burn care, including intensive care (ICU), complications during the episode of care, length of stay, discharge disposition and re-admissions.

ICU admissions

Minimising the time ventilated and ICU length of stay is important in avoiding complications following burn injury [20, 21]. An ICU admission was required for six per cent of paediatric cases and 12 per cent of adult cases. Of paediatric cases with a TBSA of greater than 20 per cent, an ICU admission was required for 77 per cent of cases and for adult cases with a TBSA greater than 20 per cent, an ICU admission was required for 70 per cent of cases. The median length of stay in ICU was 96 hours (range 41-310) for paediatric cases and 86 hours (range 38-288) for adult cases.

The median number of hours of ventilation for cases admitted to ICU was 158 hours (range 58-408) for paediatric cases and 72 hours (range 24-216) for adult cases. The majority of patients (81 per cent) with inhalation injury were admitted to ICU. The median length of time in ICU increased for cases where an inhalation injury was documented to 497 (range 158-590) hours for paediatric cases and 107 (range 41 – 331) hours for adult cases.

Renal impairment (eGFR)

Acute renal failure can develop during the early resuscitation stage in treating a burn injury and is associated with complications and poor outcomes in severe burn injury [22-25]. The estimated glomerular filtration rate (eGFR) is a quantifiable measure of acute renal failure.

Of the paediatric cases admitted to ICU, where eGFR was routinely collected (33 per cent), five cases (46 per cent) were identified as having a negative change of >30 ml/min/1.73m2 of estimated GFR (eGFR) within 72 hours of admission indicating renal impairment and possible issues with initial fluid resuscitation. In adult cases admitted to ICU 62 per cent routinely collected eGFR. Of these, five cases (4 per cent) were identified as having a negative change of >30 ml/min/1.73m2 of estimated GFR (eGFR) within 72 hours.

Complications

Table 13 outlines the ten most common complications experienced by admitted burn patients, as sourced from hospital ICD-10-AM coding. As noted for the procedure codes, direct comparison with the American NBR is limited by the version of ICD coding used across the regions.

Table 13: ICD-10 Ten most common complications codes

ICD-10 Complication description	No. of instances
Other disorders of fluid, electrolyte and acid-base balance	89
Hypertensive disease	76
Cellulites	72
Other sepsis	55
Volume depletion	51
Pneumonia	50
Hypotension	39
Fever of other and unknown origin	39

Blood cultures

Bloodstream infections increase the risk of complications and mortality in burn injured patients [26, 27]. A positive blood culture was identified for 26 (6.5 per cent) paediatric cases and 36 (5 per cent) adult cases. Of the cases that had a positive blood culture during their admission and wound swabs were taken on admission (n=47), eight paediatric cases and 11 adult cases had positive wound cultures taken on admission.

Weight recorded and weight loss

Measuring the patients' weight is important for the initial fluid resuscitation of the burn patient and for monitoring weight loss. Weight loss is a complication following burn injury that can affect patient outcomes in terms of healing potential [15, 18, 28]. Patients with an extended length of stay are more at risk of weight loss and therefore poorer outcomes.

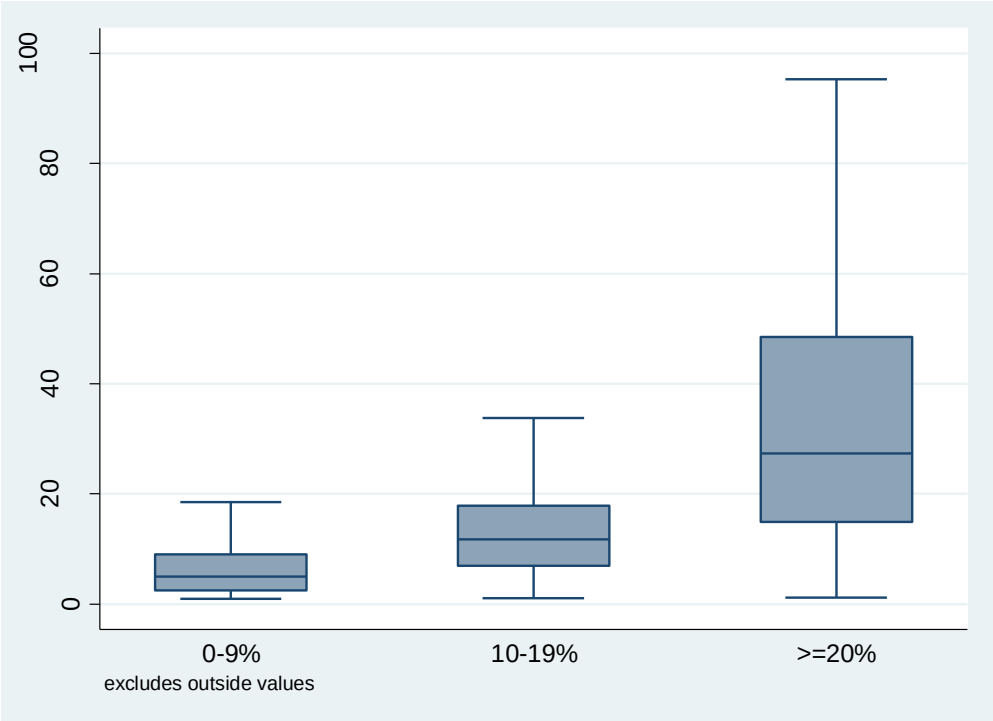
Of the paediatric patients with a length of stay greater than two weeks (9 per cent), 72 per cent had their weight measured and documented within three to five days of admission, and 55 per cent had a weekly weight documented during their admission. Weight loss was recorded in four paediatric patients ranging from 0.2kg – 14kg.

For adult cases with a length of stay greater than two weeks (20 per cent), 58 per cent had their weight measured and documented within three to five days of admission. A weekly weigh was conducted and documented for 67 per cent of these patients. Weight loss was recorded in 23 (21 per cent) cases with the range of loss between 0.1kg-20kg.

Length of stay

The length of admission can increase the risk of complications and can impact on the outcomes for burn patients [29]. The length of stay for the Bi-NBR analysis excludes cases that did not survive to discharge or where the LOS was less than 24 hours. The median length of stay (LOS) for paediatric patients was four days (range 2-9). Figure 4a shows the median LOS by percentage TBSA grouping for paediatric patients. For paediatric cases with co-morbidity recorded the median length of stay increased to five days (range 1.3-100).

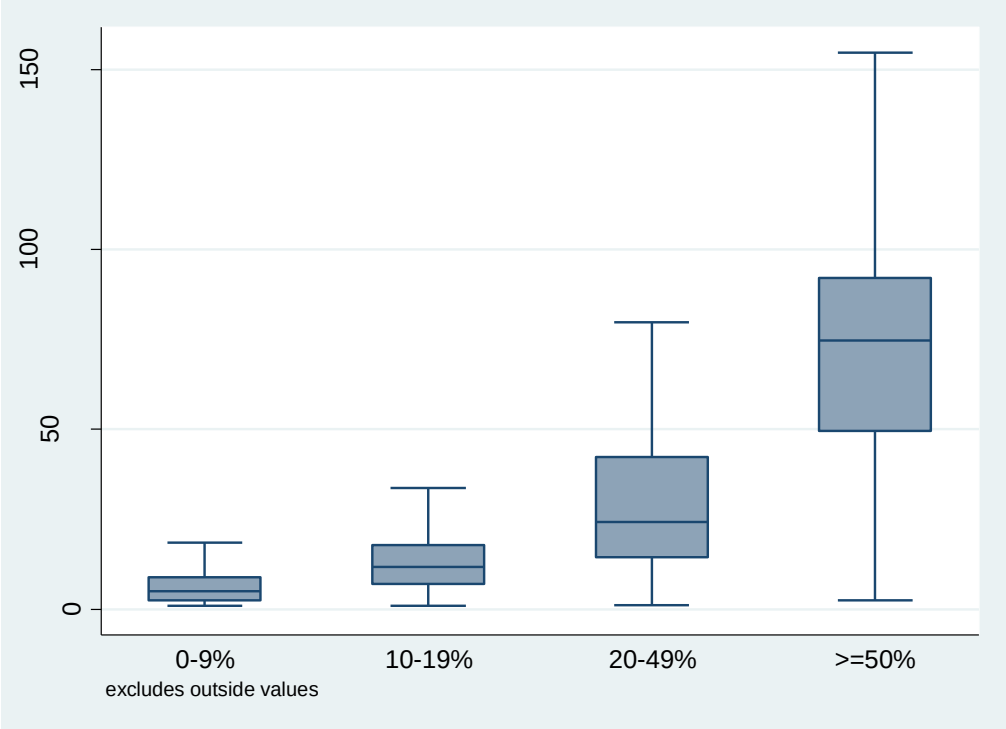
Figure 4a: Median length of stay by percentage TBSA – Paediatrics (LOS greater than 24 hours & excluding deaths)



The median LOS for adult cases was seven days (range 3-13). Figure 4b outlines the length of stay by percentage TBSA for adults. As expected, larger burns were associated with a greater hospital length of stay. This was consistent for paediatric and adult cases. The length of stay increased to ten days (range 1- 368) for adults who had a pre-existing medical condition recorded.

The American NBR reports an average length of stay of slightly greater than one day per percent TBSA burned for patients who survived. For example if the percentage TBSA was ten, the average LOS would be slightly more than ten days. For Bi-NBR cases, the average percentage TBSA was established for each percentage TBSA group and compared to the length of stay. Consistent with the American NBR, for cases that survived to discharge the length of stay was slightly more than one day per percentage TBSA where the TBSA was less than 50 per cent. For patients with a percentage TBSA greater than 50 per cent, the average length of stay was closer to two days for every percentage TBSA.

Figure 4b: Median length of stay by percentage TBSA – Adults (LOS greater than 24 hours & excluding deaths)



Deaths

Overall the registry recorded 33 deaths in the 2103 burn cases submitted to the registry. This corresponds to an overall death rate of 1.6 percent amongst the hospitalised burn patients meeting the registry inclusion criteria. This death rate is lower than the reported American NBR death rate of 3.2 per cent.

As would be expected, the likelihood of death increases with burn size. The death rate was 0.2 per cent for cases with a TBSA less than ten per cent. This is lower than the American NBR which recorded a death rate of 0.6 per cent for TBSA less than ten per cent group. The death rate increased to 18 per cent in cases with a TBSA greater than 20 per cent TBSA, and 55 per cent in cases with a TBSA greater than 50 per cent.

Of the patients who died, an inhalation injury was present in 18 (19 per cent). A reason for death was recorded for 88 per cent of cases and nearly half (48 per cent) succumbed to multi-system organ failure.

Discharge status

The majority of patients (82 per cent) were discharged to their usual residence (Table 14). The different burn centres have different practices in terms of discharge planning including differences in the use of hospital in the home and inpatient rehabilitation. Consideration of these different practices is required when interpreting this data.

Table 14: Discharge Disposition

Discharge Disposition	Number of cases	Per cent
Usual residence/ home	1,714	82.1
Hospital in the Home	114	5.5
Other	63	3.0
Inpatient Rehabilitation	43	2.1
Died	33	1.6
Other healthcare accommodation, unless usual place of residence	32	1.5
Other acute hospitals	31	1.5
Left against medical advice/ own risk	21	1.0
Another Bi-NBR Hospital	15	0.7
Psychiatric hospital	11	0.5
Statistical discharge	11	0.5

Readmissions

One hundred and ten paediatric cases (20 per cent) were readmitted within 28 days of discharge and the majority (96.4 per cent) were reported as planned readmissions. This is reflective of the common practice for paediatric patients to be discharged early and readmitted for planned acute burn wound management procedures such as skin grafting. In comparison, the readmission rate was less for adults where only 69 (4.5 per cent) cases recorded a re-admission, however nearly half (48 per cent) of these cases were reported as 'unplanned' for reasons such as wound breakdown or pain management issues.

For adult cases, it is more typical for patients to remain as inpatients until the majority of the acute burn wound management procedures are completed. Fewer cases have planned re-admissions for acute burn management procedures. This outcome quality indicator was developed to identify cases where the re-admission was unplanned or as a result of an unexpected complication. It is hoped that poor outcomes in terms of re-admission may be able to be linked to processes of care in the future.

Limitations and data caveats

- Only cases meeting the Bi-NBR inclusion criteria are included in reports
- Only the first acute admission that meets the Bi-NBR inclusion criteria for a new burn injury is included in reporting. Readmissions (within 28 days of discharge) are excluded except when reported separately in the final section. If a patient is transferred between Bi-NBR hospitals, only the initial admission is included.
- Each record in the database represents a new burn injury. If an individual sustains multiple burn injuries on different occasions, they are included as separate records.
- Only valid responses to data items are included in the analysis. Missing data and items that have been classified as "not stated/inadequately described" are reported on for completeness but excluded from analysis. Data items recorded as "not collected for this patient", "not collected at this site" are identified separately in the completeness report.
- Numbers with values less than five have been replaced by an asterisk (*) as a privacy protection measure
- Dataset changes were required during the 2009 to 2010 reporting year to improve data completeness and data quality. This has limited the ability to report data on all data items in this report.
- Reporting against the clinical quality indicators that have been developed is limited by the fact that standards of acceptable care have yet to be developed for many of the quality indicators. Data from this report and future reports will be used to develop standards of acceptable quality of care performance that will be monitored and benchmarked in the future.
- Participation remains a limitation of the Bi-NBR. Until there is near complete site participation, caution is required when using the registry data as it cannot provide definitive figures for monitoring the health care provided.
- Ten of the 11 sites provided ICD-10-AM and admission data to ascertain the rate of case capture. Identifying whether cases met the Bi-NBR inclusion criteria was limited by the inability to determine the primary diagnosis and treating unit for all cases. All cases with a burns diagnostic code were included which may under estimate the case capture rate. Whilst the analysis compared all admissions including re-admission, the re-admissions greater than 28 days after discharge could not be isolated in the case capture data. Hence the reported case capture rate may also be under estimated.

Conclusion

The overall goal of the Bi-NBR is to monitor burn injury incidence and causation and to encourage higher standards of burn injury prevention and patient care across Australia and New Zealand. The launch of the revised Bi-NBR in July 2009 provides the best opportunity to date to achieve these aims.

Data are presented for 2103 burn cases admitted to 11 of the 17 designated Burns Units across both Australia and New Zealand for the 12-month period July 2009 to June 2010. It is estimated that this corresponds to 97 per cent of burns admissions to the ten burns units that provided hospital administrative data for case capture comparison.

Data completeness is 95 to 100 per cent for the majority of core data items including the patient, burn event, admission, percentage TBSA, ICU and discharge details and continues to improve for all items.

Descriptive statistics were performed for the majority of data elements. Epidemiological data indicate males aged 20 to 29 years are at high risk of sustaining a flame burn injury and children one year of age are at risk of sustaining a scald burn injury. Injury prevention campaigns should be targeted at these age groups and burn causes.

Cool running water was documented as being applied within three hours of injury for 98 per cent of all cases that received burn cooling at the scene of injury. Where an injury requiring admission to a burns unit occurred, the vast majority of burns were less than ten per cent TBSA. However, nearly three quarters of all cases required theatre for a burn wound management procedure, indicating the severity of even the smaller burns and importance of injury prevention campaigns.

The data presented suggests similarities in patient age, sex, burn cause, and place of injury with that reported in the American Burn Association, NBR. Differences were seen in overall mortality rates and length of hospital stay for patients with a percentage TBSA of greater than 50.

While quality of care data was presented in this report, comparisons against an acceptable standard of performance are not possible until future annual reports. More detailed analysis of trends will also be possible as the volume of Bi-NBR cases and site participation increases. An executive summary is presented at the beginning of the report.

References

[1] Australian Commission on Quality and Safety in Health Care. Operating Principles and Technical Standards for Australian Clinical Quality Registries. Available at: **http://www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/PriorityProgram-08_CQRegistries**. Accessed 20 June 2010.

[2] American Burn Association. National Burn Repository, 2010 Version 6. Available at: **http://www.ameriburn.org/2010NBRAnnualReport.pdf**. Accessed February 2011.

[3] Australian Bureau of Statistics. Australian Standard Geographical Classification (ASGC) correspondence file concording 2006 (POA) to 2006 Remoteness Areas (RA). In: Section AG, editor.2006.

[4] Mahar P, Wasiak J, Bailey M, Cleland H. Clinical factors affecting mortality in elderly burn patients admitted to a burn service. Burns. 2008;34:629-36.

[5] Lundgren R, Kramer CB, Rivara F, Wang J, Heimbach D, Gibran N, et al. Influence of Comorbidities and Age on Outcome Following Burn Injury in Older Adults. Journal of Burn Care & Research. 2009;30:307-14.

[6] Thombs B, Singh V, Halonen J, Diallo A, Milner S. The Effects of Preexisting Medical Comorbidities on Mortality and Length of Hospital Stay in Acute Burn Injury. Annuals of Surgery. 2007;245:629-43.

[7] Charlson M, Pompei P, Ales K, MacKenzie C. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chron Dis. 1987;40.

[8] Commonwealth of Australia. The International Statistical Classification of Disease and Related Health Problems (ICD-10-AM). National Centre for Classification in Health; 2008.

[9] Bartlett N, Yuan J, Holland AJ, Harvey JG, Martin HC, La Hei ER, et al. Optimal Duration of Cooling for an Acute Scald Contact Burn Injury in a Porcine Model. J Burn Care Res. 2008;29.

[10] Yuan J, Wu C, Holland AJ, Harvey JG, Martin HC, La Hei ER, et al. Assessment of Cooling on an Acute Scald Burn Injury in a Porcine Model. J Burn Care Res. 2007;28.

[11] Cuttle L, Kempf M, Liu P-Y, Kravchuk O, Kimble RM. The optimal duration and delay of first aid treatment for deep partial thickness burn injuries. Burns. 2010;36:673-9.

[12] Cuttle L, Kempf M, Kravchuk OP, Phillips GE, Mill J, Wang X-Q, et al. The optimal temperature of first aid treatment for partial thickness burn injuries. Wound Repair Regen. 2008;16.

[13] Cuttle L, Pearn J, McMillan JR, Kimble RM. A review of first aid treatments for burn injuries. Burns. 2009;doi: 10.1016/j.burns.2008.10.011.

[14] Al-Mousawi AM, Mecott-Rivera GA, Herndon DN. Burn Teams and Burn Centers: The Importance of a Comprehensive Team Approach to Burn Care. Clin Plast Surg. 2009;36:547-54.

[15] Australian and New Zealand Burn Association. Burn Survivor Rehabilitation: Principles and Guidelines for the Allied Health Professional. Available at: **http://www.anzba.org.au/**. Accessed 17th January 2011.

[16] Jarrett M, McMahon M, Stiller K. Physical Outcomes of Patients With Burn Injuries - A 12 Month Follow-Up. Journal of Burn Care & Research. 2008;29:975-84.

[17] Wasiak J, Cleland H, Jeffery R. Early versus delayed enteral nutrition support for burn injuries (Review). Cochrane Database Syst Rev. 2006;Art. No.: CD005489.DOI: 10.1002/14651858.CD005489.pub2.

[18] Khorasani EN, Mansouri F. Effect of early enteral nutrition on morbidity and mortality in children with burns. Burns. 2010;doi:10.1016/j.burns.2009.12.05.

[19] Prelack K, Dylewski M, Sheridan R. Practical guidelines for nutritional management of burn injury and recovery. Burns. 2007;33:14-24.

[20] Palmieri T. What's New in Critical Care of the Burn-Injured Patient? Clin Plast Surg. 2009;36:607-15.

[21] Wang Y, Tang H-T, Xia Z-F, Zhu S-H, Ma B, Wei W, et al. Factors affecting survival in adult patients with massive burns. Burns. 2010;36:57-64.

[22] Mosier MJ, Pham TN, Klein MB, Gibran NS, Arnoldo BD, Gamelli RL, et al. Early Acute Kidney Injury Predicts Progressive Renal Dysfunction and Higher Mortality in Severely Burned Adults. J Burn Care Res 2010;31:83-92.

[23] Palmieri T, Lavrentieva A, Greenhalgh DG. Acute kidney injury in critically ill burn patients. Risk factors, progression and impact on mortality. Burns. 2010;36:205-11.

[24] Mitra B, Fitzgerald M, Cameron P, Cleland H. Fluid Resuscitation in Major Burns. ANZ J Surg. 2006;76:35-8.

[25] Latenser B. Critical care of the burn patient: The first 48 hours. Crit Care Med. 2009;37:2819-26.

[26] Guo F, Chen X-L, Wang Y-J, Wang F, Chen X-Y, Sun Y-X. Management of burns for over 80 per cent of total body surface area: A comparative study. Burns. 2009;35:210-4.

[27] Shupp JW, Pavlovich AR, Jeng JC, Pezzullo JC, Oetgen WJ, Jaskille AD, et al. Epidemiology of Bloodstream Infections in Burn-Injured Patients: A Review of the National Burn Repository. J Burn Care Res. 2010;31.

[28] Jacobs DG, Jacobs DO, Kudsk KA, Moore FA, Oswanski MF, Poole GV, et al. Practice Management Guidelines for Nutritional Support of the Trauma Patient. J Trauma. 2004;57.

[29] Pereira C, Murphy K, Herndon D. Outcome measures in burn care. Is mortality dead? Burns. 2004;30:761-71.

[30] New South Wales Health. Clinical Practice Guidelines: Burn Wound Management. Available at: **http://www.health.nsw.gov.au/gmct/burninjury/guidelines.asp**. Accessed 28 March.

[31] Australian Institute of Health and Welfare. METeOR Available at: **http://meteor.aihw.gov.au**. Accessed 9 May 2010.

[32] Gabbe B, Magtengaard K, Hannaford A, Cameron P. Is the Charlson Comorbidity Index Useful for Predicting Trauma Outcomes? Acad Emerg Med. 2005;12.

[33] Li B, Evans D, Faris P, Stafford D, Hude Q. Rosk adjustment performance of Charlson and Elixhauser comorbidities in ICD-9 and ICD-10 administrative databases. BMC Health Services Research. 2008;8.

[34] Kidney Health Australia. The eGFR Calculator (estimated Glomerular Filtration Rate). Available at: **http://www.kidney.org.au/HealthProfessionals/eGFRClinicalTools/tabid/632/Default.aspx**. Accessed 28 March.

[35] New Zealand Government. Statistics New Zealand. Available at: **http://www.stats.govt.nz/surveys_and_methods/methods/classifications-and-standards/classification-related-stats-standards/ethnicity/definition.aspx**. Accessed 28 March

[36] Carr J, Phillips B, Bowling W. The Utility of Bronchoscopy After Inhalation Injury Complicated by Pneumonia in Burn Patients: Results From the National Burn Repository. Journal of Burn Care & Research. 2009;30:967-74.

Glossary

Burn Depth:	Burns are described according to the depth of injury to the skin layers and are classified into superficial dermal, mid-dermal, deep-dermal and full thickness burns [30].
Burn Injury classifications [30]	• Chemical – direct contact with chemicals • Contact- direct contact with hot objects • Electrical – direct contact with an electrical current • Flame – direct contact with open flame or fire • Flash – exposure to the energy produced by explosive material • Friction – rapid movement of a surface against the skin, eg treadmill, road surface • Radiation – exposure to solar energy, radiotherapy, laser • Radiant heat – heat radiating from heaters , open fire places • Scald hot liquids such as hot water and steam, hot fats, oils and foods
Country of Birth:	Country in which the person was born [31].
Charlson Comorbidity Index	Includes 19 diseases weighted according to their association with mortality. It has been shown to be a reliable predictor of mortality in a number of populations [32]and has been adapted for use on ICD-9 and ICD-10 administrative systems [33].
Definitive burn wound assessment:	The burn assessment documented by the most senior burns clinician assessment within 72 hours of admission. This definition was developed by the registry's Steering Committee in an effort to standardise burn wound assessment data, particularly given the per centTBSA can be estimated and documented by numerous clinicians at multiple time points following burn injury.
Enteral / parenteral feeding:	**Enteral** nutrition is commonly administered through a nasogastric tube placed via the nose. **Parenteral** nutrition is administered via a peripheral or central vein. Enteral and parenteral nutritional supports are used to provide nutrients on a temporary or permanent basis to patients who are unable to ingest or tolerate adequate nutrients or to tolerate an oral diet [15].

Estimated glomerular rate (eGFR):	*'The glomerular filtration rate measures how well kidneys filter the waste products and toxins from a patient's blood and is the best indicated of kidney function. It helps determine if there is any damage.'* [34] The eGFR (estimated Glomerular Filtration Rate) is test used to screen for and detect early kidney damage and to monitor kidney status. It is a quantifiable measure of acute renal failure and routinely recorded in patients admitted to intensive care units across Australia and New Zealand.
Ethnicity:	The ethnic group or groups that a person identifies with or feels they belong to. Ethnicity is a measure of cultural affiliation, as opposed to race, ancestry, nationality or citizenship [35].
Full thickness burns:	The most severe classification of burn depth where all skin layers are destroyed, leaving no cells to heal the wound. Full thickness burns are likely to require surgical excision and skin grafting [30].
Inhalation injuries:	Burns to the oropharynx and upper airway result in swelling and possible airway obstruction within the first few hours after injury. Inhalation injuries are complex, with significant morbidity and increased mortality [36].
Senior burn clinician:	The Head of Unit; or a surgeon with a minimum of two years experience in a major burn unit who has Emergency Management of Severe Burns (EMSB) certification; or a Burns Nurse Practitioner with Emergency Management of Severe Burns (EMSB) certification.
Total body surface area:	A percentage measure of burns of the skin. The two most common assessment tools used to assess the burn size are the 'Lund and Browder' and 'Rule of Nines' chart. As a general guideline the size of a person's hand print (palm and fingers) is approximately 1 per cent of their TBSA [30].

Appendix 1: Data Completeness

Within each section, the level of completeness of each data item is defined as not entering that section or the input of the "not stated/adequately described" option. Where data were not entered for an item or the option of not stated/not adequately described or not applicable / not collected for at site or not collected for that patient was selected, data were excluded from the reported analyses.

All data items are listed according to how they are entered on the database. Most data items are expressed as a percentage of the total number of cases. However, for many of the quality indicators or where a particular event (eg. ICU, death) occurs, data items are expressed as a percentage of that event. Eg. ICU admission Dates only for ICU admissions.

Patient Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Date of Birth	2103 (100%)	-	2103 (100%)
Date of Injury	2103 (100%)	-	2103 (100%)
Time of Injury	1418 (67.4%)	685 (32.6%)	2103 (100%)
Gender	2103 (100%)	-	2103 (100%)
Ethnicity or Country of Birth	2059 (97.9%)	44 (2.1%)	2103 (100%)
Residential Postcode	1974 (93.9%)	129 (6.1%)	2103 (100%)

Admission Section	Complete and valid response: n (%) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Date of Admission	2103 (100%)	-	2103 (100%)
Time of Admission	1948 (92.6%)	155 (7.4%)	2103 (100%)
Fund	2086 (99.2%)	17 (0.8%)	2103 (100%)
Admission Type	2103 (100%)	-	2103 (100%)
Referral Source	2103 (100%)	-	2103 (100%)

Event Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Cause - Primary	2100 (99.9%)	3 (0.1%)	2103 (100%)
Accelerant	2075 (98.7%)	28 (1.3%)	2103 (100%)
Accelerant Type	347 (96.7%)	12 (3.3%)	359 (100%)
Explosion/Flash	2079 (98.9%)	24(1.1%)	2103 (100%)
Activity when injured	2065 (98.2%)	38 (1.8%)	2103 (100%)
Place of injury	2035 (96.8%)	68 (3.2%)	2103 (100%)
Intent of injury	2103 (100%)	-	2103 (100%)
Event Description	2090 (99.4%)	13 (0.6%)	2103 (100%)
Event Postcode	1750 (83.2%)	353 (16.8%)	2103 (100%)
Drug/Alcohol Involvement	1597 (75.9%)	506 (24.1%)	2103 (100%)
Inhalation Injury	2103 (100%)	-	2103 (100%)
Transfer Delay - Geographical	1748 (99.4%)	10 (0.6%)	1758 (100%)
Transfer Delay - Patient Initiated	1746 (99.3%)	12 (0.7%)	1758 (100%)
Transfer Delay - Transport-related	1740 (99.0%)	18 (1.0%)	1758 (100%)

Burn Cooling Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Cooling Techniques	1836 (87.3%)	267 (12.7%)	2103 (100%)
Cool Running Water	1202 (100%)	-	1202 (100%)
Water Mins	937 (87.8%)	130 (12.2%)	1067 (100%)
Water Hours	1050 (98.4%)	17 (1.6%)	1067 (100%)
Hydrogel	1201 (99.9%)	1 (0.1%)	1202 (100%)
Other Cooling Techniques	1202 (100%)	-	1202 (100%)

Burn Assessment Section (Burns Unit)	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
TBSA	1968 (93.6%)	135 (6.4%)	2103 (100%)
Burn Depth	1583 (75.3%)	520 (24.7%)	2103 (100%)
Assessed By	1940 (92.2%)	163 (7.8%)	2103 (100%)
Assessed Date/Time	1918 (91.2%)	185 (8.8%)	2103 (100%)

Assessment Quality Indicators Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Surgeon Assessment	1949 (92.7%)	154 (7.3%)	2103 (100%)
Surgeon Assessment Date	896 (100%)	-	896 (100%)
Surgeon Assessment Time	762 (85.0%)	134 (15.0%)	896 (100%)
Physical Functioning Assessment	230 (96.6%)	8 (3.4%)	238 (100%)
Enteral /Parenteral Feeding	161 (90.0%)	22 (10.0%)	183 (100%)

Inpatient Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
ICU Admission	2103 (100%)	-	2103 (100%)
ICU Admission Date	222 (99.6%)	1 (0.4%)	223 (100%)
ICU Discharge Date	222 (99.6%)	1 (0.4%)	223 (100%)
ICU Readmission	222 (99.6%)	1 (0.4%)	223 (100%)
Ventilation Hours	201 (90.1%)	22 (9.9%)	223 (100%)

Inpatient Quality Indicator Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Renal Impairment (eGFR)	258 (75.4%)	84 (24.6%)	342 (100%)
• *Not collected for this patient*	72 cases		
• *Not collected at this site*	27 cases		
Blood Cultures	1141 (91.1%)	111 (8.9%)	1252 (100%)
• *Not collected for this patient*	851 cases		
Positive Swab on Admission	52 (81.3%)	12 (18.7%)	64 (100%)
• *Not collected for this patient*	7 cases		
• *Not collected at this site*	4 cases		

The renal impairment quality indicator is relevant to ICU patients only. While completeness is 75 per cent for this data item, a further 99 cases (22 per cent) were recorded as not collected for the patient or not collected at the site. The blood cultures data item relates to whether the patient had a positive blood culture during the admission. The number of cases recorded as not collected for this patient is likely to be appropriate as blood cultures would not be completed unless clinically indicated. A positive swab on admission is only applicable to sites that routinely swab on admission.

Discharge Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Disposition	2088 (99.3%)	15 (0.7%)	2103 (100%)
Death Cause	29 (87.9%)	4 (12.1%)	33 (100%)
Decision	15 (45.5%)	18 (54.5%)	33 (100%)
Decision Date	14 (93.3%)	1 (6.7%)	15 (100%)
Discharge Date	2091 (99.4%)	12 (0.6%)	2103 (100%)
Discharge Time	1855 (88.2%)	248 (11.8%)	2103 (100%)

Discharge Quality Indicators Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Weight Day 5	331 (84.9%)	59 (15.1%)	390 (100%)
• *Not collected at this site*	4 cases		
Weight Weekly	314 (80.3%)	76 (19.7%)	390 (100%)
• *Not collected at this site*	3 cases		
Weight Loss	12 (63.9%)	7 (36.1%)	19 (100%)

The weight loss quality indicators are relevant to patients with a length of stay of greater than two weeks only. A small number of cases were recorded as not being collected at a burns unit.

ICD-10-AM Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Diagnoses	1868 (99.3%)	14 (0.7%)	1882 (100%)
Procedures	1717 (96.6%)	61 (3.4%)	1778 (100%)

ICD-10 diagnoses and procedures data were received predominantly in electronic format from hospital administrative systems for ten of the eleven sites that submitted data for this report.

Appendix 2: Steering Committee Membership

Peter Cameron	VIC	Monash University	Chief Investigator (Project Lead)
Belinda Gabbe	VIC	Monash University	Chief Investigator (Project Supervisor)
Dina Watterson	VIC	Monash University	Project Manager
Natalie Picton	VIC	Monash University	Project Coordinator
Andrew Hannaford	VIC	Monash University	Data Systems Analyst
Heather Cleland	VIC	The Alfred	Head of Burns Unit (ANZBA Vice President)
Yvonne Singer	VIC	The Alfred	Victorian State Burns Education Program Coordinator
Kathy Bicknell	VIC	The Royal Children's	Burns Co-ordinator
Michael Rudd	QLD	Royal Brisbane & Women's	Head of Burns Unit
Roy Kimble	QLD	Royal Children's	Head of Burns Unit
Belinda Wallis	QLD	Royal Children's	Burns Prevention Researcher
Peter Maitz	NSW	Concord General Repatriation	Head of Burns Unit
John Harvey	NSW	Westmead	Head of Burns Unit
Anne Darton	NSW	Statewide Burn Injury Service	Program Manager
Mihaela Lefter	TAS	Royal Hobart	Head of Burns Unit
Sheila Kavanagh	SA	Royal Adelaide	Clinical Nurse Consultant (ANZBA President)
Ian Mackie	SA	Royal Adelaide	Burns Consultant
Sanjeev Khaurana	SA	Women & Children's	Consultant Paediatric Surgeon
Linda Quinn	SA	Women & Children's	Burns - Advanced Clinical Practice Consultant
Fiona Wood	WA	Royal Perth	Head of Burns Unit
Dale Edgar	WA	Royal Perth	Senior Physiotherapist / Clinical Research Manager (Former ANZBA President)
Alison Mustapha	NT	Royal Darwin	CNC Outpatient Burn Service
Jan Diwell	NT	Royal Darwin	CNC Inpatient Burn Service
Tracey Perrett	NZ	New Zealand	National Burn Service Coordinator
Richard Wong She	NZ	Middlemore	Head of Burns Unit
Deb Bates	SA	n/a	Funding Body Representative, Julian Burton Burns Trust
Cynthia Banham	ACT	n/a	Consumer Representative

Appendix 3: Reference Committee Membership

Belinda Gabbe	VIC	Monash University	Chief Investigator (Project Supervisor)
Dina Watterson	VIC	Monash University	Project Manager
Natalie Picton	VIC	Monash University	Project Coordinator
Andrew Hannaford	VIC	Monash University	Data Systems Analyst
Yvonne Singer	VIC	The Alfred	Victorian State Burns Education Program Coordinator
Kathy Bicknell	VIC	The Royal Children's	Burns Co-ordinator
Belinda Wallis	QLD	Royal Children's	Burns Prevention Researcher
Teresa Matthews	QLD	Royal Brisbane & Women's	Database Manager
James Scott	NSW	Concord General Repatriation	Clinical Nurse Specialist
Tim Pruyn*	NSW	Concord General Repatriation	Burns Enrolled Nurse
Anne Darton	NSW	Statewide Burn Injury Service	Program Manager
Rebecca Schrale	TAS	Royal Hobart	Clinical Nurse Consultant
Carolyn Hynes*	TAS	Royal Hobart	Acting Clinical Nurse Consultant
Suzanne Land*	TAS	Royal Hobart	Acting Clinical Nurse Consultant
Sheila Kavanagh*	SA	Royal Adelaide	Clinical Nurse Consultant (ANZBA President)
Sally McRae	SA	Royal Adelaide	Burns Nurse
Darren Nesbitt	SA	Royal Adelaide	Burns Nurse
Natasha Forster*	SA	Women & Children's	Burns Nurse
Alex Manna	SA	Women & Children's	Burns Clinical Nurse Specialist
Linda Quinn	SA	Women & Children's	Burns – Advanced Clinical Practice Consultant
Phil Calvert	SA	Women & Children's	Physiotherapy Manager
Joy Fong	WA	Royal Perth	Clinical Nurse Consultant
Dale Edgar*	WA	Royal Perth	Senior Physiotherapist / Clinical Research Manager (Former ANZBA President)
Lisa Martin	WA	Princess Margaret	Clinical Research Nurse, McComb Foundation
Tania McWilliams	WA	Princess Margaret	Clinical Development Nurse
Alison Mustapha	NT	Royal Darwin	CNC Outpatient Burn Service
Jan Diwell	NT	Royal Darwin	CNC Inpatient Burn Service
Tracey Perrett	NZ	New Zealand	National Burn Service Coordinator
Frances James*	NZ	Middlemore	Senior Clinical Psychologist
Aislinn Carr*	NZ	Middlemore	Burns Clinical Nurse Specialist
Margaret Conaglen	NZ	Christchurch	Nurse Educator

* Former members during reporting period

Appendix 4: Hospitals with ethics committee approval

Collection of potentially re-identifiable patient level data from each of the hospitals and health services is conducted under strict National Health and Medical Research Council guidelines and national and Victorian privacy legislation.

Ethics committee approval for the registry was initially obtained from Monash University Human Research Ethics Committee.

Approval for burns data collection has also been actively sought from all Bi-NBR hospitals. As at 1st January 2011, registry data collection was approved at 16 of the 17 sites. By the end of the first year of reporting, 12 sites had commenced registry data submission; however one site was excluded from analysis due to low numbers. Of the 11 Burns Units, six sites treat paediatric patients (55per cent) and eight sites treat adult patients (62 per cent).

Australian and New Zealand Bi-NBR Hospitals:

Hospital	State/Country	Adults/Paediatrics
Women & Children's	South Australia	Paediatrics
Royal Adelaide	South Australia	Adults
The Alfred	Victoria	Adults
Royal Children's	Victoria	Paediatrics
Royal Perth	Western Australia	Adults
Royal North Shore	New South Wales	Adults
Concord General Repatriation	New South Wales	Adults
Children's Hospital Westmead	New South Wales	Paediatrics
Royal Hobart	Tasmania	Adult/Paediatrics
Royal Darwin	Northern Territory	Adult/Paediatrics
Middlemore	New Zealand	Adults/Paediatrics

Note: *NSW burns units form the NSW Statewide Burn Injury Service (SBIS)*

The following sites did not submit data for the reporting period. One site did commence data collection, however was excluded from analysis due to low numbers.

	Hospital	State/Country	Adult/Paediatrics
1	Royal Brisbane & Women's	Queensland	Adults
2	Royal Children's Brisbane	Queensland	Paediatrics
2	Princess Margaret	Western Australia	Paediatrics
3	Hutt Valley	Wellington, NZ	Adult/Paediatrics
4	Christchurch	Christchurch, NZ	Adult/Paediatrics
5	Waikato	Hamilton, NZ	Adult/Paediatrics

Appendix 5: Report of structural quality indicators

Structural quality indicators describe the attributes of a setting in which health care occurs. These include the resources available such as; adequacy of building, equipment, qualifications / availability of staff. Structural indicators are linked to a process of care that has a direct link to an outcome of care. The following structural indicators have been included in the Bi-NBR and will be reported on an annual basis only. The data was requested from the 12 sites that contributed data to the Bi-NBR July 2009 – June 2010 and the questions required a yes/no response only.

STRUCTURAL QUALITY INDICATORS	Response rate (per cent)	(p) Yes
1. Is a Burns Surgeon available on call 24 hours?	66%	87.5%
2. Is a Burns theatre available on a 24 hour basis?	66%	100%
3. Is Multidisciplinary care provided within the burns unit?	66%	100%
• **Are weekly multidisciplinary team meetings conducted in the burns unit?**	66%	100%
4. Does your unit routinely complete infection surveillance swabs on admission?	66%	62.5%

Appendix 6: Methodology for developing the co-morbidity categories

Co-morbidities have been shown to increase the risk of death and length of stay for burn patients [4-6] . The methodology developed to categorise co-morbidities for the Bi-NBR using ICD-10-AM data incorporated the following three key methods:

(i) The Charlson Comorbidity Index (CCI) [7].

(ii) The American Burn Association National Burns Registry (ABA-NBR) combination of the CCI with the Elixhauser method using ICD-9-CM, mapped to ICD-10-AM in the Bi-NBR [6].

(iii) Remaining co-morbidities using ICD-10-AM chapter titles, not classified using the CCI and ABA-NBR, grouped according to prevalent diseases or ICD-10-AM blocks [8].

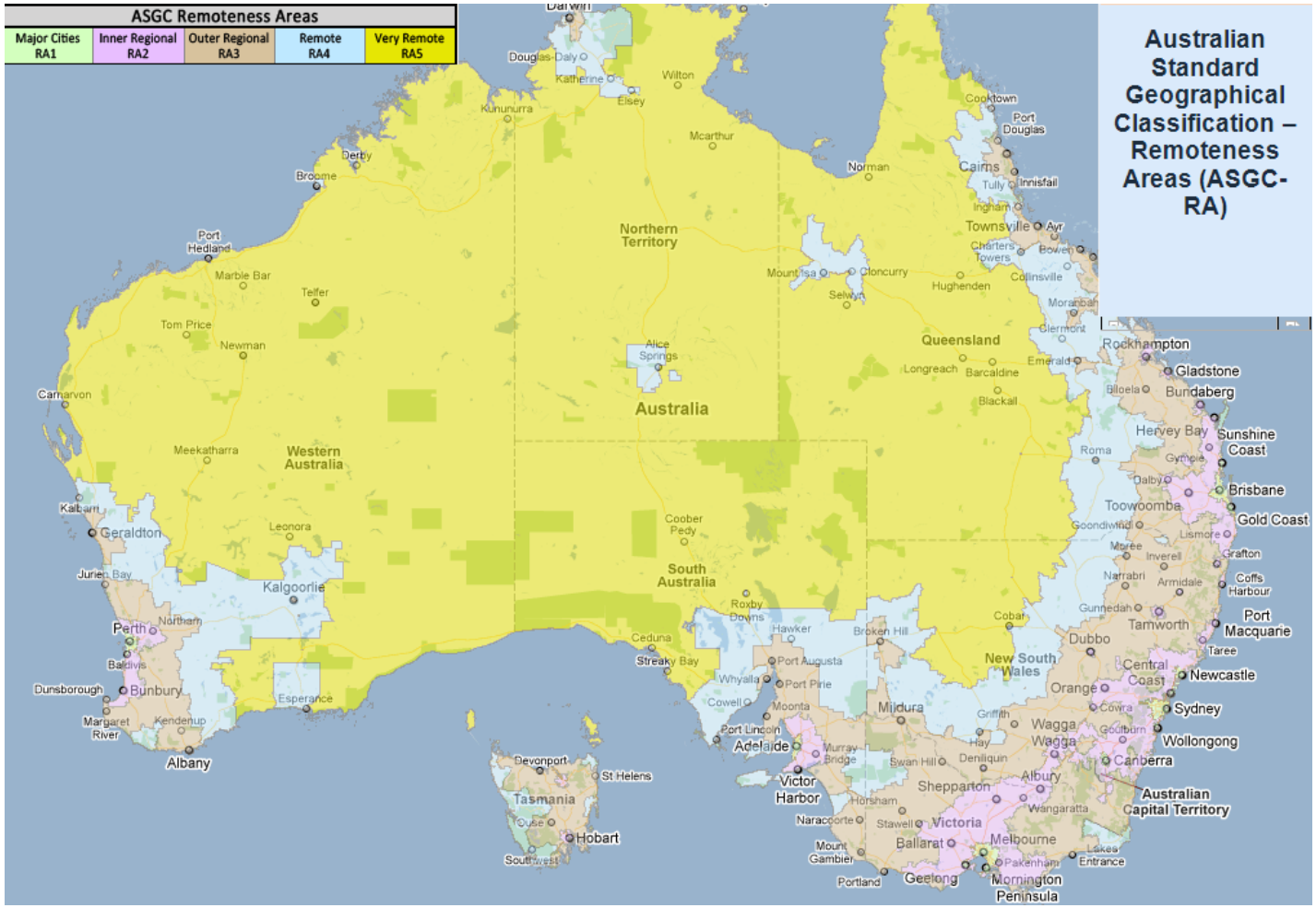
Appendix 7: ANZBA Referral Criteria

Criteria for specialised burns treatment

The following criteria are endorsed by the Australian & New Zealand Burn Association in assessing whether burns require treatment in a specialised burns unit (ANZBA 2004):

- burns greater than 10 per cent of total body surface area (TBSA);
- burns of special areas—face, hands, feet, genitalia, perineum, and major joints;
- full-thickness burns greater than 5 per cent of TBSA;
- electrical burns;
- chemical burns;
- burns with an associated inhalation injury;
- circumferential burns of the limbs or chest;
- burns in the very young or very old, or pregnant women;
- burns in people with pre-existing medical disorders that could complicate management, prolong recovery, or increase mortality;
- burns with associated trauma; and
- Non-accidental burns.

Appendix 8: Remoteness Areas



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