BI-NATIONAL BURNS REGISTRY

ANNUAL REPORT

1st July 2011 – 30th June 2012

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Foreword

The Australian and New Zealand Bi-National Burn Registry (Bi-NBR) was launched in 2009 with the primary aim of improving quality of burn care in Australia and New Zealand: this is our third annual report. The Bi-NBR is a collaboration between the Australian and New Zealand (ANZ) peak body for burn clinicians, the Australian and New Zealand Burn Association (ANZBA), and Monash University Department of Epidemiology and Preventive Medicine. Over the course of its development, the registry has been supported by government, professional and philanthropic organisations, and has received considerable in kind support from burns clinicians and Monash registry and academic staff.

The Bi-NBR represents the best opportunity for the improvement of burn care in Australia and New Zealand – it has been initiated by clinicians, developed according to clear well defined processes, managed by experts and governed by an inclusive and diverse steering committee composed of clinicians, registry experts, academics and other stakeholders. As a clinical quality registry with quality indicators relevant to burns embedded within the dataset, the registry is the first of its kind in burn care in the world.

Sixteen out of 17 ANZ burn units have ethics approval to contribute to the Bi-NBR and fifteen sites contributed data with 2,772 cases entered during this reporting period. Resourcing data entry continues to constitute a significant challenge for participating sites. During 2011-12, we have continued to develop technical solutions to assist efficient uploading of data. Bi-NBR data can now be electronically transferred via Secure File Transfer Protocol. Data linkage development remains a priority for the Bi-NBR and work is continuing on this and other projects including the electronic upload of hospital clinical coding data. Participating units can download their own data for unit-specific purposes and generate their own reports as required. The Registry continues to respond to requests for data for research, prevention, quality and educational purposes.

We now have three years of data and are embarking on the next phase of development to review and refine the quality indicators. The successful use of the developed indicators for benchmarking requires confirmation of their validity and application of the indicators using a methodology that is accepted by key stakeholders: it is critical to establish an acceptable model for quality assessment. The development of benchmarking policies and procedures for the Bi-NBR will enhance the monitoring of quality of burn care in Australia and New Zealand, and underpin the development of the Bi-national Burns Quality Improvement Program – BQIP.

I commend this report and trust it will be of use in examining the characteristics of burn injury and its management and in directing, supporting and enhancing burn prevention and care initiatives.

Heather Cleland

President, Australian and New Zealand Burn Association (ANZBA)
Chair, Steering Committee Bi-NBR

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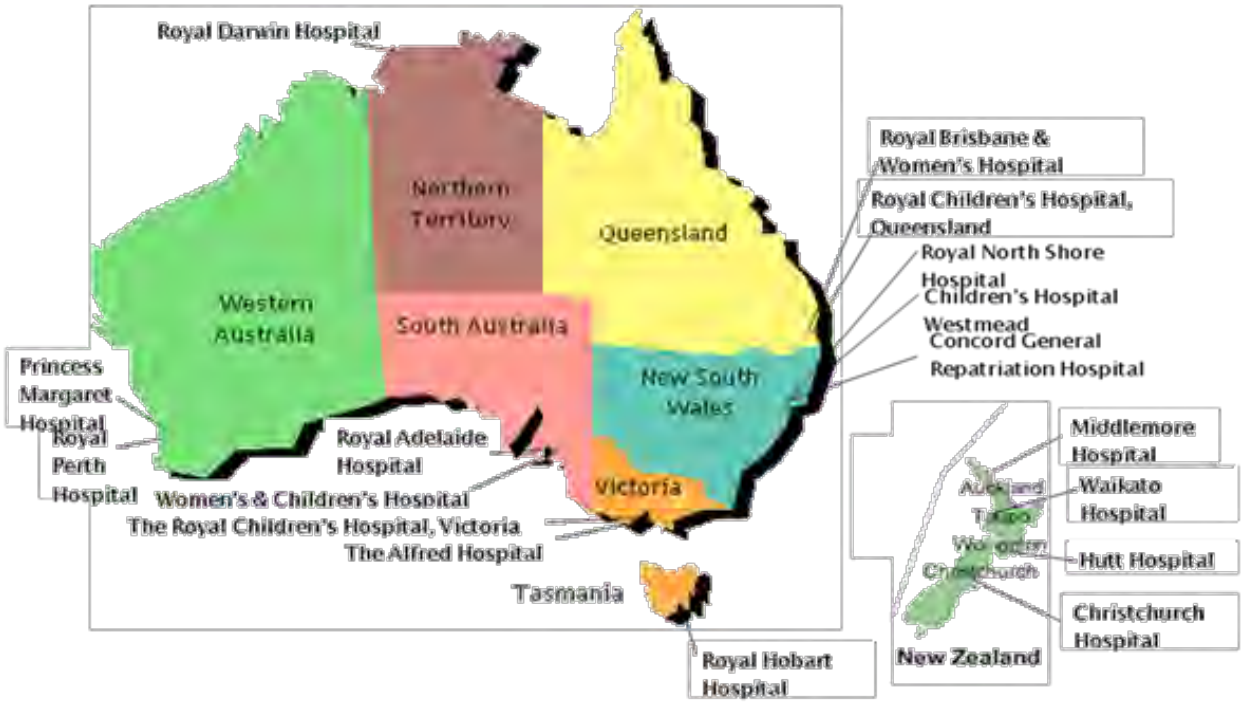
Introduction

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 New Zealand (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 to improve quality of care. The revised Bi-NBR was launched in July 2009 and is now in its fourth year of operation. This clinical quality registry captures epidemiological, quality of care, and outcome data for adult and paediatric burn patients across Australian and New Zealand burn units. The project is a collaboration between the Australian and New Zealand Burn Association (ANZBA) and Monash University, Department of Epidemiology and Preventive Medicine (DEPM).

Figure 1: Designated burns units across Australia and New Zealand



The Bi-NBR is 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 (2008-09); the Helen Macpherson Smith Trust (2010-2012); the Thyne Reid Foundation (2011-2013). Individual burns units now also contribute to co-funding the registry to ensure ongoing sustainability of the Bi-NBR.

Executive Summary

This is the third annual report from the 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 Bi-NBR hospitals who meet the inclusion criteria. Improvements are made to the database as required to enhance data capture and quality.

Data are presented for 2772 burn patients treated at 15 burns units over the 12 month period from 1st July 2011 to 30th June 2012. Consistent with data from the 2010-11 year and that reported by the American Burn Association, National Burn Repository, 69 per cent of cases overall were adults, with males accounting for 67 per cent of all cases. Children aged 12 to 24 months accounted for 33 per cent of paediatric cases while 20 to 29 year olds accounted for 26 per cent of adult cases. Flame (36 per cent) and scald burns (36 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. Contact burns were the next most common aetiology accounting for 21 per cent of paediatric patients.

For children 11 to 15 years of age, and 16 to 49 year old adults, flame burn was the predominant cause. In the over 70 years age group, scalding was the predominant cause of burn. Nearly all burns were considered unintentional (94 per cent).

The data presented in this report indicates that for cases admitted to Australian burns units, 82 per cent were born in Australia, with 8 per cent Australian Aboriginal. For New Zealand cases, 79 per cent of these identified as a New Zealander with 33 per cent of these identified as a New Zealand Maori. Most Australian cases were funded by the Australian Health Care Agreement (83 per cent) and with just fewer than 10 per cent of cases funded by work injury compensation schemes. Most New Zealand cases (98 per cent) were funded under the Accident Compensation Corporation.

A burn of less than 10% Total Body Surface Area (TBSA) was recorded for 82 per cent of all cases. Seventy per cent of paediatric cases and 75 per cent of adult cases underwent a burn wound management procedure in theatre. Fifty four per cent of paediatric cases and 69 per cent of adult cases required skin grafting, and is consistent with the 2010-11 annual report. This also signifies 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 8).

The initial burn management data suggests that cool running water (considered the most appropriate management for burn injury) is the primary burn cooling strategy used in the majority of cases at the scene of injury (90 per cent). Cool running water was documented as being applied for greater than twenty minutes within three hours of the burn for 34 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 were used at the scene of the burn injury for burn cooling in 12 per cent of cases.

Almost half of paediatric and adult cases were transferred to the burns unit from another hospital. The median (IQR) time from injury to admission to the Bi-NBR hospital was 16 (4-144) hours for paediatric cases and 16 (4-107) hours for adult cases. The median (IQR) length of stay (LOS) for paediatric cases (where LOS is > 24 hours and excluding deaths) was five (2-10) days and seven (3-13) days for adult cases. The overall in-hospital death rate was one per cent for hospitalised burn cases. The majority of cases (86 per cent) were discharged to their usual residence.

Eighty-eight paediatric cases (10 per cent) were readmitted within 28 days of discharge and the majority (74 per cent) were reported as planned readmissions. A readmission was recorded for only five per cent of adult cases (n=102) although over half (63 per cent) of these cases were reported as 'unplanned'.

The hospital process and quality of care data presented in this report provides a baseline from which future monitoring of care can be undertaken. The Bi-NBR continues to develop and ongoing improvements to data fields and definitions will be made over 2013 to improve data quality and interpretation.

About this report

This is the third annual report of the Bi-National Burns Registry (Bi-NBR). Data collected during the period of 1st July 2011 and 30th June 2012 (Year 3) is summarised in this report. Fifteen of the 17 Bi-NBR sites (12 out of 13 Australian sites and three out of four New Zealand sites) contributed data with 2,772 cases entered. Of these sites, five sites treat paediatric patients, five sites treat adult patients and five sites treat both paediatric and adult patients. One site did not contribute data for the first quarter of Year 3 and one site did not contribute data for the middle two quarters of Year 3 due to resource issues. Only sites with Institutional Ethics Committee (IEC) approval to participate and who had local resources for data collection were able to contribute data to the registry.

The report describes the registry, its achievements, and describes the profile, treatment and outcomes of burn unit admissions from 1st July 2011 to 30th June 2012. Quality of care data related to processes of care is also provided. Where appropriate, data has been compared to the 2009-10 and 2010-11 reporting periods. Where relevant, data has also been compared with the American Burn Association's National Burn Repository (NBR) 2012 [2] report of data from January 2002 to June 2011, as this is the only other burn database that reports comparable summary data.

The Bi-NBR excludes burn patients that died before reaching hospital, or who died after discharge from hospital. Future plans to conduct a project using The National Coroner's Information System is under consideration to enable a more comprehensive profile of burn-related mortality in Australia and New Zealand.

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, quality of care, and outcomes data for adult and paediatric burn patients across Australian and New Zealand burn 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 (2008-09) and the Helen Macpherson Smith Trust (2011).

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 the ability to provide resources for local data collection submit data to the Bi-NBR. For the third year of reporting (Jul 11- Jun 12), 15 of the 17 Bi-NBR sites (88 per cent) contributed data. Appendix 5 summarises the participating Bi-NBR sites.

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

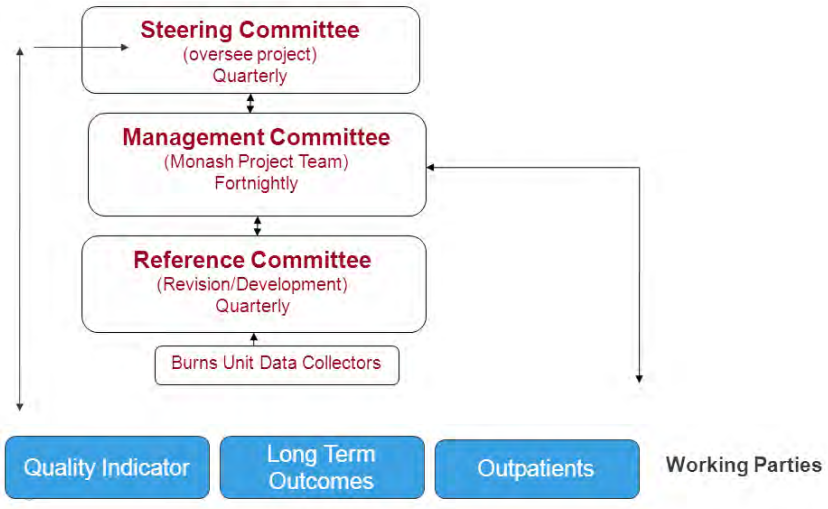
Key project outcomes achieved are summarised below:

Ethics approval obtained

For the first year of reporting, 13 out of 17 sites had obtained ethics approval to submit data to the Bi-NBR and by the third year this increased to 16 sites. 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 project team.

Governance structure established

A formalised governance structure is established to oversee and develop the Bi-NBR. This includes a Management Committee (Appendix 2), Steering Committee and Reference Committee (Appendix 3), and various sub-committees. Steering Committee membership includes burns clinical experts, consumer and funding body representation.



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 a systematic review of this data is currently underway.

Reporting

Quarterly reports are routinely produced and provide summary aggregate data from the registry. Additional reporting functions have been generated to allow individual units to produce their own reports and download data for their unit-specific purposes.

External requests for data must comply with the Bi-NBR Data Access Policy. The data request form and associated policies are publicly available on the internet at www.bi-nbr.org. In the third year of reporting, there were 24 requests for data for purposes such as injury prevention, education, public awareness campaigns and collaborative work with Emergency Services.

There has also been international interest in the development and implementation of the Bi-NBR from an international working party (including the UK and USA burns registry affiliates); South African Burns Society; School of Public Health, Tehran University of Medical Science in Iran; and the 3rd Military Hospital, Chongqing in China. The data dictionary and data collection forms have been provided to these groups, in anticipation of a collaborative relationship and the possibility to benchmark burns care on an international level.

Publications

Watterson D, Gabbe B. J., Cleland H, Edgar D, Cameron P and Members of the Bi-NBR Steering Committee. (2012) Developing the first Bi-National clinical quality registry for burns—Lessons learned so far. Burns 38(1): 52-60.

Watterson D, Cleland H, Darton A, Edgar D, Fong J, Harvey J, Kavanagh S, Perrett T, Singer Y, Tonkin C, Cameron P. (2011) Developing clinical quality indicators for a Bi-National Burn Registry: Burns 37(8):1296-308.

Schricke, DI., Jennings, PA., Edgar, D., Harvey, JH., Cleland, HJ., Wood, FM., Cameron, PA. Scald burns in children aged 15 and younger in Australia and New Zealand - an analysis of the Bi-National Burns Register. Burns. 2013 June 19 doi:10.1016/j.burns.2013.05.010 [Epub ahead of print]

Presentations

During the reporting period, the Bi-NBR was presented at the Australian and New Zealand Burns Association (ANZBA) Annual Scientific Meeting in Hobart; the National Trauma Research Institute (NTRI) Annual Scientific Meeting in Melbourne; the Annual Australasian Conference on Safety and Quality in Health Care in Cairns; and the 16th Congress of the International Society for Burn Injuries (ISBI) in Edinburgh.

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 presentation to the Bi-NBR hospital

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

Desquamating skin conditions such as Stevens Johnson Syndrome and Toxic Epidermal Necrolysis (TENS) are excluded from the registry.

Data Capture

Data collection is the responsibility of participating Burn Units. Bi-NBR data collectors are listed in Appendix 4. Patient data are retrieved via medical records and existing hospital information systems and entered into the web-based database. A paper-based 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, and submitted for uploading 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.

To maximise data completeness, sites run their own data completeness reports prior to the central extraction of data for the quarterly and annual reports. Manual checking of data occurs at each reporting deadline, and 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

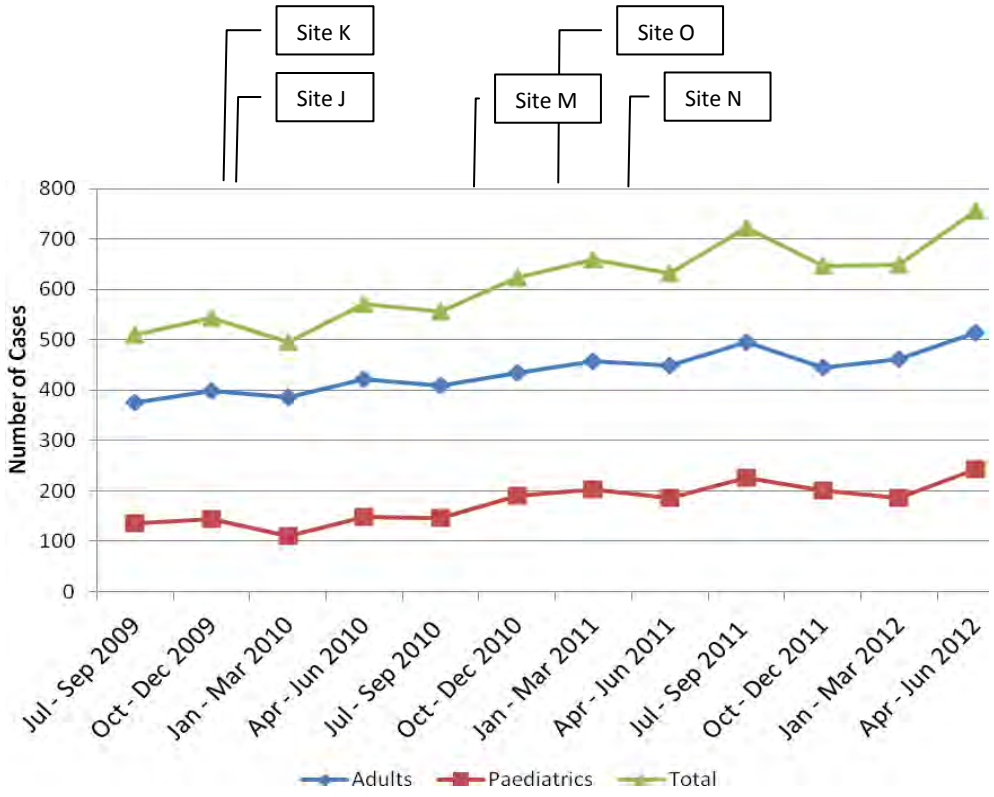
This section provides information about the number of patients admitted to a participating burns unit that meet the Bi-NBR inclusion criteria.

Bi-NBR burn cases

The total number of burn cases recorded on the Bi-NBR for Year 3 (1st July 2011 to 30th June 2012) was 2772, with 1916 adult cases (16 years of age and older) and 856 paediatric cases (15 years of age and under). Of these sites, five sites treat paediatric patients, five sites treat adult patients and five sites treat both paediatric and adult patients (see Appendix 5).

For the reporting period, 15 sites submitted data to the registry. Figure 2 shows the numbers of adult cases and paediatric cases by quarter since the commencement of the registry in July 2009. Sites K, J, M, N and O commenced at different time points as identified in Figure 2 and the remaining sites commenced in July 2009. One paediatric site did not contribute data for the first quarter of Year 2, one paediatric site did not contribute data for two quarters of Year 3 and a third paediatric site has not contributed data consistently across all quarters and this is a limitation of comparative data analysis for paediatric cases.

Figure 2: Reporting year trends in burn patients



Registry capture rate

Table 1 outlines the case numbers entered by each site by reporting year.

Table 1: Site case numbers per reporting year

Site	1st Jul 09 – 30th Jun 10	1st Jul 10 – 30th Jun 11	1st Jul 11 – 30th Jun 12	TOTAL
A	276	264	303	843
B	236	269	263	768
C	207	267	235	709
D	73	81	46	200
E	216	173	204	593
F	118	92	103	313
G	315	322	327	964
H	178	236	272	686
I	249	223	240	712
J	9	0	19	28
K	55	85	75	215
L	202	226	281	709
M	-	65	84	149
N	-	62	103	165
O	-	137	217	354
TOTAL	2,134	2,502	2,772	7,408

* Denotes less than five cases

Data Completeness

Appendix 1 outlines the completeness of each data item. Data not entered for an item or entered with the option of 'not stated/not adequately described', were defined as incomplete and is excluded from analysis for each of the relevant data items.

Demographic profile of hospitalised burn patients

Figures 3a and 3b show the age distribution by gender for paediatric and adult cases. Males represented 67 per cent of all cases which is consistent with the 2009-10 and 2010-11 reporting years. One to two year olds accounted for almost 33 per cent of paediatric cases (34 per cent in 2010-11) and 20 to 29 year olds nearly 26 per cent of adult cases consistent with the 2010-11 reporting year.

These figures are consistent with the American Burn Association, National Burn Repository (NBR) 2012 which reported that nearly 70 per cent of burn patients were men. The age distribution were similar, where children under the age of five accounted for 19 per cent of cases in the American NBR (compared to 22 per cent in the Bi-NBR) and patients aged 60 or older represented 12 per cent of all cases (compared to 13 per cent in the Bi-NBR).

Figure 3a: Age distribution by gender – Paediatric cases

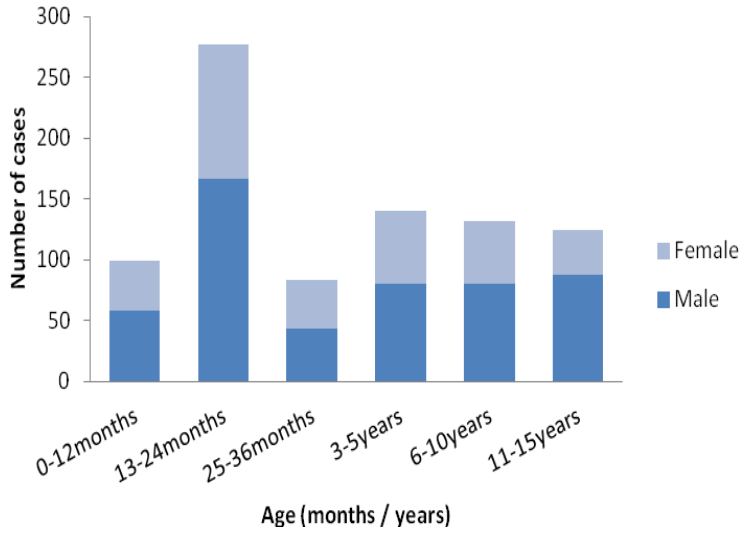


Figure 3b: Age distribution by gender – Adult cases

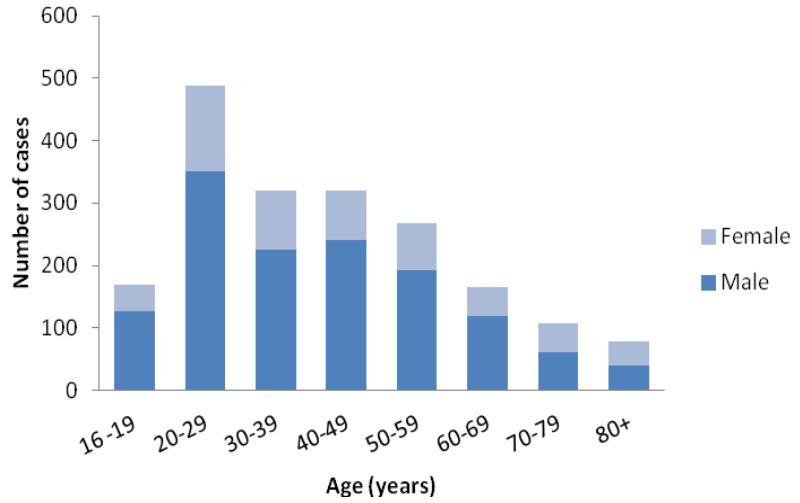


Table 2 outlines the region of birth for patients admitted to Australian units and the ethnicity by region for New Zealand units. The difference in reporting accounts for Australian hospitals routinely collecting 'country of birth' whereas New Zealand hospitals record the 'ethnicity' of their patients.

Of the patients admitted to Australian Burn Units, the majority of cases (82 per cent) were born in Australia. Indigenous Australians accounted for 12 per cent (n=78) of paediatric cases and six per cent (n = 70) of adult cases born in Australia, which is consistent with the 2009-10 and 2010-11 year (paediatric cases eight and ten per cent respectively and adult cases seven per cent for both years). There were 404 patients admitted to Australian burn units who were born overseas. These patients were distributed between European, Asian, North African and Middle Eastern countries.

Of the New Zealand Burn Unit admissions, 79 per cent were classified as a "New Zealander", of which 95 (33 per cent) were New Zealand Maori. This is consistent with the 2009-10 and 2010 – 11 reporting years. A further 72 (20 per cent) patients were of other Oceanian descent; predominantly Samoan (n=29, 40 per cent).

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

Region of birth - Australian Units	N	%
Australia	1,901	82.5
North West Europe	100	4.3
Southern and Eastern European	73	3.1
Southern and Central Asian	41	1.8
South East Asian	41	1.8
North African and Middle Eastern	38	1.6
New Zealander	32	1.4
North East Asia	31	1.3
Sub-Saharan Africa	18	0.8
Peoples of the Americas	15	0.7
Oceanian (other)	15	0.7
		100.0

Region of Ethnicity - New Zealand Units	N	%
New Zealander	285	70.2
Oceanian (other)	72	17.8
South East Asian	13	3.2
Southern and Central Asian	12	3.0
North West European	7	1.7
North Africa and Middle Eastern	5	1.2
Sub-Saharan African	4	1.0
North East Asian	4	1.0
Peoples of the Americas	3	0.7
Southern and Eastern Europe	1	0.2
		100.0

* Denotes less than five cases

Consistent with 2009-10 and 2010-11, the vast majority of cases admitted to Australian Burn Units were funded by the Australian Health Care Agreement (n=1,944, 83 per cent) with just under 10 per cent (n=204) covered under the workers compensation scheme in each State or Territory. Most New Zealand cases were funded by the Accident Compensation Corporation (n=414, 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

Consistent with the previous two years, flame and scald burns were the most common cause of burn injury. Flame burns accounted for 36 per cent, and scalds accounted for 36 per cent of all cases. The American NBR 2012 report also identified flame burns and scalds as the most common aetiology, however fire/flame related injuries were more common (44 per cent) compared to scald injuries (33 per cent).

Tables 3a and 3b outline the cause of injury by paediatric and adult age groups and Figure 4a and 4b compares common burn causes across all age groups. Consistent with the previous two years, scald burns were the most common cause of injury for paediatric cases aged 10 years or less. For the 11 to 15 years age group, flame burns were the most common cause of injury (n=41). Contact burns were the second most common injury accounting for 21 per cent of paediatric burns. In the adult age range of 16 to 49 years, flame burn was the most common cause of injury and scald burns were the predominant cause of burn for those aged 70 years and over.

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

Primary Cause of Burn	Paediatric Age Group (months & years)							
	0-12 months	13-24 months	25-36 months	3-5 years	6-10 years	11-15 years	Total	%
Scald	71	200	42	65	53	27	**458**	**53.7**
Contact	19	50	21	30	28	34	**182**	**21.3**
Flame	*	9	6	24	37	41	**119**	**14.0**
Friction	-	9	11	18	11	12	**61**	**7.2**
Chemical	*	*	*	*	*	5	**16**	**1.9**
Radiant Heat (no contact to source)	*	-	-	-	*	-	**3**	**0.4**
Electrical	*	*	*	*	-	*	**5**	**0.6**
Other	*	*	-	-	-	-	**2**	**0.2**
Total	98	276	83	140	132	124	**853**	**100.0**

* Denotes less than five cases

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

Primary Cause of Burn	Adult Age Group (years)									
	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80+	Total	%
Flame	96	226	166	139	117	70	36	20	**870**	**45.5**
Scald	35	125	87	85	67	52	50	44	**545**	**28.5**
Contact	15	65	35	47	40	21	15	6	**244**	**12.8**
Chemical	4	27	14	26	16	10	*	*	**102**	**5.3**
Friction	12	27	7	10	7	*	*	-	**67**	**3.5**
Electrical	5	11	*	7	10	5	*	*	**45**	**2.4**
Radiant Heat (no contact to source)	*	8	*	*	9	*	*	*	**34**	**1.7**
Pressurised gas/air (non-flame)	*	*	*	-	-	-	-	-	**3**	**0.2**
Cooling	*	-	-	*	-	*	-	-	**3**	**0.2**
Total	170	490	318	319	266	164	106	78	**1911**	**100.0**

* Denotes less than five cases

Figure 4a: Frequency of Flame, Scald and Contact burns by Paediatric Age Group

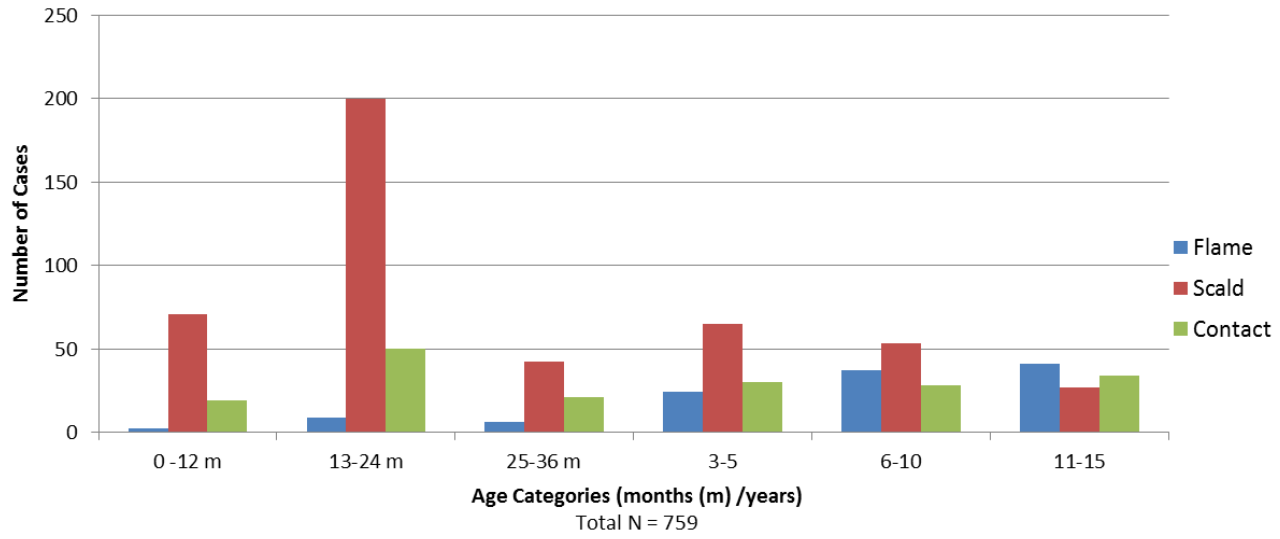
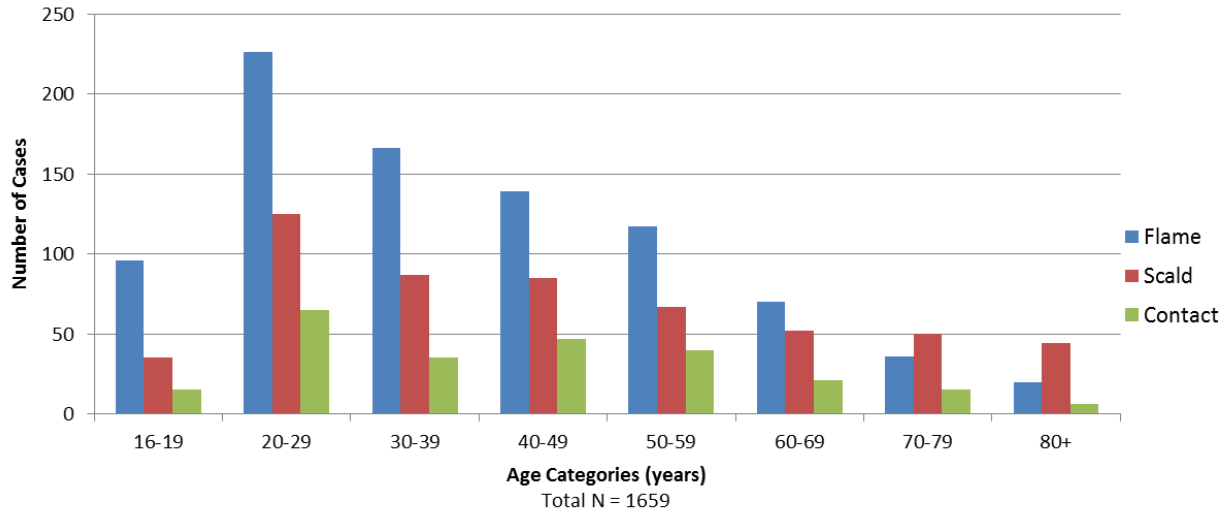


Figure 4b: Frequency of Flame, Scald and Contact burns by Adult Age Group



The most common sub-causes of paediatric and adult burn injuries are shown in Tables 4a and 4b, accounting for 75 per cent of paediatric cases and 68 per cent of all 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, flame burns from a campfire, bonfire or burn-off was by far the most common sub-cause, followed by scald from fat/oil and scald from water from Saucepan/Kettle/Jug/Billy/Urn/Thermos. The three most common sub-causes of burn injury in both adults and paediatrics are consistent over the past three years.

Flame 'other' includes flame injuries that could not be coded into the pre-defined categories and 'source unclear' was coded where the source of the flame was unknown (e.g. house fire with unknown cause). Chemical burns from alkali substances increased from 41 cases in the 2009-10 reporting year to 58 cases in 2010-11. However, there was some inconsistency with chemical burn coding and this will be reviewed.

Consistent with the previous two years, in the 16 to 59 year age group, flame burns accounted for the majority of burn injuries (47 per cent). An accelerant was used to ignite/enhance the flame in more than half (66 per cent) of these cases and petrol was the most common accelerant used (59 per cent), followed by gas (12 per cent).

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

Cause	Sub Cause	N	%
Scald	Hot beverages	168	19.7
Scald	Water from saucepan /kettle/jug/billy/urn/ thermos	125	14.7
Scald	Food liquid/solid	65	7.6
Contact	Coals/Ashes	53	6.2
Flame	Campfire/bonfire/burnoff	47	5.5
Contact	Vehicle Exhaust	41	4.8
Friction	Treadmill	33	3.9
Scald	Water from tap/bath/shower	31	3.6
Flame	Lighter/matches	30	3.5
Scald	Fat/oil	23	2.7
Friction	Via vehicle/motorbike	20	2.3

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

Cause	Sub-Cause	N	%
Flame	Campfire/bonfire/burnoff	284	14.9
Scald	Fat/oil	150	7.9
Scald	Water from saucepan /kettle/jug/billy/urn/ thermos	118	6.2
Flame	Other	99	5.2
Flame	Lighter/matches	67	3.6
Chemical	Alkali	66	3.4
Flame	Vehicle engine parts	64	3.4
Flame	Source of flame unclear	63	3.3
Contact	Coals/Ashes	54	2.8
Friction	Via vehicle/motorbike	53	2.8
Scald	Hot beverages	52	2.7
Flame	BBQ	49	2.6
Flame	Welder grinder	48	2.5
Scald	Food liquid/solid	44	2.3
Contact	Vehicle Exhaust	43	2.3
Flame	Cigarette	39	2.0

Seasonal Trends

Based on the patient's date of injury, the primary burn sub-cause was segregated into the seasonal cohorts of summer, autumn, winter, and spring to identify if trends in burn injury were evident and this data is presented in Figure 5a and 5b. A burn injury sub-cause was recorded in 1,910 adult cases and 785 paediatric cases. Comparisons across the three years (for adult cases only) are included where possible, and two sites were excluded for this analysis as they commenced mid-way through the time period. Two paediatric sites (64 cases) were excluded from this analysis due to incomplete data entry and year to year comparisons were not conducted as paediatric sites commenced mid-way through the three year reporting period and overall there were small case numbers.

In adult cases, more than half of burns from hot water bottles (n=22, 56 per cent) and heaters (n=51, 57 per cent) occurred in the winter months. For example, sitting too close to a heater or using a hot water bottle to stay warm during the cooler months. Heaters were inclusive of electric, wood, gas and any other heater types coded as 'heater'.

For Australian cases (n=257), there were two times the number of flame injuries by campfire/bonfire/burn-off in autumn (n=85, 30 per cent) and winter (n=87, 31 per cent) compared to summer (n=43, 15 per cent) when open fires are less likely to occur during the fire danger season. In contrast, for New Zealand cases (n=27), flame injuries by campfire/bonfire/burn-off occurred more frequently in summer (n=10, 37 per cent) and autumn (n=8, 30 per cent) compared to winter (n=5, 19 per cent). New Zealand Burns Units have previously launched burns prevention campaigns leading up to the summer months as people are more likely to undertake property maintenance and 'burn-offs' to clear their properties.

Contact burns from hot coals/ashes were also more prevalent during winter (n=23, 43 per cent) compared to the summer months (n=5, 9 per cent). As expected, the incidence of flame burns involving barbeques were higher during summer (n=49, 41 per cent) when people are more likely to cook outdoors. Intentional or accidental use of an accelerant as an ignition source (n=560, 36 per cent) marginally increased in summer (n=165, 35 per cent) whether) compared to all other seasons - autumn (29 per cent), winter (26 per cent) and spring (28 per cent).

Nearly half of all flame injuries by welding/grinding occurred during winter (n=20 42 per cent). Rates were also higher in the previous two years during winter (2009-2010: 38 per cent; 2010-2011: 31 per cent), however the ratio difference between seasons wasn't as significant. Clothing was documented as catching alight in just over half of all cases (n=24, 56 per cent) across all seasons; and for the previous year it occurred in three quarters of cases (n=29, 83 per cent). Layers of clothing worn during welding/grinding may pose a greater risk of clothing catching alight from an open flame.

Friction burns caused by falling off a vehicle or motorbike doubled in numbers during summer (n=36, 19 per cent) compared to winter (n=8, 15 per cent); and the majority of these cases were admitted to one specific Australian Burns Unit (n=15, 79 per cent).

Further research will be undertaken by this site to understand if the increased numbers are due to lack of safety equipment use on the roads or there is a bias towards the hospital admitting smaller friction burns compared to those admitted to other larger units.

Firework flame burns in adults were higher in winter (n=6, 46 per cent) and five out of six cases (83 per cent) were admitted to a Burns Unit in the Australian state where there is an annual festival 'fireworks day' whereby fireworks can be purchased and used for private use. Overall the annual case numbers were small (< 20) and this trend was not consistent across the previous two years where firework burns were more likely to occur during summer.

In paediatric cases flame burns by campfire/bonfire/burn-off (n=18, 45 per cent), contact burns by coals/ashes (n=19, 44 per cent) and heater burns were more prevalent in winter (n=12, 44 per cent). Flame burns by lighters and matches also occurred more frequently in winter (n=11, 44 per cent) compared to summer (n=4, 16 per cent).

Nearly half of all friction burns caused by falling off a vehicle or motorbike occurred in the summer months (n=8, 42 per cent). Contact burns by vehicle exhaust was also highest in summer (n=16, 40 per cent). These injuries were commonly sustained when riding or being a passenger on a motorbike/quad bike/trail bike and the majority of patients were between 11 to 15 years old (n=11, 69 per cent). Teenagers may be more likely to engage in motorbike recreation activities during the summer months and less likely to wear adequate safety equipment due to the warmer weather.

Treadmills can be dangerous for children as they can sustain friction burns when the moving treadmill is touched. Friction burns by treadmill occurred more frequently in summer and spring collectively (n=19, 61 per cent) compared to autumn and winter (n=12, 39 per cent); the majority of patients were under 5 years of age (n=17, 64 per cent); and 89 per cent of cases occurred in the home.

Examining the impact of the changing seasons on burn cause can help guide burns prevention strategies and resource utilisation. Limitations of this analysis does not take into account seasonal variations in weather across Australia and New Zealand (e.g. 'wet' and 'dry' seasons in Northern Territory) and if there is a bias towards the type and severity of burn injuries admitted to individual burns units. In the paediatric population, there were also a smaller number of cases compared to adults; however year to year trends can be more closely examined as there is complete data capture across all Burns Units.

Figure 5a: Seasonal Trends by Adult Age Group

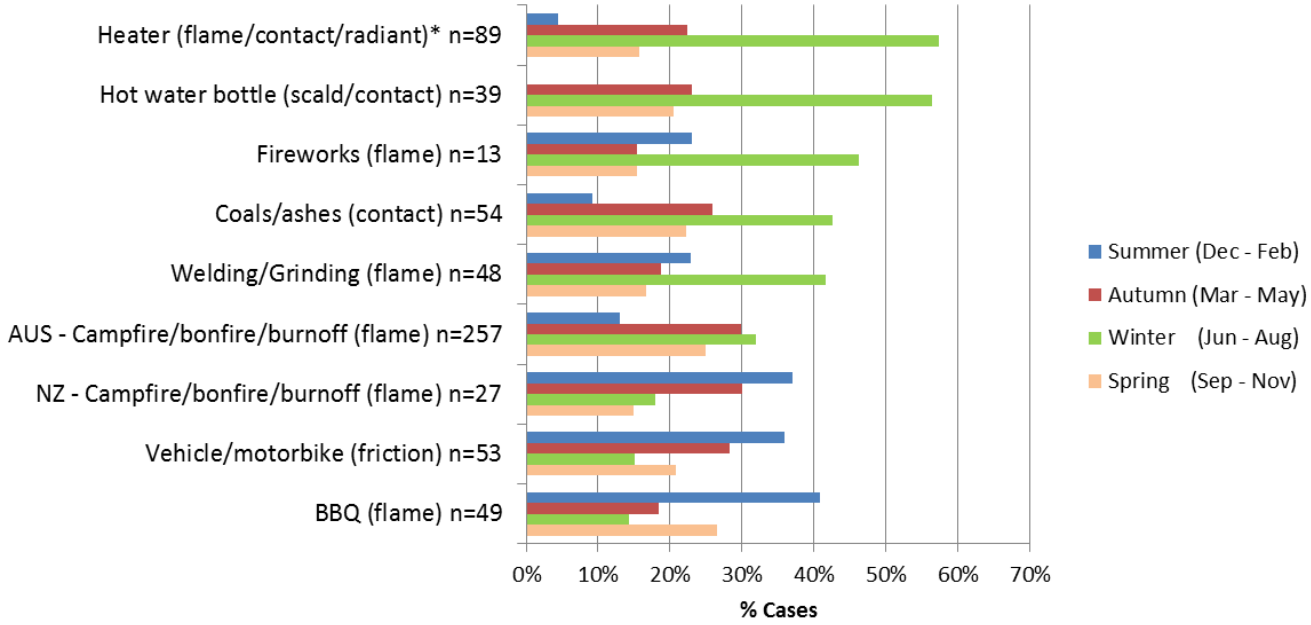
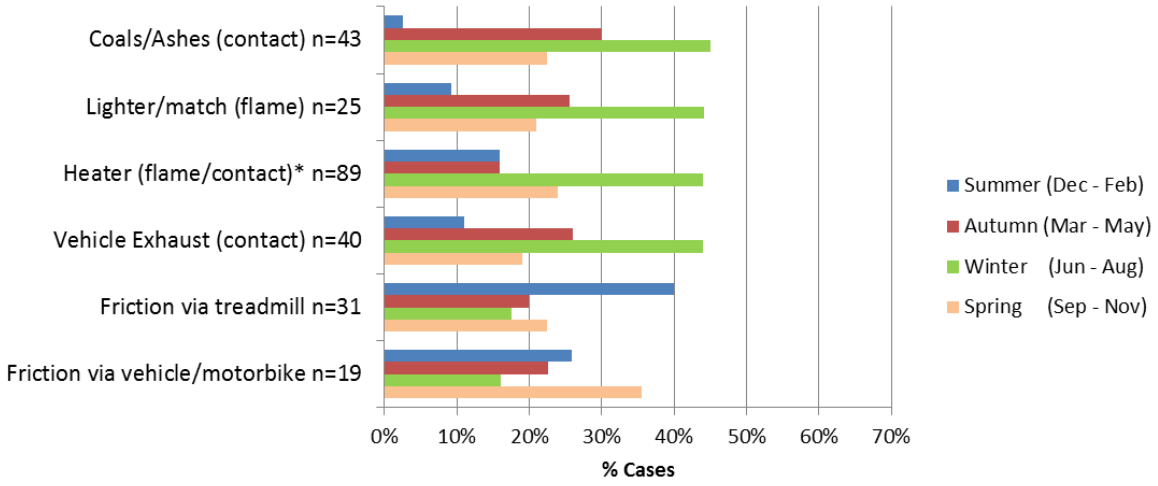


Figure 5b: Seasonal Trends by Paediatric Age Group



** "Heater" is inclusive of electric, wood, gas and any other heater types coded as 'heater'*

Intent, place and activity of injury

Most burn patients (94 per cent) sustain their injury during unintentional events. Consistent with the 2009-10 and 2010-11 reporting years, intentional self-harm accounted for three per cent of all cases. In 30 per cent of intentional self-harm cases, the burn size was greater than 10% TBSA. The remaining cases were assaults, an event of unspecified intent or adverse effects or complications of medical treatment.

The most common place of injury was the home for both paediatric (80 per cent) and adult cases (56 per cent) and this is consistent across the previous two years. The burn occurred in the kitchen for 46 per cent of paediatric cases and 32 per cent of adult cases. The living room, playroom or family room was the second most common place for paediatrics cases (20 per cent) and the garden/yard was for adult cases (25 per cent). The place of injury is summarised in Tables 5a and 5b and is consistent with the American NBR 2012 report, where 69 per cent of admissions occurred at home.

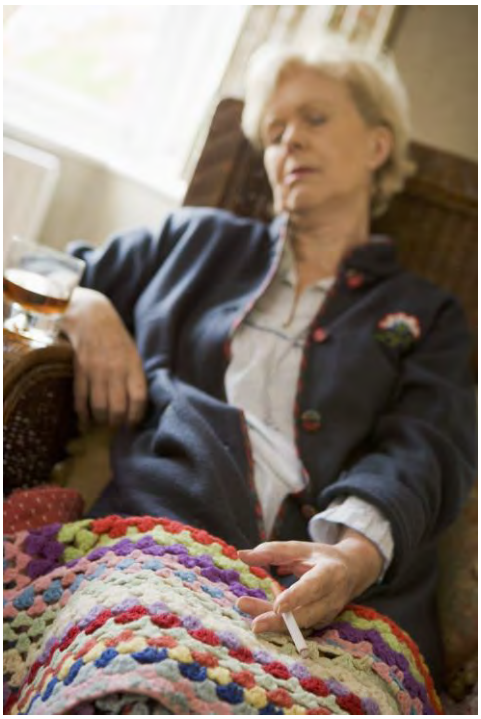


Table 5a: Place of injury – Paediatrics

Place of injury	N	%
Home	651	79.8
Place for recreation	47	5.8
Other residence (e.g. friend's house)	44	5.4
Street and highway	23	2.8
School, other institution and public administrative area	19	2.3
Farm	12	1.5
Trade and service area	10	1.2
Other specified place	*	0.6
Sports or athletics area	*	0.3
Industrial and construction area	*	0.3

* Denotes less than five cases

Table 5b: Place of injury – Adults

Place of injury	N	%
Home	1,049	56.5
Trade and service area	166	8.9
Place for recreation	139	7.5
Street and highway	137	7.4
Other residence (e.g. friend's house)	135	7.3
Industrial and construction area	103	5.5
Farm	46	2.5
School, other institution and public administrative area	26	1.4
Residential Institution	25	1.4
Other specified place	22	1.2
Sports or athletics area	10	0.5

Tables 6a and 6b outline common activities being performed at the time of injury for paediatric cases and adult cases (where > 5 cases). 'Playing' and 'near person preparing food or drink', were the most common activities at the time of injury for paediatric cases. Of the children two-years and younger who sustained a scald injury (n=313), nearly half of these cases occurred whilst near a person preparing food or drink (47 per cent). This is consistent with the previous two reporting years.

Consistent with the previous two years, participating in a leisure activity, cooking or preparing food, and working for income were the most common adult activities resulting in a burn injury.

Of the adults cases who were 'working for income' and there was a recorded activity at time of injury (n=266), nearly half (n=124, 47 per cent) occurred in the Trade and Service area, followed by the Industrial and Construction area (n=88, 33 per cent).

In the 20 to 29 years age group, the burn was more likely to occur during a leisure activity (44 per cent) and the place of injury was in the home or another person's residence (71 per cent). In the 60 years and over age group, the most common activity at the time of injury was cooking (27 per cent), and this is consistent with the 2010-11 report (31 per cent) but not with 2009-10 data which had reduced rates (19 per cent).

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

Activity at the time of injury	N	%
Playing	340	41.2
Near person cooking	193	23.4
Leisure activity (excluding sporting activity)	90	10.9
Cooking	43	5.2
Eating/drinking	33	4.0
Bathing	30	3.6
Other specified activities	26	3.2
Driving	22	2.7
Sleeping/resting	13	1.6
Other vital activities	11	1.3
Self-harming	5	0.6

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

Activity at the time of injury	N	%
Leisure activity (excluding sporting activity)	406	21.5
Cooking	390	20.7
Working for income	273	14.5
Sleeping/resting	147	7.8
Driving	101	5.4
Household maintenance	91	4.8
Vehicle maintenance	81	4.3
Self- harming	70	3.7
Other specified activities	61	3.2
Gardening	50	2.7
Bathing	44	2.3
Suspected illegal activity	38	2.0
Other vital activities	33	1.8
Eating/drinking	29	1.5
Cleaning	20	1.1
Playing	14	0.7
Other types of unpaid work	12	0.6
Near person cooking	12	0.6
Sports activity	11	0.6

Drug and/or alcohol involvement

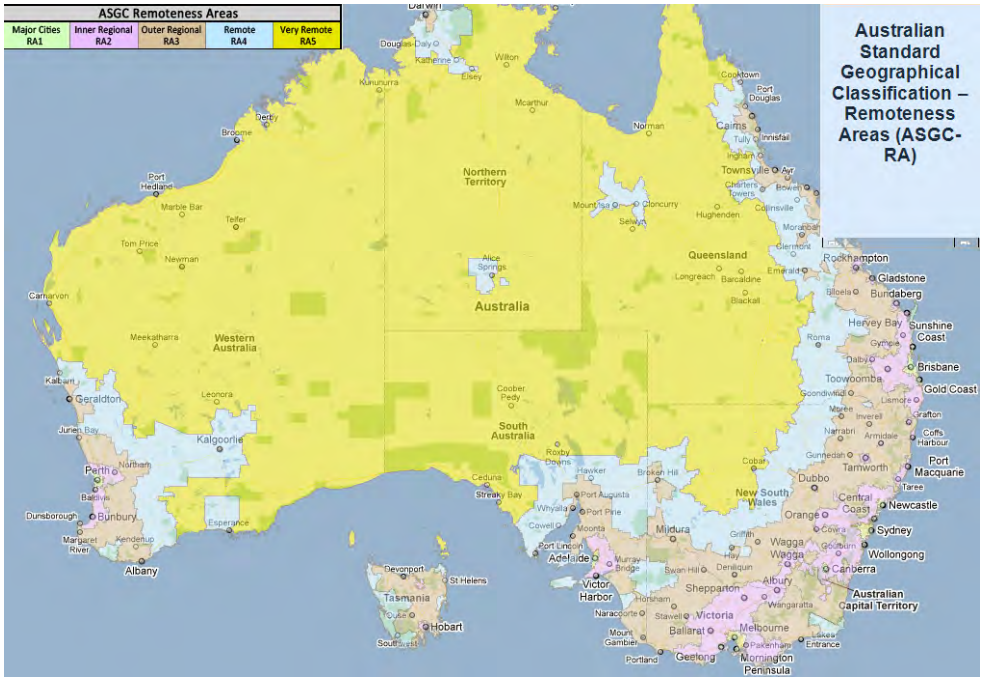
For the majority of cases (84 per cent), there was no documented suspicion of drug or alcohol involvement and this is consistent across the previous two years. Documented suspicion of alcohol involvement was recorded in 15 per cent of cases with drugs only (one per cent) and a combination of drugs and alcohol (one per cent) in less than two per cent of cases. Blood testing for alcohol or drug involvement is not routinely conducted for all burn patients and therefore the information captured is based on medical record documentation of suspicion of, or known, alcohol or drug involvement. Further work is required to clarify the definition of suspicion of alcohol or drug involvement. Whether there is under-reporting of drug or alcohol involvement in the medical record also requires further investigation.

Location of burn injury by region (Australian Sites)

Consistent with the 2010-2011 year, over half (57 per cent) of burns admissions to Australian units occurred in major cities according to the Australian Bureau of Statistic Classification of Remoteness [3] (Appendix 9). A further 34 per cent occurred in regional Australia and six per cent in remote areas. The rate of burn injury per 100,000 population is almost ten times more for very remote areas which comprise almost half indigenous Australians than in major cities. This means that nearly half of burn injuries occur outside cities where Burn Units are located and has implications for transport and pre-hospital care. Table 7 shows the total rate per 100,000 population, and the rate for non-indigenous and indigenous Australians. The indigenous population had three times the rate per 100,000 population of burn injury 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	9.8	13.4
Inner regional Australia	7.0	8.4	5.1
Outer regional Australia	25.6	32.7	36.6
Remote Australia	26.1	36.9	40.3
Very remote Australia	68.5	147.4	122.5
Total rate of injury	9.2	12.1	36.7



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Burn injury severity

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

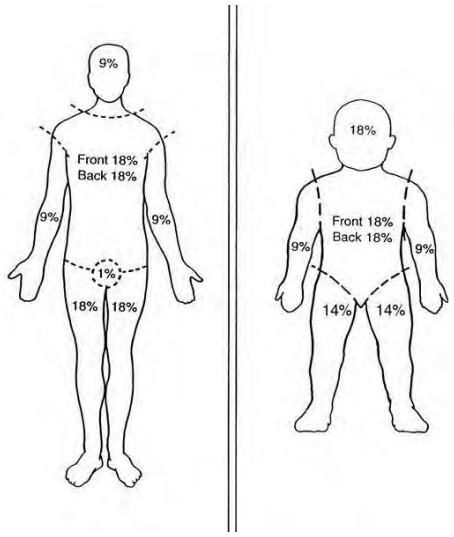
Total Burn Surface Area (% TBSA)

A burn of less than 10% TBSA was recorded for 82 per cent of adult and paediatric cases. This finding is consistent with the previous two years of Bi-NBR data (80 per cent). This also demonstrates that when compared to the American NBR where 70 per cent of burns in the USA were less than 10% TBSA, Australia has a lower percentage of major burn injury.

For paediatric patients, 87 per cent sustained a burn of less than 10% TBSA and fewer than two per cent sustained a burn greater than 20% TBSA. For adult patients, over three quarters (79 per cent) experienced a burn less than 10% TBSA, with just over eight percent sustaining a burn greater than 20% TBSA. Just under two per cent of adults sustained a burn involving 50 per cent or greater of their TBSA. Table 8 outlines the percentage TBSA for paediatrics and adults cases.

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

% TBSA group	Paediatrics		Adults	
	N	%	N	%
0-9%	699	86.6	1,485	79.4
10-19%	79	9.8	236	12.6
20-49%	21	2.6	117	6.3
≥ 50%	8	1	32	1.7
TOTAL	807	100	1,870	100



Rule of Nines – example of a burn assessment tool

Burn Depth

As described in the previous annual report, improvements in the Bi-NBR database from July 2010 allowed burn depth data to be more accurately recorded in the Bi-NBR and therefore used for analysis. A burn depth was recorded for 86 per cent of cases. A full thickness burn was recorded for 21 per cent (n=478) of cases. The percentage TBSA of the full thickness burn was documented for 88 per cent of these cases. Table 9 outlines the number of cases where the percentage TBSA full thickness burn was documented. The number of cases with coded full thickness burns over 10% TBSA (seven per cent) was the same as the 2010-2011 reporting year (seven per cent).

Table 9: Percentage of TBSA with full thickness burns

% Full Thickness TBSA	**N**	**%**
< 10 %full thickness	770	80.8
10-19%full thickness	94	9.9
20-49%full thickness	58	6.1
≥50% full thickness	31	3.3
Total	953	100

Inhalation injury

Inhalation injuries are complex and are suspected on the basis of a history of smoke exposure, clinical presentation and diagnostic investigations. Burns to the oropharynx and upper airway result in swelling and possible airway obstruction within the first few hours after injury. An inhalation injury is recorded if it is documented in the patient history. There is currently no agreed method across Bi-NBR sites for reporting of inhalation injuries given the challenges in recognising and diagnosing an inhalation injury, particularly in patients with less severe injuries or where the clinical consequences are delayed.

A documented inhalation injury was recorded for eight per cent of adult cases and just over one per cent of paediatric cases. Of the patients who died following their burn injury, 65 per cent had sustained an inhalation injury.

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 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 [4-6]. 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 [4, 5, 7, 8].

Consistent with the 2010-11 reporting year most of the paediatric cases (81 per cent) and 69 per cent of adult cases had documented burn cooling at the scene of the burn injury. Of these cases, cool running water was used in 90 per cent of adult cases and 88 per cent in paediatric cases.

Water was documented as being applied to the burn within three hours of injury in 98 per cent of cases which is the same as the 2010-11 reporting year. However, only 25 per cent of paediatric and 38 per cent of adult cases were cooled with water for more than 20 minutes.

The most common 'other' cooling techniques used at the scene of injury included; application of wet cloths such as towels, dressings and blankets and immersion in water where this was a bath, swimming pool, river, lake or the sea. Use of ice and ice packs, aloe vera, butter, and toothpaste were used in 12 per cent of cases that had burn cooling at the scene of injury however, are not recommended as effective or appropriate first aid for burn injury. Tables 11 and 12 outline 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		Adults	
	N	%	N	%
Cool running water applied	558 (n=632)	88.3	1,118 (n=1,242)	90.0
Within three hours of injury ** of cases where cool running water applied*	529 (n=536)	98.7	1,075 (n=1,093)	98.4

Table 12: Time of water application at the scene

Time of water application	Paediatrics		Adults	
	N	%	N	%
< 20 minutes	392	75.4	668	61.8
Greater than 20 minutes	128	24.6	413	38.2

What was the referral source to the burns unit?

Consistent with the previous two reporting periods (2009-10 and 2010-11), half of both the paediatric and adult cases were referred to the burns unit from another hospital. For paediatric cases, 18 per cent were directly transported from the scene of injury via ambulance to the burns unit consistent with the 2010-2011. For adult cases, 25 per cent of cases were directly transported from the scene of injury via ambulance consistent with 2010-11.

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 a Bi-NBR hospital 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 in some states. 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 Bi-NBR hospital, identify if pre Burn Unit care was appropriate and monitor outcomes of care where there have been transfer delays.

Figure 6: Time from injury to admission

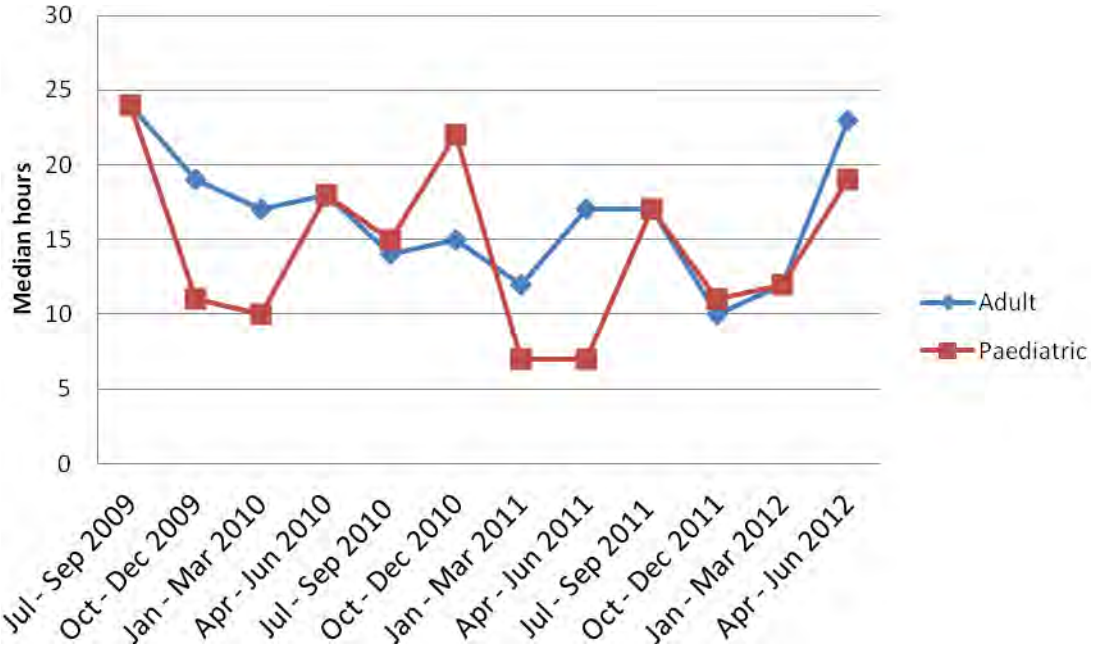


Figure 6 shows the median time from injury to admission for paediatric and adult cases. The median (IQR) time from injury to admission to the Bi-NBR hospital was 16 (4-144) hours for paediatric cases which was higher than the 2010-11 reporting year (9 (2-143) hours). For adult cases the median (IQR) time from injury to admission was 16 (4-107) hours, compared to 14 (4-90) for the previous year.

The initial treatment of a burn patient is critical for reducing the risk of complications, poor long term outcomes and mortality. ANZBA advocate that referring hospitals consult with the Burn Unit as soon as possible to assist with the initial treatment plan and in triaging the patients requiring transfer. A burn size greater than 15% TBSA in adult cases and greater than 10% TBSA in paediatric cases are considered major burns by ANZBA requiring escalation of care. In adult cases with a burn size greater than 15% TBSA and who were referred from another hospital, the referring hospital made contact with the Burn Unit within one hour of injury in 60 per cent of cases. For paediatric cases with a burn size greater than 10% TBSA, contact was made within one hour in 25 per cent of cases which has increased from 15 per cent in 2010-11.

For 50 per cent of patients transferred from another hospital, the reason for the delay in transfer was considered as a result of the geographical distance of the burn injury from the Burn Unit. For 24 per cent of cases, the delay was attributed to transport issues and for 16 per cent of cases as a result of the patient not presenting to the referral hospital in a timely manner.

For adult cases transferred from the scene of injury to the Burn Unit with a burn size greater than 15% TBSA (n=76), 70 per cent were received at the Bi-NBR hospital within two hours of injury with only five cases transported greater than ten hours of injury. In paediatric cases with a burn size greater than 10% TBSA (n=22), 73 per cent were received at the Bi-NBR hospital within two hours of injury with all twenty -two cases transferred greater than 10 hours of injury.

Burn unit performance

The following section outlines Burn Unit 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.

In 65 per cent of paediatric cases, and 70 per cent of adult cases, their definitive burn wound assessment was 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 44 per cent of cases, followed by the burn care nurse coordinator/or nurse practitioner (21 per cent), and 'other' clinicians (12 per cent). For adult cases, the burn registrar documented the burn wound assessment for 32 per cent of cases followed by the burn care nurse coordinator/or nurse practitioner (14 per cent) and the burn fellow (12 per cent).

Senior Burns Clinician assessment

It is common practice that more serious burns are assessed and managed by a senior burn clinician. A senior burns clinician is defined as a Head of Unit or at least one surgeon with a minimum of two years' experience in a major burn unit with Emergency Management of Severe Burns (EMSB) certification, or a Burns Nurse Practitioner with EMSB certification.

For paediatric patients with major burns (greater than 10% TBSA), a senior burn clinician assessment was documented in 87 per cent of cases, compared to 79 per cent of cases in the 2010-11 year. This assessment was documented to have occurred within 24 hours of admission for 67 per cent of paediatric cases which is consistent with the 2010-11 reporting year (69 per cent).

For adult cases with major burns (greater than 15% TBSA), a senior burn clinician assessment was documented in 55 per cent of cases. This assessment occurred within 24 hours of admission for 50 per cent of adult cases which was lower than the 2010-11 reporting year (75 per cent).

Theatre for burn wound excision

For the 2010-11 year, 70 cent of paediatric cases underwent a burn wound management procedure in theatre consistent with the 2010-2011 reporting year (65 per cent). For adult cases, 75 per cent underwent a burn wound management procedure compared to 71 per cent in 2010-11. Improvements to the database from July 1st 2010 enabled burn wound management procedures to be captured in more detail. The date of first time to surgery for each burn wound management procedure will enable greater understanding of the complexity of the surgical requirements for burn patients and key quality of care information such as the time from injury to surgery.

Table 13 outlines the percentage of procedures conducted for paediatric and adult cases. One case may have multiple procedures recorded; therefore percentages are reflective of total procedures and not procedures per case. The other procedures were predominately primary wound closure, free flaps and application of dressing such as vac dressings.

Table 13: Percentage of burn wound management procedures

Procedure	Paediatrics cases		Adult cases	
	N	%	N	%
Debridement and skin grafting	319	54	970	69
Debridement and temporary skin closure product e.g. Biobrane™	131	22	306	22
Debridement only	109	18	362	26
Debridement and skin cell product (e.g. CEA)	135	10	135	10
Debridement and dermal reconstructive product e.g. Integra™	6	1	4	0.3
Total	700		1840	
Other procedures not outlined above				
Dressing change in theatre only	85	71	31	33
Other	24	20	32	34
Escharotomy	10	8	19	20
Amputation	0		5	5
Fasciotomy	0		*	3
Escharotomy and Fasciotomy	0		*	2
Escharotomy, Fasciotomy and Amputation	0		*	1
Total	119		82	

Burn wound debridement and skin grafting was completed for 54 per cent of paediatric cases and 69 per cent of adult cases. For cases where a full thickness burn was coded, 83 per cent of paediatric case and 84 per cent of adult cases underwent debridement and grafting. The median time to grafting from injury was 6 (4-10) days for paediatric cases and 6 (3-10) days for adult cases that were not transferred between Bi-NBR hospitals. For adult cases transferred between Bi-NBR hospitals the median time to grafting from injury was twice as long at 12 (6-18) days.

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 [9-11]. Dedicated allied health burn clinicians are responsible for assessing burns patients and commencing rehabilitation as early as possible.

Of the paediatric patients with greater than 10% TBSA and stayed in hospital for more than 24 hours (n=73), 85 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 15% TBSA (n=197) and stayed in hospital for more than 24 hours, 84 per cent had documentation of a physical functioning assessment within 48 hours of admission.

Enteral / parenteral feeding

Burn injury increases the body's metabolic requirements. The provision of an adequate supply of nutrients as close to the time of the burn injury is considered crucial in reducing the effects of metabolic abnormalities [10, 12-14].

Of the paediatric cases with a burn greater than 10% TBSA (n=78), supplementary feeding (either enteral or parenteral) was documented as commencing within 24 hours of admission for 72 per cent of patients. For adult cases with a burn greater than 20% TBSA (n=130), supplementary feeding was documented as commencing within 24 hours for 55 per cent of patients. This demonstrates a reduction of 15 per cent in the rate of early supplementary feeding when compared to the 2010-11 report.

In-hospital outcomes of burn injury

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

ICU admissions

Critical care management and mechanical ventilation may be required after burn injury [15, 16]. An ICU admission was required for 5 per cent of paediatric cases and 15 per cent of adult cases which is consistent with the 2010-11 reporting year. Of paediatric cases with a burn of greater than 10% TBSA, an ICU admission was required for 38 per cent of cases. For adult cases with a burn size greater than 15%, an ICU admission was required for 59 per cent of cases. The median (range) length of stay in ICU was 86 (19-293) hours for paediatric cases compared to 54 (21-235) in the 2010–11 reporting period. For adult cases the median hours (IQR) was 50 (24-177) compared to 67 (31-192) in 2010-11. The majority of patients (89 per cent) with a documented inhalation injury were admitted to ICU. The median (IQR) ICU length of stay increased for cases where an inhalation injury was documented to 141 (94-576) hours for paediatric cases and 77 (38–257) hours for adult cases.

The median (IQR) hours of ventilation for cases admitted to ICU was 13 (0-91) for paediatric cases and 22 (1-77) for adult cases. This was lower for both paediatric and adult cases than in the 2010-2011 reporting period. The percentage of cases admitted to ICU with burns greater than 10% TBSA was consistent with the 2010-11 reporting year with paediatric (67 per cent) and adult cases (59 per cent) compared to the 2010-11 reporting period (paediatric 73 per cent, adult 59 per cent).

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 [17-20]. The estimated glomerular filtration rate (eGFR) is a quantifiable measure of acute renal failure. A negative change of >30 ml/min/1.73m2 of estimated GFR (eGFR) within 72 hours of admission indicates renal impairment.

Of the paediatric cases admitted to ICU, where eGFR was routinely measured (15 per cent), one case (14 per cent) were identified as having a negative change of >30 ml/min/1.73m2 and possible issues with initial fluid resuscitation. For adult cases admitted to ICU, the eGFR was routinely collected for 79 per cent. Of these, six cases (3 per cent) were identified as having a negative change of >30 ml/min/1.73m2 of estimated GFR (eGFR) within 72 hours.

Blood cultures

Bloodstream infections increase the risk of complications and mortality in burn injured patients [21, 22]. A blood culture was collected during the inpatient stay in 25 per cent of adult cases (n=484) and 39 per cent of paediatric cases (n=326). This rate of blood culture collection is comparable to Year 2 where a blood culture was taken in 24 per cent of adults (n=410) and 35 per cent of paediatric cases (n=274). The likelihood of blood culture collection also significantly increased with burns greater than 20% TBSA with 63 per cent of adults and 75 per cent of paediatric cases having a blood culture taken.

Seven per cent of adult cases (n=34) had a positive blood culture and this was comparable to Year 2 (n=35, 9%). For paediatric cases, 23 per cent had a positive blood culture (n=76) which is an increase compared to Year 2 (n=36, 13%) however not all paediatric sites were contributing to the registry in Year 2 compared to Year 3 and further data analysis is required.

Wound swabs on admission are not routinely performed at all sites (see Structural Indicators Appendix 7). Of the cases with a positive blood culture and wound swabs were taken on admission (adults n=33, paediatrics n=71), 14 (42 per cent) adult cases and 41 (58 per cent) had positive wound swab on admission. Most of these returned a positive screening swab for staphylococcus forms.

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 and rehabilitation outcomes. Extended length of stay can be associated with weight loss and associated poorer outcomes [10, 13, 23].

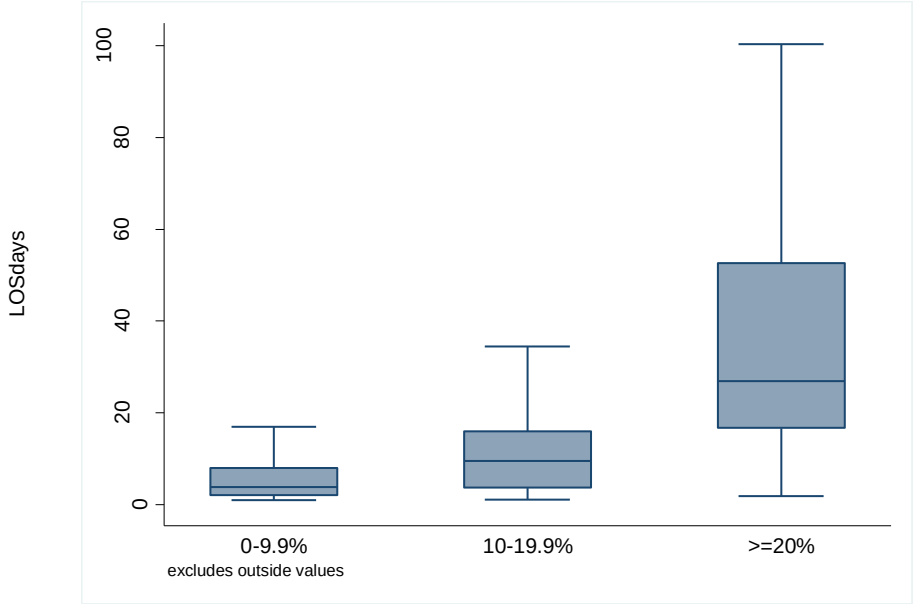
Of the paediatric patients with a length of stay greater than two weeks (nine per cent), 81 per cent had their weight measured and documented within three to five days of admission, and 59 per cent had a weekly weight documented during their admission. Weight loss was recorded for six paediatric patients.

For adult cases with a length of stay greater than two weeks (17 per cent), 81 per cent had their weight measured and documented within three to five days of admission. A weekly weigh was conducted and documented for 57 per cent of these patients. Weight loss was recorded in 24 (29 per cent) cases.

Length of stay

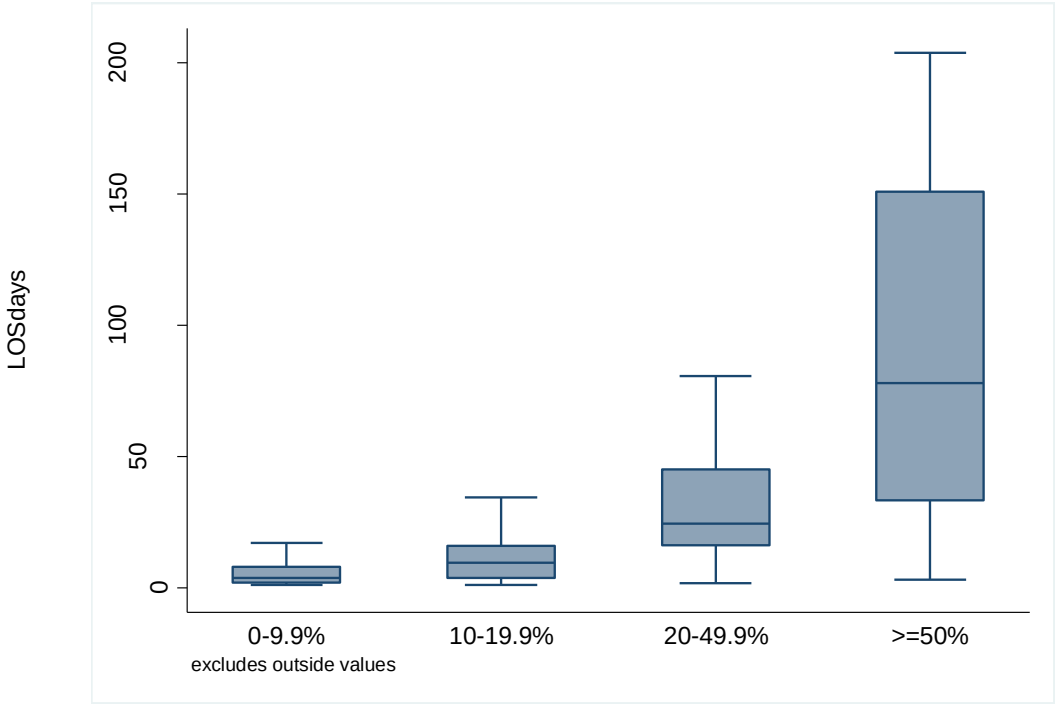
The length of admission can be associated with increased risk of complications and can impact on the outcomes for burn patients [24]. The length of stay for the Bi-NBR analysis excludes cases that did not survive to discharge or where the LOS was less than 24 hours. Consistent with the 2010-11 reporting years, the median (IQR) length of stay (LOS) for paediatric patients was five (2-10) days. Figure 7a shows the distribution of LOS by percentage TBSA grouping for paediatric patients.

Figure 7a: Distribution of the length of stay by percentage TBSA – Paediatric cases (excluding deaths)



The median (IQR) LOS for adult cases was seven (3-13) days which is consistent with 2010-11. Figure 7b shows the distribution of hospital 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 American NBR recorded an average length of stay of eight days for both female and male cases in the 2012 report. The average length of stay across the Bi-NBR population was 11 days.

Figure 7b: Distribution of length of stay by percentage TBSA – Adults (excluding deaths)



Deaths

Overall, 32 (one per cent) patients died before hospital discharge. This in-hospital death rate was lower than the reported American NBR death rate of three per cent for males and females.

As would be expected, the likelihood of death increased with burn size. The death rate was 0.3 per cent for cases with a TBSA less than 10 per cent. The death rate increased to two per cent in cases with a TBSA between 10 and 49 per cent, and 38 per cent in cases with a TBSA greater than 50 per cent.

Of the patients who died, an inhalation injury was present in 21 (66 per cent) cases. A reason for death was recorded for 91 per cent of cases with burn shock (n=10) and multi-system organ failure (n=8) the most common reason for death.

Discharge status

The majority of patients (86 per cent) were discharged to their usual residence (Table 14). There are different practices in terms of discharge planning across the burn centres including 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	N	%
Usual residence/ home	2,371	86
Hospital in the Home	110	3.9
Other	63	2.3
Other acute hospitals	55	1.9
Inpatient Rehabilitation	40	1.4
Died	32	1.1
Another Bi-NBR Hospital	26	0.9
Left against medical advice/ own risk	24	0.8
Other healthcare accommodation, unless usual place of residence	24	0.8
Psychiatric hospital	13	0.5
Statistical discharge	10	0.4

Readmissions

Eighty eight paediatric cases (10 per cent) were readmitted within 28 days of discharge which is lower than the 2010 -2011 (139, 18 per cent). The majority (74 per cent) were 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.

Consistent with 2010-2011, the readmission rate was less for adults where only 102 (five per cent) cases recorded a readmission. In contrast to paediatric cases sixty three per cent of these cases were reported as 'unplanned' readmissions for reasons such as a non-healing wound or wound infection. 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 readmissions for acute burn management procedures. This outcome quality indicator was developed to identify cases where the readmission was unplanned or as a result of an unexpected complication. It is hoped that poor outcomes in terms of readmission may be able to be linked to processes of care which can be improved 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 compare 2011-12 data with 2009-2010 data in this report.
- Reporting against the clinical quality indicators 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.
- 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.

Conclusion

The overall goal of the Bi-NBR as a clinical quality registry is to identify variation in care and relate that to outcomes using risk adjustment to ensure correct comparisons. This information will then inform quality improvement projects that will result in improved consistency of delivery of evidence based care in specialist Burn Units in Australia and New Zealand.

Data are presented for 2772 burn cases admitted to 14 of the 17 designated Burn Units across both Australia and New Zealand for the 12-month period July 2011 to June 2012. Data completeness is 95 to 100 per cent for most core data items including the patient, burn event, admission, percentage TBSA, ICU and discharge details.

Descriptive statistics were performed for the majority of data elements. Comparable to the 2009 -2010 and 2010 -2011 reporting periods, 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 initiatives should be targeted at these age groups and burn causes.

Cool running water was documented as being applied within three hours of injury for 90 per cent of all cases that received burn cooling at the scene of injury. Where an injury requiring admission to a Burn 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 was comparable to the 2009-2010 and 2010-2011 reporting periods and suggests similarities in patient age, sex, burn cause, and place of injury with that reported in the American Burn Association, NBR.

While quality of care data is presented in this report, comparisons against an acceptable standard of performance and between units are not currently performed. Further work on the quality indicators and development of procedures for accurate and appropriate benchmarking is required. 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.

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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 [25].
Burn Injury classifications [25]	• 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 [26].
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 % TBSA 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 [10].

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.'* [27] 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 [28].
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 [25].
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 [29].
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% of their TBSA [25].

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. The data item will be expressed as a percentage of the total number of cases, or as percentage of the subset population if the data item is conditional on the response of another data item. For example, completeness of ICU data is only applicable to the patients who attended ICU.

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	2779 (100%)	-	2779 (100%)
Date of Injury	2779 (100%)	-	2779 (100%)
Time of Injury	2400 (86.4%)	379 (13.6%)	2779 (100%)
Gender	2779 (100%)	-	2779 (100%)
Ethnicity or Country of Birth	2718 (97.8%)	61 (2.2%)	2779 (100%)
Residential Postcode	2539 (91.4%)	240 (8.6%)	2779 (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	2779 (100%)	-	2779 (100%)
Time of Admission	2754 (99.1%)	25 (0.8%)	2779 (100%)
Fund	2774 (99.8%)	5 (0.2%)	2779 (100%)
Admission Type	2779 (100%)	-	2779 (100%)
Referral Source	2779 (100%)	-	2779 (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	2771 (99.7%)	8 (0.3%)	2779 (100%)
Accelerant	2758 (99.2%)	21 (0.8%)	2779 (100%)
Accelerant Type	628 (99.7%)	2 (0.3%)	630 (100%)
Explosion/Flash	2750 (99.0%)	29 (1.0%)	2779 (100%)
Activity when injured	2717 (97.8%)	62 (2.2%)	2779 (100%)
Place of injury	2680 (96.4%)	99 (3.6%)	2779 (100%)
Intent of injury	2767 (99.6%)	12 (0.4%)	2779 (100%)
Event Description	2779 (100%)	-	2779 (100%)
Event Postcode	2586 (93.1%)	193 (6.9%)	2779 (100%)
Drug/Alcohol Involvement	2459 (88.5%)	320 (11.5%)	2779 (100%)
Inhalation Injury	2779 (100%)	-	2779 (100%)
Transfer Delay - Geographical	2293 (99.3%)	17 (0.7%)	2310 (100%)
Transfer Delay - Patient Initiated	2281 (98.7%)	29 (1.3%)	2310 (100%)
Transfer Delay - Transport-related	2274 (98.4%)	36 (1.5%)	2310 (100%)
Transfer Delay – ED/OP managed	2288 (99.0%)	22 (1.0%)	2310 (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	2616 (94.1%)	163 (5.9%)	2779 (100%)
Cool Running Water	1877 (99.1%)	18 (0.9%)	1895 (100%)
Water Mins	1603 (95.5%)	76 (0.5%)	1679 (100%)
Water Hours	1631 (97.1%)	48 (2.9%)	1679 (100%)
Hydrogel	1875 (98.9%)	20 (1.1%)	1895 (100%)
Other Cooling Techniques	1895 (100%)	-	1895 (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	2644 (95.1%)	135 (4.9%)	2779 (100%)
Superficial	2292 (94.0%)	352	2644 (100%)
Mid dermal	2299 (87.0%)	345	2644 (100%)
Deep dermal	2299 (87.0%)	345	2644 (100%)
Full thickness	2297 (86.9%)	347	2644 (100%)
Assessed By	2632 (94.7%)	147 (5.3%)	2644 (100%)
Assessed Date/Time	2649 (95.3%)	130 (4.7%)	2644 (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	2760 (99.3%)	19 (0.7%)	2779 (100%)
Surgeon Assessment Date	1406 (99.2%)	9 (0.8%)	1417 (100%)
Surgeon Assessment Time	1362 (96.1%)	55 (3.9%)	1417 (100%)
Physical Functioning Assessment	277 (97.5%)	7 (2.5%)	284 (100%)
Enteral /Parenteral Feeding	210 (99.5%)	1 (0.5%)	211 (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	2775 (99.9%)	4 (0.1%)	2779 (100%)
ICU Stay	334 (100%)	-	334 (100%)
ICU Readmission	333 (99.7%)	1 (0.3%)	334 (100%)
Ventilation Hours	316 (94.6%)	18 (5.4%)	334 (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) • Not collected for this patient • Not collected at this site	235 (92.2%) 41 cases 37 cases	20 (7.8%)	255 (100%)
Blood Cultures • Not collected for this patient	815 (96.7%) 1932 cases	28 (0.3%)	843 (100%)
Positive Swab on Admission • Not collected for this patient • Not applicable (* see note)	104 (99.0%) 6 cases 2,646 cases	1 (1.0%)	105 (100%)

The renal impairment quality indicator is relevant to ICU patients only. 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.

**Note: Commencing December 2012, the 'positive swab on admission' question changed to a mandatory data item, whereas during this reporting period it was only triggered if the patient had a positive blood*

culture during the admission. 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	2769 (99.6%)	10 (0.4%)	2779 (100%)
Death Cause	29 (90.6%)	3 (9.4%)	32 (100%)
Decision	27 (84.4%)	5 (15.6%)	32 (100%)
Decision Date	32 (100%)	-	32 (100%)
Discharge Date	2773 (99.8%)	6 (0.2%)	2779 (100%)
Discharge Time	2728 (98.2%)	51 (1.8%)	2779 (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	440 (91.3%)	42 (8.7%)	482 (100%)
• Not collected at this site	3 cases		
Weight Weekly	429 (89.2%)	39 (9.1%)	481 (100%)
• Not collected at this site	4 cases		
Weight Loss	113 (70.2%)	48 (29.8%)	161 (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 count $\geq$ 1			2141 (77%)
Procedures count $\geq$ 1			2043 (73%)

ICD-10 diagnoses and procedures data were received predominantly in electronic format from hospital administrative systems. There was at least one diagnoses recorded for 77 per cent of cases and one procedure code recorded for 73 per cent of cases. A procedure code is only recorded if a procedure occurs during the inpatient stay.

Appendix 2: Management Committee membership

Belinda Gabbe	Monash University, DEPM	Bi-NBR Project Supervisor, Senior Research Fellow
Natalie Picton	Monash University, DEPM	Bi-NBR Project Coordinator
Mimi Morgan	Monash University, DEPM	Research Program Manager, Critical Care Division
Ian Loh	Monash University, DEPM	Master of Surgery Student

** Paul Jennings (Research Fellow, Critical Care Division) and Dina Watterson (Project Manager) were members during reporting period*

Appendix 3: Reference & Steering Committee membership

NAME	SITE	TITLE	Steering Committee	Reference Committee
Peter Cameron	Monash	Chief Investigator (Project Lead)	✓	
Belinda Gabbe	Monash	Chief Investigator (Project Supervisor)	✓	✓
Natalie Picton	Monash	Project Coordinator	✓	✓
Dina Watterson	Monash	Project Officer	✓	✓
Ian Loh	Monash	Master of Surgery student		✓
Heather Cleland	VIC, Alfred	Head of Burns Unit / Acting Chair SC	✓	
Yvonne Singer	VIC, Alfred	Victorian State Burns Education Program Coordinator	✓	✓
Kathy Bicknell	VIC, RCH	Burns Co-ordinator	✓	✓
Michael Rudd	QLD, RBWH	Head of Burns Unit	✓	
Teresa Matthews	QLD, RBWH	Database Manager		✓
Roy Kimble	QLD, RCH	Head of Burns Unit	✓	
Lauren Harvey	QLD, RCH	Database Manager (mat leave Oct 12)		✓
James Scott	NSW, Concord	Clinical Nurse Specialist		✓
John Harvey	NSW, CH Westmead	Head of Burns Unit	✓	
Siobhan Connolly	NSW, SBIS	Burns Prevention & Education Officer		✓
Anne Darton	NSW, SBIS	Program Manager	✓	✓
Mihaela Lefter	TAS, Royal Hobart	Head of Burns Unit	✓	
Rebecca Schrale	TAS, Royal Hobart	Clinical Nurse Consultant, Burns	✓	✓
Sheila Kavanagh	SA, RAH	Clinical Nurse Consultant (ANZBA President)	✓	
Sally-Anne McRae	SA, RAH	Burns Nurse		✓
Darren Nesbitt	SA, RAH	Burns Nurse		✓
Kathryn Heath	SA, RAH	Allied Health Project Manager, Burns SA/ Senior Dietitian, Surgical Specialities		✓
Linda Quinn	SA, WCH	Burns - Advanced Clinical Practice Consultant	✓	
Fiona Wood	WA, RPH	Head of Burns Unit	✓	

NAME	SITE	TITLE	Steering Committee	Reference Committee
Dale Edgar	WA, RPH	Senior Physiotherapist / McComb Clinical Research Manager (Past ANZBA President)	✓	
Joy Fong	WA, RPH	Clinical Nurse Consultant		✓
Tania McWilliams	WA, Princess Margaret	Clinical Development Nurse		✓
Lisa Martin	WA, Princess Margaret	Clinical Research Nurse, McComb Foundation		✓
Alison Mustapha	NT, Royal Darwin	CNC Outpatient Burn Service	✓	✓
Margaret Brennan	NT, Royal Darwin	CNC Inpatient Burn Service	✓	✓
Tracey Perrett	NZ	National Burn Service Coordinator	✓	✓
Richard Wong She	NZ, Middlemore	Head of Burns Unit	✓	
Margaret Conaglen	NZ, Christchurch	Nurse Educator		✓
Hilary Neighbours	NZ, Hutt Valley	Associate Clinical Nurse Manager		✓
Deb Bates	Julian Burton Burns Trust	Manager, Projects and Programs	✓	

Previous Members (during reporting period)

Rochelle Kurmis	SA, RAH	Allied Health Project Manager, Burns SA/ Senior Dietitian, Surgical Specialities	✓	
Prof Peter Maitz	NSW, Concord	Head of Burns Unit	✓	
Belinda Wallis	QLD, RCH	Burns Prevention Researcher – RCH Burns and Trauma Research Group	✓	✓
Paul Jennings	Monash	Researcher	✓	✓
Jan Diwell	NT, Royal Darwin	CNC Inpatient Burn Service	✓	✓
Cynthia Banham		Consumer Representative	✓	

Appendix 4: Bi-NBR Data Collectors

NAME	STATE	SITE	TITLE
Helen Donaldson	VIC	Alfred	Burn Registry Nurse
Kathy Bicknell	VIC	Royal Children's	Burns CNC
TBA	QLD	Royal Children's	
TBA	QLD	Royal Brisbane & Women's	
James Scott	NSW	Concord	Burns CNS
Jackie Maitland	NSW	Royal North Shore	Burns receptionist
Anne Laguthaas	NSW	Westmead Children's	Data entry clerk
Rebecca Schrale	TAS	Royal Hobart	Burns CNC
TBA	TAS	Royal Hobart	Data entry clerk
Sally-Anne McRae	SA	Royal Adelaide	Burns Nurse
Darren Nesbitt	SA	Royal Adelaide	Burns Nurse
Lois Robinson	SA	Women's & Children's	Data entry clerk
Joy Fong	WA	Royal Perth	Burns CNC
Penelope Cox	WA	Royal Perth	Burns Nurse
Lisa Martin	WA	Princess Margaret	Research Nurse
Alison Mustapha	NT	Royal Darwin	Burns CNC OP
Margaret Brennan	NT	Royal Darwin	Burns CNC IP
Colin Picton	NT	Royal Darwin	Burns Nurse
Megan Hook	NT	Royal Darwin	Burns Nurse
Margaret Conaglen	NZ	Christchurch	Nurse Educator
Mandy Arnett	NZ	Christchurch	Ward Clerk
Hilary Neighbours	NZ	Hutt Valley	ACN Manager
Anne-Marie Yaxley	NZ	Hutt Valley	Burns Nurse
Stacey Bell	NZ	Hutt Valley	Paediatric Nurse

NAME	STATE	SITE	TITLE
Lynne Walker	NZ	Waikato	CNS
Krystal Chaffe	NZ	Middlemore	Burns Nurse
Supra Pebberti	NZ	Middlemore	Ward Clerk

Appendix 5: Bi-NBR 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 obtained from Monash University Human Research Ethics Committee.

Approval for burns data collection has also been actively sought from all Bi-NBR hospitals. Sixteen of the 17 burns units have ethics approval to submit data to the Bi-NBR and the remaining site (Royal Brisbane & Women's QLD) is in the process of obtaining approval. For this reporting period, 15 sites contributed data (Table 15). Of these sites, five sites treat paediatric patients only, five sites treat adult patients only and five sites treat both paediatric and adult patients.

Table 15: Australian and New Zealand Bi-NBR Hospitals with Ethics Approval

Hospital	State/Country	Adults/Paediatrics
The Alfred	Victoria	Adults
Royal Children's	Victoria	Paediatrics
Princess Margaret	Western Australia	Paediatrics
Royal Perth	Western Australia	Adults
Royal North Shore[1]	New South Wales	Adults
Concord General Repatriation[1]	New South Wales	Adults
Children's Hospital Westmead[1]	New South Wales	Paediatrics
Women & Children's	South Australia	Paediatrics
Royal Adelaide	South Australia	Adults
Royal Children's	Queensland	Paediatrics
Royal Hobart	Tasmania	Adult/Paediatrics
Royal Darwin	Northern Territory	Adult/Paediatrics
Middlemore[2]	Auckland, NZ	Adults/Paediatrics
Christchurch[2]	Christchurch, NZ	Adult/Paediatrics
Waikato[2]	Hamilton, NZ	Adult/Paediatrics
Hutt[2]	Wellington, NZ	Adult/Paediatrics

[1] *NSW burns units form the NSW Statewide Burn Injury Service (SBIS).*

[2] *The National Burn Centre (NBC) at Middlemore hospital and the Regional Burn Units (Christchurch, Waikato, Hutt) form the National Burn Service (NBS) for New Zealand.*

Appendix 6: Australia and New Zealand burns websites

Hospital/Unit/Service		Website
The Alfred Hospital	VIC	http://www.alfredhealth.org.au/burns_unit/
Royal Children's Hospital	VIC	http://www.rch.org.au/burns/clinical_information/
Victorian Burns Unit	VIC	http://www.vicburns.org.au
Princess Margaret Hospital	WA	http://www.pmh.health.wa.gov.au/general/about_us/
Royal Perth Hospital	WA	http://www.rph.wa.gov.au/Burns_Department/
Royal North Shore Hospital	NSW	http://www.nslhd.health.nsw.gov.au/NSHLD_Hospitals/rns.html
Concord General Repatriation Hospital	NSW	http://www.slhd.nsw.gov.au/Concord/
Children's Hospital Westmead Hospital	NSW	http://www.chw.edu.au/prof/services/burns_unit/
NSW Statewide Burn Injury Service	NSW	www.aci.health.nsw.gov.au/networks/burn-injury
Women & Children's Hospital	SA	http://www.wch.sa.gov.au/services/az/divisions/psurg/burns/
Royal Adelaide Hospital	SA	http://www.rah.sa.gov.au/burns/
Royal Children's Hospital	QLD	http://www.qcmri.org.au/Research/Burns,TraumaandtheCriticallyIll/CentreforChildrensBurnsandTraumaResearch.aspx
Royal Brisbane & Women's Hospital	QLD	http://www.health.qld.gov.au/rbwh/services/burns.asp
Royal Hobart Hospital	TAS	http://www.dhhs.tas.gov.au/service_information/services_files/RHH
Royal Darwin Hospital	NT	http://www.health.nt.gov.au/Hospitals/Royal_Darwin_Hospital/
Middlemore Hospital	NZ	http://www.nationalburnservice.co.nz/
Christchurch Hospital	NZ	http://www.cdhb.govt.nz/nursing/surgical/ward20.htm
Waikato Hospital	NZ	http://www.waikatodhb.govt.nz
Hutt Hospital	NZ	http://www.huttvalleydhb.org.nz

Appendix 7: 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. Data was received from 15 of the 17 sites (88 per cent response rate) and the questions required a yes/no response only.

STRUCTURAL QUALITY INDICATORS	Total	Yes (n)	Yes (%)
1. Is a Burns Surgeon available on call 24 hours?	15	11	73%
2. Is a Burns theatre available on a 24 hour basis?	15	11	73%
3. Is Multidisciplinary care provided within the burns unit?	15	15	100%
• Are weekly multidisciplinary team meetings conducted in the burns unit?	15	15	100%
4. Does your unit routinely complete infection surveillance swabs on admission?	15	7	47%

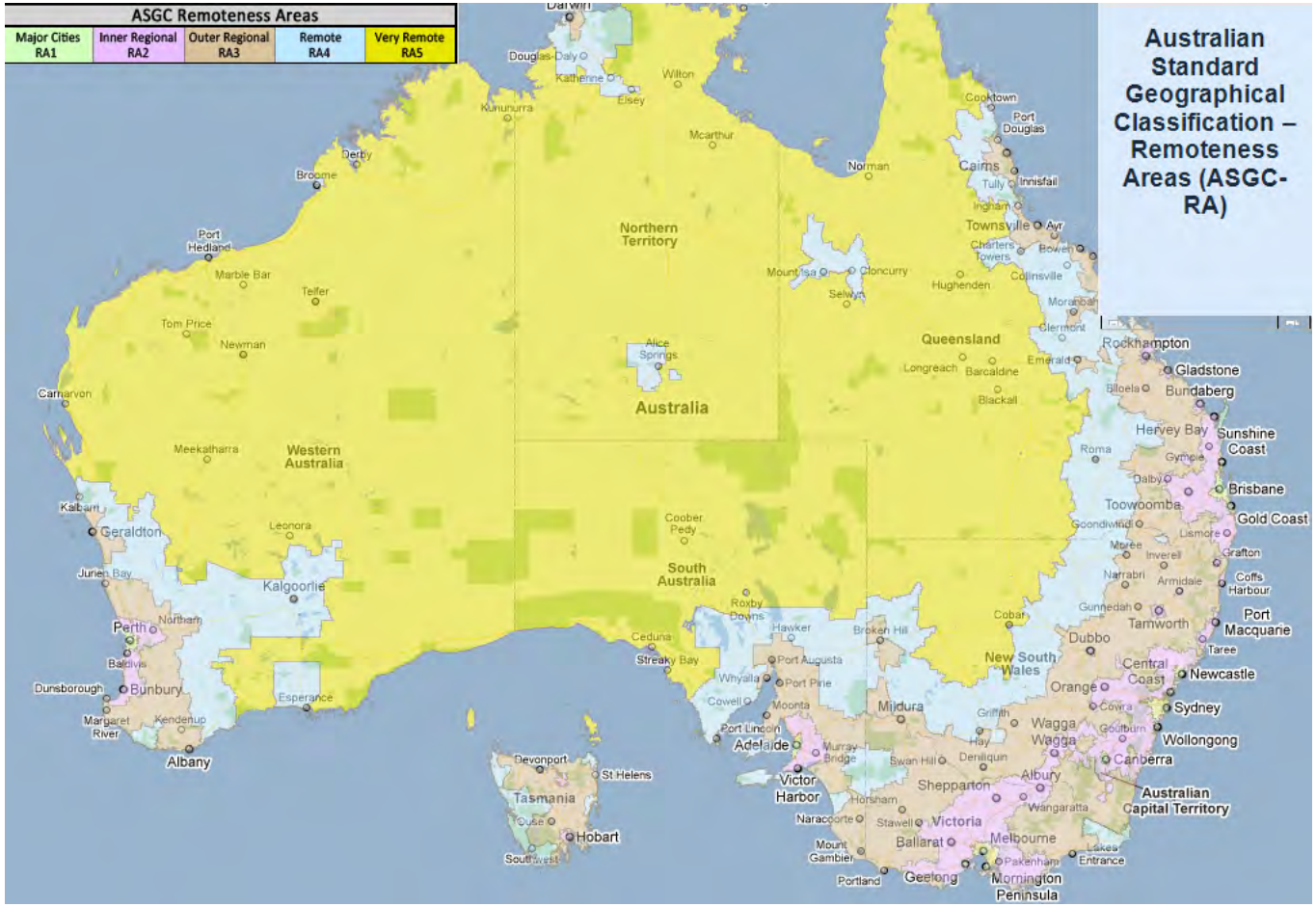
Appendix 8: ANZBA Referral Criteria

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 five 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 9: Remoteness Areas



Sourced from: http://www.doctorconnect.gov.au/internet/otd/Publishing.nsf/Content/locator