BURNS REGISTRY OF AUSTRALIA AND NEW ZEALAND

ANNUAL REPORT

1st July 2013 – 30th June 2014

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Foreword

The aims of the Burns Registry of Australia and New Zealand (BRANZ) are twofold. It was originally established to collect epidemiological data to inform community burns awareness programs and the development of safety standards across Australia and New Zealand. Subsequently, it was further developed as a clinical quality registry to collect clinical data on all patients admitted with acute burn injury to all Australian and New Zealand specialist burn units, in order to monitor care and examine risk-adjusted outcomes.

Care of the burn injured patient is complex. Despite a steady improvement in mortality outcomes in recent years, the effect of numerous treatment variables in this group of patients is unknown, and the evidence base in burn care is lacking. Improved understanding of the key components of appropriate and effective care will support quality and safety improvement initiatives, the development of guidelines and standards for burn care, and improved patient outcomes. The highly centralized arrangements for delivery of burn care in Australia and New Zealand support this endeavour: a total of 17 designated burn units admit and treat virtually all patients with significant burn injury, as well as many more with less severe burns. In this report, data are presented for 2656 burns patients treated at 15 of these 17 burns units from 1st July 2013 to 30th June 2014.

The last five years' data from BRANZ provides emerging evidence of variation in clinical practice between units. This requires further consideration within a sound clinical governance framework that will support quality improvements. Fundamental to this process is an infrastructure that ensures accuracy and completeness of data collection, data cleansing, reporting and analysis: each of these areas requires significant and secure resourcing if clinicians and organizations are to act confidently on information to implement change. A review of the dataset and quality indicators as the first stage of the Burns Quality Improvement Program (BQIP) has commenced. In the future the BQIP will assist burn centres to monitor individual performance, and provide quality improvement resources to assist in making changes directed at achieving best outcomes for our patients.

BRANZ is collaboration between the Australian and New Zealand peak body for burn clinicians, the Australian and New Zealand Burn Association (ANZBA), and Monash University Department of Epidemiology and Preventive Medicine. It continues to be directed and lead by senior expert clinicians and academics, and supported by philanthropic, clinical and professional organizations. It is a major resource for directing, supporting and enhancing burn prevention and care initiatives, and I commend this, our fifth annual report, to you.

Heather Cleland

Chair,

Steering Committee BRANZ

Fiona Wood

President,

Australian and New Zealand Burn Association (ANZBA)

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Executive Summary

This is the fifth annual report from the Burns Registry of Australia and New Zealand (BRANZ). BRANZ provides valuable information on the incidence and aetiology of burn injury across Australia and New Zealand. The registry collects epidemiological data on all burn patients admitted to BRANZ hospitals who meet the inclusion criteria. This data assists to monitor burn injury incidence and causation for developing targeted prevention campaigns and to identify objective and verifiable data on treatment, outcomes and quality of care in burn injury management. Hence the overall goal of BRANZ is to encourage higher standards of both burn injury prevention and patient care. Improvements are continuously made to the database as required to enhance data capture and quality.

Data are presented for 2656 burns patients treated at 15 burn units over the 12-month period from 1st July 2013 to 30th June 2014. Consistent with data from the 2012-2013 year and that reported by the American Burn Association, National Burn Repository, 64 per cent of cases overall were adults, with males accounting for 68 per cent of all cases. Children aged 12 to 24 months accounted for 34 per cent of paediatric cases while 20 to 29 year olds accounted for 25 per cent of adult cases. Flame (32 per cent) and scald burns (38 per cent) were the primary cause of burn injury for all age groups. Scald burns were the predominant cause for paediatric patients accounting for 56 per cent of all burns followed by contact burns (19 per cent). For children 11 to 15 years of age and adults 16 to 79 years of age, flame burn was the predominant cause. In the over 80 year age group, scalding was the predominant cause of burn. Nearly all burns were considered unintentional (96 per cent).

The data presented in this report indicates that for cases admitted to Australian burns units, 84 per cent were born in Australia, with six per cent identified as Australian Aboriginal. For New Zealand cases, 48 per cent of cases were classified as New Zealander and a further 22 per cent were identified as New Zealand Maori. Most Australian cases were funded by the Australian Health Care Agreement (83 per cent) while eight per cent of cases were funded by work injury compensation schemes and six per cent of cases by private health insurance. Most New Zealand cases (99 per cent) were funded under the Accident Compensation Corporation, the government sponsored universal insurer for injury in New Zealand.

A burn of less than 10 per cent Total Body Surface Area (TBSA) was recorded for 89 per cent of paediatric cases and 82 per cent of adult cases. Almost 75 per cent of all cases underwent a burn wound management procedure in theatre and, 47 per cent of these cases required skin grafting. Appropriate initial burn assessment, management and referral to the burns units for definitive treatment of burns that meet the ANZBA endorsed referral criteria (Appendix 8) promotes best treatment and care.

The application of cool running water is the most appropriate first aid for the management of burn injury. The initial burn management data suggests that cool running water was the primary burn cooling strategy used in the majority of cases at the scene of injury (90 per cent). 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 10 per cent of cases.

The time taken for a burn patient to be admitted from the scene of injury to a BRANZ hospital has a significant influence on the initial medical and surgical management of burn injuries. The median (IQR) time from injury to admission to a BRANZ hospital was 24 (4-212) hours for paediatric cases and 16 (4-94) hours for adult cases. The median (IQR) length of stay (LOS) was 4 (2-9) days for paediatric cases and 6 (2-11) days for adult cases (where LOS is more than 24 hours and excluding deaths). The overall in-hospital death rate was one per cent for hospitalised burn cases. The majority of cases (88 per cent) were discharged to their usual residence.

A total of 103 paediatric cases (11 per cent) were readmitted within 28 days of discharge and the majority (85 per cent) were reported as planned readmissions. A readmission was also recorded for 115 adult cases (seven per cent) and in contrast to the paediatric cases 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 it is possible to make comparisons between centres and future monitoring of care can be undertaken. BRANZ continues to develop and improvements to data fields and definitions will be made over 2015 to improve data quality and interpretation.

About this report

This is the fifth annual report of the Burns Registry of Australia and New Zealand (BRANZ). Data collected between the 1st July 2013 and 30th June 2014 (Year 5) is summarised in this report. Fifteen of the 17 BRANZ sites (12 out of 13 Australian sites and 3 of the 4 New Zealand sites) contributed data with 2656 cases entered in the fifth reporting year.

The sites that participated had Institutional Ethics Committee (IEC) approval and local resources for data collection that enabled them to contribute data to the registry. Of the fifteen BRANZ sites that contributed to this report, six sites treat paediatric patients, five sites treat adult patients and four sites treat both paediatric and adult patients.

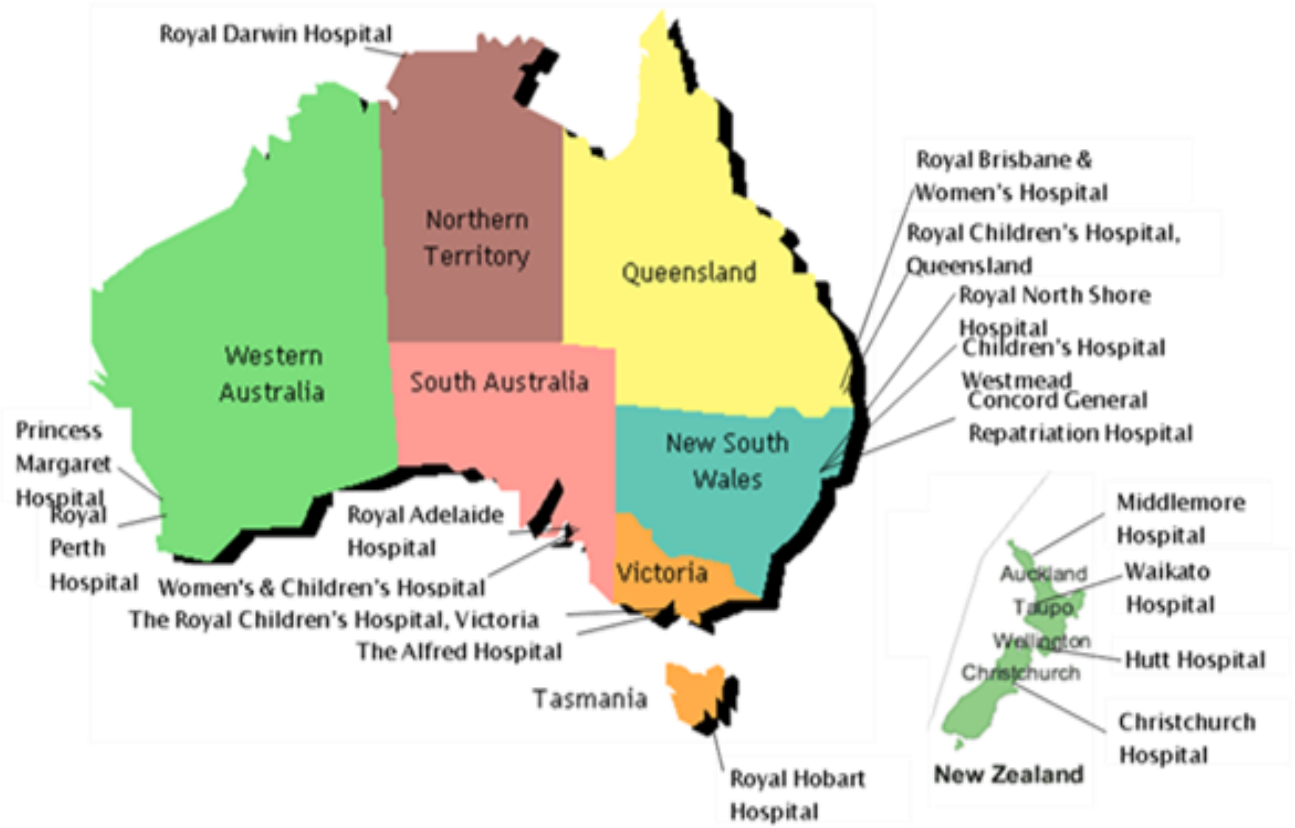
The report describes the registry, as well as the profile, treatment and outcomes of burns unit admissions from 1st July 2013 to 30th June 2014. Quality of care data related to processes of care is also provided. Where appropriate, data has been compared to the 2009-10, 2010-11, 2011-12 and 2012-13 reporting periods. Data has also been compared with the American Burn Association's National Burn Repository (NBR) 2014 [2] report of data from January 2004 to June 2013, as that the NBR reports comparable summary data.

About Burns Registry of Australia and New Zealand (BRANZ)

What is Burns Registry of Australia and New Zealand?

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 have regionalised burns care with 17 designated burns units across the two countries (Figure 1). The initial Bi-National Burns Registry 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-National Burns Registry was launched in July 2009 and is now in its fifth year of operation and has been renamed the Burns Registry of Australia and New Zealand (BRANZ). This clinical quality registry captures epidemiological, treatment, 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 registry is an ANZBA initiative with additional funding from the Julian Burton Burns Trust (2008-2013), 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), the New Zealand Accident Compensation Corporation (2013-2014) and the Australasian Foundation for Plastic Surgery (2013-2014). Individual burns units have also contributed to co-funding the registry to ensure the ongoing sustainability of BRANZ.

Participating Burns Units

Only sites with Institutional Ethics Committee (IEC) approval and the ability to provide resources for local data collection submit data to BRANZ. For the fifth year of reporting (July 2013 to June 2014), 16 of the 17 BRANZ sites had obtained ethics approval and 15 sites contributed data to the fifth annual report. Appendix 5 summarises the participating BRANZ sites.

Aims

The overall 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.

The specific aims of BRANZ are to:

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

Review of quality indicators

Key quality of care indicators were developed for BRANZ to allow the quality of health care provided to burn patients to be monitored and benchmarked across services. Nineteen quality indicators are embedded within BRANZ. A review of these indicators was commenced in Year 4 and will be completed in 2015.

Reporting

Quarterly reports are routinely produced and provide summary aggregate data from the registry. The quarterly reports have been updated to enable comparison of individual burn units for key indicators. Data completeness by site is now also included in the quarterly reports. Individual sites are not identified by name in these reports but provided with their own identifier code to enable them to evaluate their own data relative to other sites. Additional reporting functions have been generated to allow individual units to produce their own reports and download data for their unit-specific purposes.

Data Requests

External requests for data must comply with BRANZ Data Access Policy. The data request form and associated policies are publicly available on the internet at http://anzba.org.au/the-bi-nbr/data-requests/. In the fifth year of reporting, there were seven requests for data from BRANZ for purposes such as research, injury prevention, education and public awareness campaigns. They were all approved and the data provided.

Presentations

During the reporting period, BRANZ was presented at the following national and international meetings:

1. Australian and New Zealand Burns Association (ANZBA) Annual Scientific Meeting, Perth. October 2013: How the BiNBR can improve surgical management of major burn injuries in ANZ burn units .Heather Cleland.

2. European Burn Association Congress, Vienna. August 2013: Implementing a burn admission proforma to improve data quality. Heather Cleland.

3. American Burn Association meeting, Boston. March 2014: The Binational Burn Registry and the Burn Quality Improvement Program (BQIP). Yvonne Singer et al (Poster presentation).

4. Royal Australasian College of Surgeons ASM, Singapore. May2014: ANZBA Bi-National Burn Registry (Bi-NBR) - Review of Nutritional Support Quality Indicators in Severe Burn Injury. Ian Loh, Heather Cleland & Belinda Gabbe.

5. Royal Australasian College of Surgeons ASM, Singapore, May2014: Australian and New Zealand Bi National Burns Registry. Heather Cleland (Plenary Session, Invited Speaker)

BRANZ was presented at many educational seminars during the 2013-2014 reporting period, including:

1. Lecture to Royal Australasian College of Surgeons at Burns Clinical Trials Group and Burns Multicentre Clinical trials Masterclass in 2014: ANZBA, the Bi-NBR and establishing treatment protocols between Australian New Zealand Burns Units. Heather Cleland - Invited Speaker

2. Burns management education sessions to various audiences including emergency departments, GP groups, Victorian Arson Squad, Fire Services, Ambulance Victoria, postgraduate emergency and critical care courses and St John Ambulance Australia first aid training. There were a total of 21 sessions in the reporting period – Yvonne Singer.

3. ANZBA online seminar series and the ANZBA Nursing Seminar Forum in Melbourne – Yvonne Singer.

How does BRANZ 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 BRANZ 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. BRANZ 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. 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 BRANZ.

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 when data collectors commence work. '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 BRANZ produces high quality data. Completeness of data by site is also provided in the quarterly reports to enable individual sites to track their data completeness relative to other participating sites.

Data Analysis

Number of Burn Cases

This section provides information about the number of patients admitted to a participating burns unit that met BRANZ inclusion criteria.

BRANZ burn cases

The total number of burn cases recorded on BRANZ for Year 5 (1st July 2013 to 30th June 2014) was 2656, with 1700 adult cases (16 years of age and older) and 956 paediatric cases (15 years of age and under). For the reporting period, 15 sites submitted data to the registry. 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).

Registry capture rate

Figure 2 shows the numbers of adult and paediatric cases entered into the registry at each quarter from commencement and Table 1 outlines the case numbers entered by each site for the five reporting years. Although the registry began in July 2009, commencement of data contribution to BRANZ varied among the different sites and as seen in Table 1 some sites did not contribute in certain years. These inconsistencies in recording of registry data currently limits the capacity to carry out comparisons between sites and over time.

Figure 2: Reporting year trends in burn patients

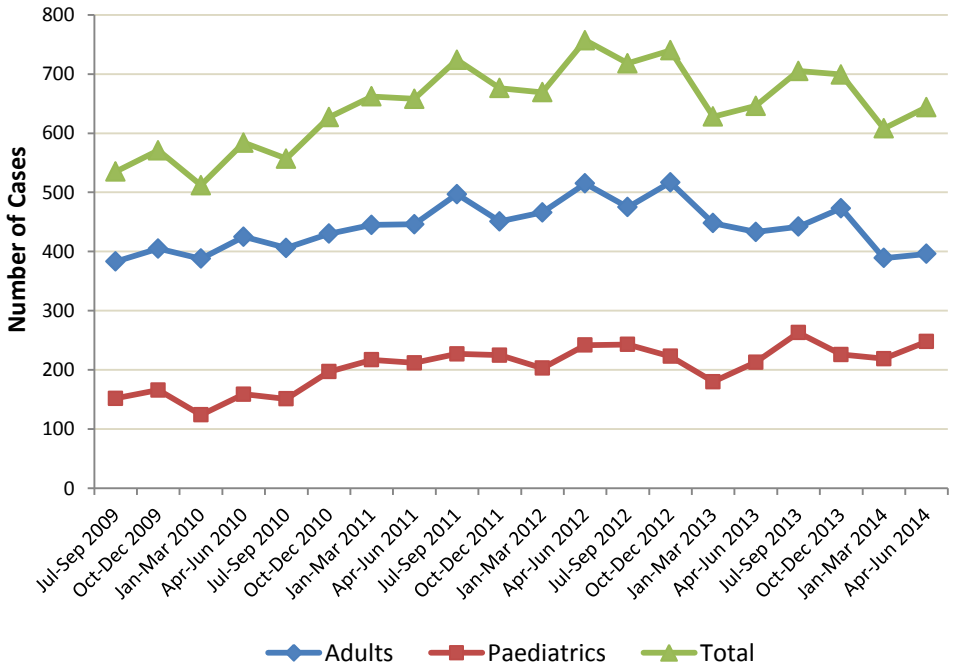


Table 1: Site case numbers per reporting year

Site	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
A	282	264	306	282	239	1373
B	238	269	263	274	270	1314
C	206	267	236	168	173	1050
D	84	81	89	101	94	449
E	224	174	205	155	53	811
F	121	92	103	78	71	465
G	333	322	330	388	352	1725
H	192	237	273	289	260	1251
I	251	223	240	238	280	1232
J	9	0	20	13	124	166
K	55	85	75	83	96	394
L	205	226	281	270	302	1284
M	2	65	84	75	79	305
N	0	62	104	88	85	339
O	0	137	217	220	178	752
P	0	0	0	10	0	10
Total	2202	2504	2826	2732	2656	12920

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 were 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 68 per cent of all cases. A third (34 per cent) of paediatric cases were aged one to two years while a quarter of the adult cases were aged 20 to 29 years. These figures are consistent with the previous four BRANZ reporting years and figures reported in the American National Burn Repository (American NBR) 2014 annual report. Children under the age of five accounted for 19 per cent of cases (compared to 22 per cent in BRANZ) and patients aged 60 or older represented 13 per cent of all cases (compared to 13 per cent in BRANZ).

Figure 3a: Age distribution by gender – Paediatric cases

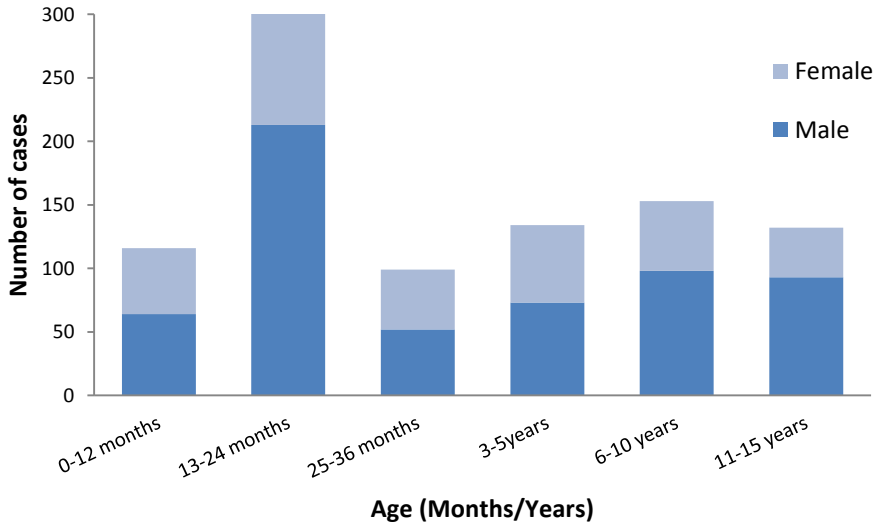
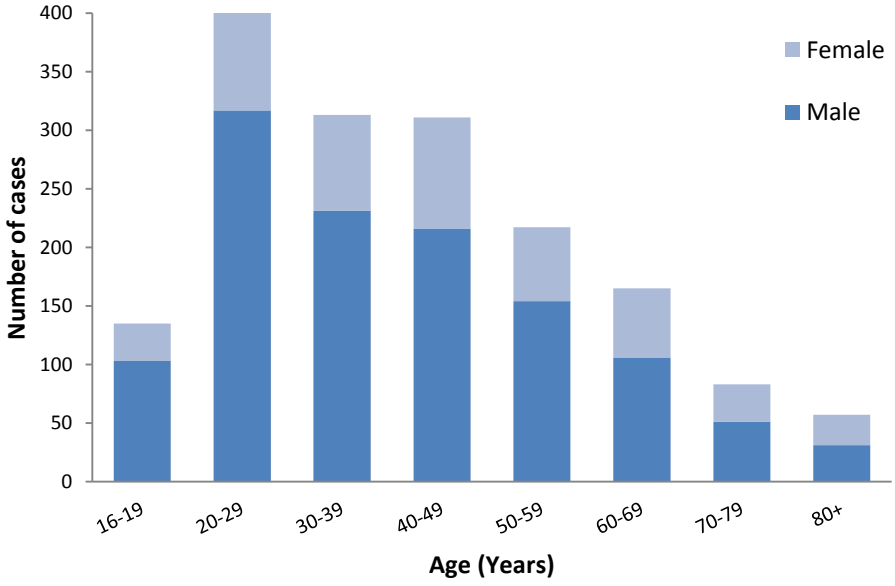


Figure 3b: Age distribution by gender – Adult cases



Australian hospitals routinely collect 'country of birth' whereas New Zealand hospitals record the 'ethnicity' of their patients. Therefore the data are reported separately for New Zealand and Australian burn centres (Table 2). BRANZ recorded 2319 admissions to Australian sites and 337 admissions to New Zealand sites in the fifth reporting year.

The majority of cases admitted to Australian burns units were born in Australia (n=1927, 84 per cent). Indigenous Australians accounted for seven per cent of the Australian born admissions consisting of 11 per cent of paediatric cases and three per cent of adult cases which is consistent with previous reporting years. There were 370 patients admitted to Australian burns units who were recorded as being born overseas. Their country of birth was either Europe, Asia, North Africa or Middle Eastern countries. The country of birth was missing for 23 cases.

Of the New Zealand burn admissions, 48 per cent (n=156) were classified as 'New Zealander' and a further 22 per cent of cases (n=71) were classified as 'New Zealand Maori'. There were 58 patients classified as 'Other Oceanian descent'. These were predominantly Samoan (n=22, 38 per cent of other oceanian and seven per cent of total NZ admissions) but also included Cook Island Maori, Tongans and other pacific islanders.

Table 2: Region of birth for Australian and Ethnicity by region for New Zealand burns units

Region of birth - Australian Units	N	%
Australia	1927	83.9
Southern and Eastern European	60	2.6
North West Europe	57	2.5
South East Asian	55	2.4
Southern and Central Asian	42	1.8
North African and Middle Eastern	40	1.7
New Zealander	35	1.5
North East Asia	31	1.4
Sub-Saharan Africa	18	0.8
Peoples of the Americas	14	0.6
Oceanian (other)	17	0.6
		100.0

Region of Ethnicity - New Zealand Units	N	%
New Zealander	156	47.9
New Zealand Maori	71	21.8
Other Oceanian	58	17.8
Southern and Central Asian	10	3.1
North East Asian	10	3.1
South East Asian	7	2.1
North West European	5	1.5
Southern and Eastern Europe	*	1.2
North Africa and Middle Eastern	*	<1.0
Sub-Saharan African	*	<1.0
Peoples of the Americas	*	<1.0
		100.0

- Denotes less than 5 cases

Most cases admitted to Australian burns units were funded by the Australian Health Care Agreement (n=1,921, 83 per cent). A further eight per cent (n=180) were covered under the relevant workers compensation scheme in each state or territory and six per cent (n=149) were funded through various private health insurance schemes. Examples of other sources of funding were third party motor vehicle

insurance, department of Veterans Affairs, Department of Defence and reciprocal health care agreements.

Most New Zealand cases were funded by the Accident Compensation Corporation (n=332, 99 per cent) which is the comprehensive, no-fault personal injury insurance scheme for all New Zealand residents and visitors to the country.

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 previous years, scald and flame burns were the most common cause of burn injury. Scalds accounted for 38 per cent, flame burns for 32 per cent, and contact burns for 16 per cent of all cases. The 2014 data from the American NBR also identified flame burns and scalds as the most common aetiology, however fire/flame related injuries were more common (44 per cent) than scald injuries (33 per cent) in the USA.

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. The most common overall cause for burn injury among paediatric cases was scalds (57 per cent) followed by contact (20 per cent) and flame (11 per cent) injuries. Consistent with previous years, scald burns were the most common cause of injury for paediatric cases aged 10 years or less (n=504) and flame burns were the most common cause of injury in the 11-15 year age group (n=50). The most common overall cause of adult burn injuries was flame (44 per cent) followed by scald burns (28 per cent) and contact burns (14 per cent) that required hospital admission. 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 injuries for elderly patients aged over 80 years.

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

Primary Cause of Burn	Paediatric Age Group (months and years)							
	0-12 months	13-24 months	25-36 months	3-5 years	6-10 years	11-15 years	Total	%
Scald	83	245	61	55	60	39	543	57.0
Contact	19	56	17	30	39	25	186	19.5
Flame	5	4	4	23	21	50	107	11.2
Friction	*	12	16	24	18	11	84	8.8
Chemical	*	*	*	*	*	*	12	1.2
Radiant Heat (no contact to source)	*	*	*	*	5	*	12	1.2
Electrical	*	*	*	*	5	*	8	0.8
Other	*	*	*	*	*	*	*	<1.0
Total	116	321	100	134	153	132	956	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	60	192	156	147	78	66	30	16	745	44.3
Scald	36	93	72	84	67	64	28	26	470	27.9
Contact	21	63	43	37	29	17	16	11	237	14.1
Chemical	6	26	15	19	26	6	4	*	103	6.1
Friction	9	25	13	8	*	*	*	*	63	3.7
Electrical	*	14	9	9	*	*	*	*	40	2.4
Radiant Heat (no contact to source)	*	6	*	7	7	*	*	*	36	1.4
Pressurised gas/air (non-flame)	*	*	*	*	*	*	*	*	*	<1.0
Other	*	*	*	*	*	*	*	*	*	<1.0
Total	135	419	312	311	216	165	82	57	1697	100

* Denotes less than five cases

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

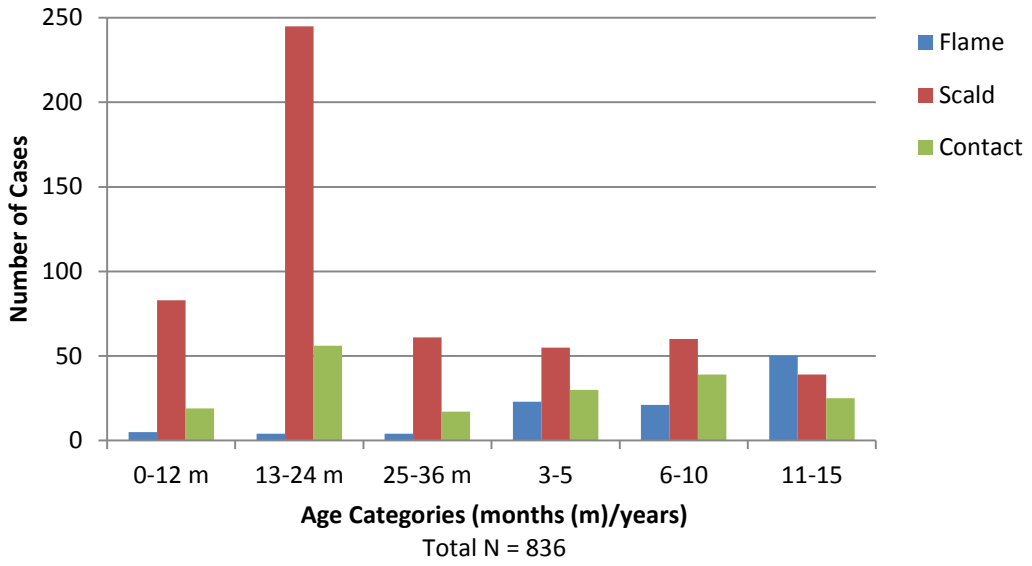
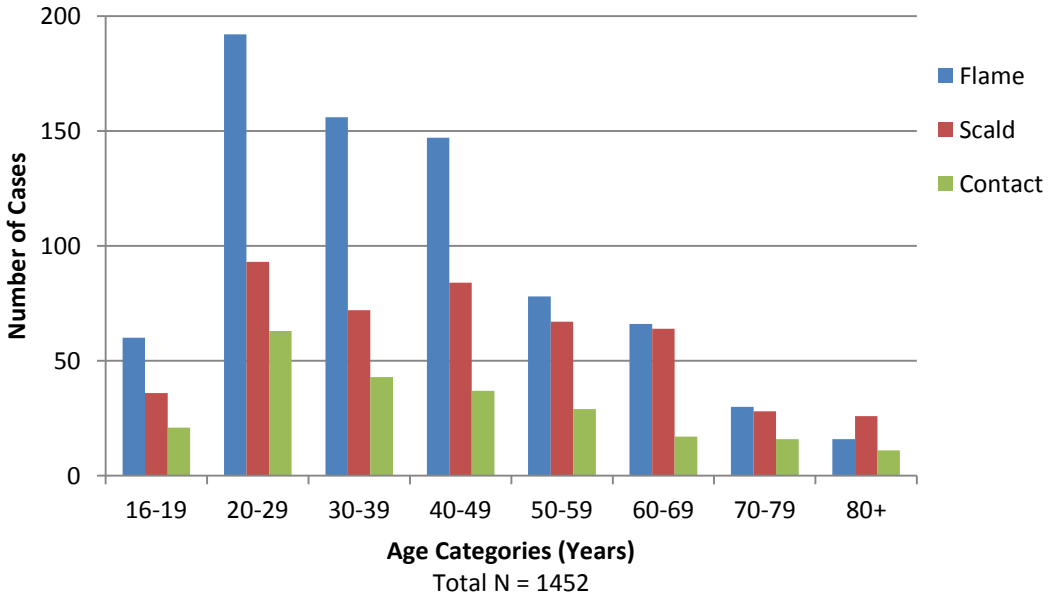


Figure 4b: Frequency of Flame, Scald and Contact burns by Adult Age Group



The most common sub-causes of paediatric and adult burn injuries are shown in Tables 4a and 4b. These sub-causes accounted for 82 per cent of paediatric cases and 73 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 resulting from a campfire, bonfire or burn-off was by far the most common sub-cause, followed by scalds due to fat/oil and scald burns from water from saucepan/kettle/jug/billy/urn/thermo. The three most common sub-causes of burn injury in both adults and paediatrics have been consistent over the past five years.

In 56 per cent of flame burn cases, an accelerant was used to ignite/enhance the flame. Petrol was the most common accelerant used (53 per cent) followed by methylated spirits (13 per cent). Petrol has been the predominant accelerant, and methylated spirits the second most common accelerant, for all years of reporting by BRANZ.

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

Cause	Sub Cause	N	%
Scald	Hot Beverages	197	20.7
Scald	Water from saucepan/kettle/jug/billy/urn/thermos	162	17.0
Scald	Food (liquid/solid)	83	8.7
Contact	Vehicle Exhaust	48	5.0
Friction	via Treadmill	44	4.6
Contact	Coal Ashes	43	4.5
Scald	Water from tap/bath/shower	36	3.8
Flame	Campfire/Bonfire/Burnoff	30	3.2
Flame	Lighter or Matches	30	3.2
Friction	via Vehicle/Motorbike	23	2.4
Contact	Wood Heater	19	2.0
Scald	Fat/Oil	19	2.0
Scald	Water from basin/sink/bucket	16	1.7
Contact	Iron	15	1.6
Contact	Electric/Gas Heater	12	1.3

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

Cause	Sub-Cause	N	%
Flame	Campfire/Bonfire/Burn-off	211	12.5
Scald	Fat/Oil	134	8.0
Scald	Water from saucepan/kettle/jug/billy/urn	101	6.0
Chemical	Alkali	62	3.7
Flame	Gas bottle	59	3.5
Flame	Vehicle/Engine parts	55	3.3
Scald	Food (liquid/solid)	52	3.1
Contact	Coal Ashes	51	3.0
Flame	Lighter or Matches	51	3.0
Friction	via Vehicle or Motorbike	51	3.0
Scald	Hot Beverages	44	2.6
Flame	Ignition of Fat/Oil	39	2.3
Contact	Hot Metal	36	2.1
Flame	BBQ	35	2.1
Contact	Vehicle Exhaust	34	2.0
Flame	Welding/Grinding	34	2.0
Flame	Cigarette	33	2.0
Scald	Water from tap/bath/shower	26	1.5
Scald	Water from hot water bottle	26	1.5
Scald	Water from radiator	23	1.4
Chemical	Acid	21	1.2
Flame	Electrical	19	1.1
Contact	Wax	17	1.0
Scald	Water from basin/sink/bucket	17	1.0

Seasonal Trends

Examining the impact of the changing seasons on burn cause can help guide burns prevention strategies and resource utilisation. Whether the burn occurred during summer, autumn, winter or spring months was determined using the patient's date of injury. While the primary burn cause was recorded for all patients, a burn injury sub-cause was recorded for 99 per cent of adult (n=1685) adult and paediatric (n=948) cases. The primary burn cause and sub-cause were categorised according to the season and this data is presented in Figures 5a and 5b. Consistent with previous reporting years, patterns of seasonal variations were mainly observed in relation to burn injuries caused by heaters, hot water bottles and barbeques.

Paediatric cases

The definition of heaters include electric, wood, gas, open fireplace and any other heater types. Burn injuries caused by heaters showed a seasonal trend in paediatric injuries with over 60 per cent of these incidents occurring during winter. There were no injuries caused by heaters recorded in the summer months. Heater burns were predominantly flame or contact injuries and there were no injuries in paediatric cases caused by radiant heat. Scald injuries obtained from hot beverages or from water from saucepan/kettle/jug/billy/urn/thermos which were the most common cause of burns in children (n=359; Table 4a), did not show a seasonal pattern but had a similar distribution across the seaseons.

Burns caused by contact with a vehicle exhaust were more prevalent in summer and spring (63 per cent) compared to the autumn and winter months. These injuries were commonly sustained when riding or being a passenger on a motorbike/quad bike/trail bike and the majority of children sustaining these injuries (79 per cent, n=38) were between 6 and 15 years of age.

The highest incidence of friction burns caused by a vehicle or motorbike occurred in summer (39 per cent) while a high proportion of contact burns caused by coal and ashes (40 per cent) occurred in autumn. The incidence of flame burn injuries caused by campfires/bonfires/burnoffs was

lowest during the summer months (13 per cent) and highest during autumn (33 per cent) and winter (33 per cent).

Adult cases

In adult cases, more than half of burns caused by heaters (55 per cent) and hot water bottles (55 per cent) occurred in winter (Figure 5b), reflecting the higher levels of exposure to these items in the cooler months. While flame or contact burns were the primary cause, 15 cases were caused by radiant heat due to sitting to close to the heater. The incidence of burns resulting from barbeques was 40 in the fifth year and was spread consistently over spring, summer and autumn. Most barbeque related burns were due to flame (n=35, 88 per cent) while five cases were caused by direct contact. Use of an accelerant was recorded for 71 per cent (n=25) of the flame burns resulting from barbeques.

A higher incidence of flame burns from welding/grinding (64 per cent) and friction burns from vehicle/motorbike (71 per cent) was seen during the summer and spring months compared to winter and autumn (Figure 5b).

Consistent with paediatric cases, the number of adult burn injuries caused by campfires/bonfires/burn-offs was lowest in the summer months (n=26, 16 per cent), compared to 31 per cent (n= 65) occurring in autumn, 27 per cent (n=57) in winter, and 27 per cent (n=26) during spring (Figure 5b).

Figure 5a: Seasonal Trends by Paediatric Age Group

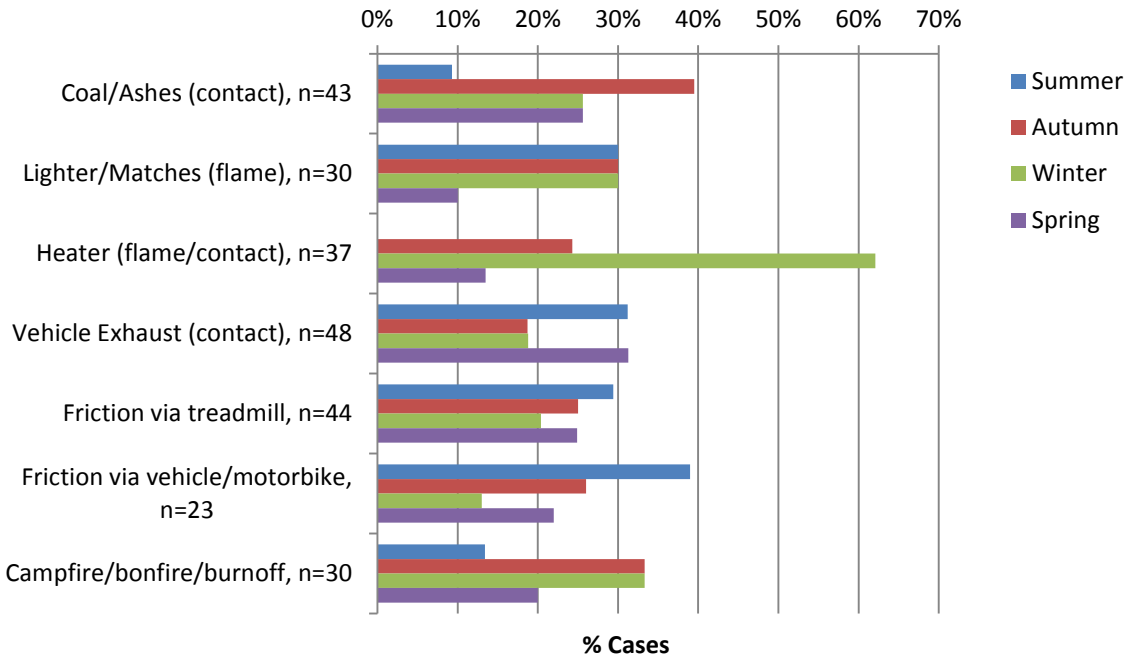
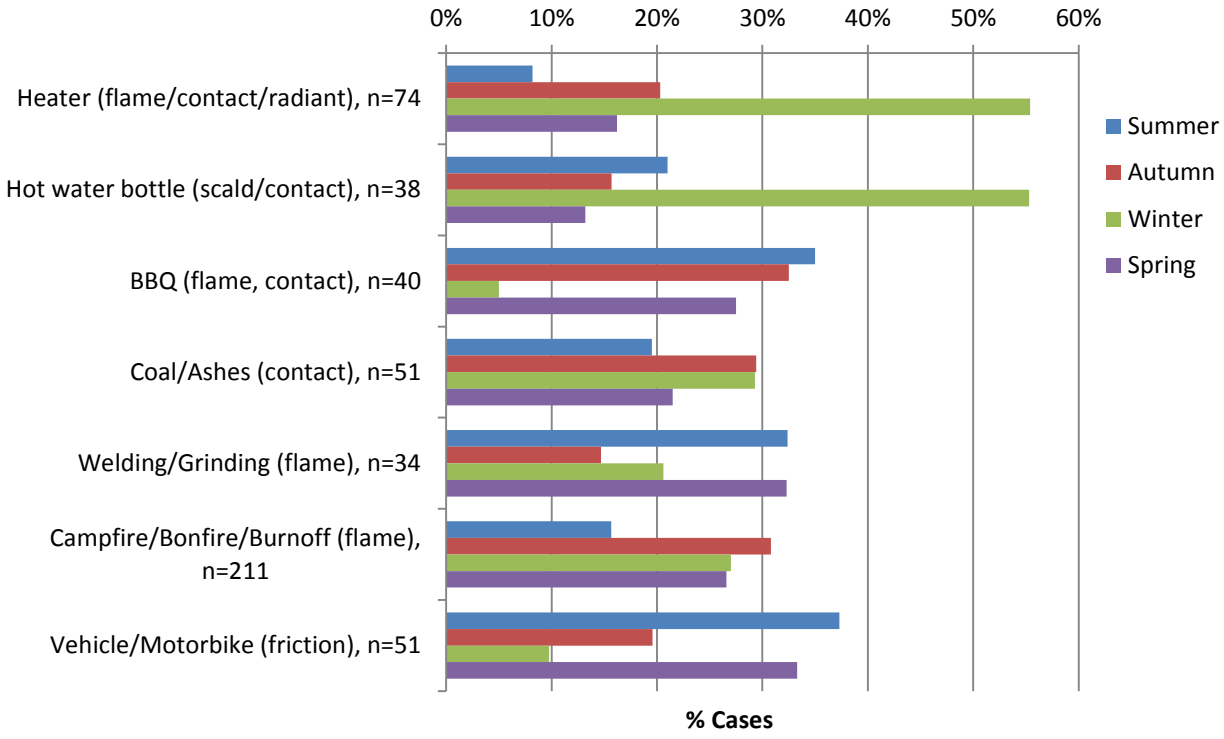


Figure 5b: Seasonal Trends by Adult Age Group



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

Intent, place and activity of injury

Consistent with previous years, the majority of burns patients (96 per cent) sustained their injury during unintentional events. Intentional self-harm accounted for less than three per cent of all cases. The remaining cases were assaults, an event of unspecified intent or adverse effects or complications of medical treatment. Eighty -five per cent of unintentional burn cases and 78 per cent of intentional self-harm cases sustained injuries that were in the lowest TBSA category (0-9 per cent TBSA).

Consistent with previous reporting years, and the American NBR, most burn injuries occurred at home. Sixty-five per cent of all injuries, registered by BRANZ in the fifth year occurred at home. The places of injury for paediatric and adult cases are summarised in Tables 5a and 5b. In 76 per cent of paediatric cases and 59 per cent of adult cases, the injury occurred at home.

Table 5a: Place of injury – Paediatrics

Place of injury	N	%
Home	708	76.3
Other residence (e.g. - friend's house)	71	7.6
Place for recreation	56	6.0
Street and highway	25	2.7
Farm	14	1.5
Trade and service area	10	1.1
School, other institution and public administrative area	8	0.9
Other specified place	36	3.9
Total	928	100.0

Table 5b: Place of injury – Adults

Place of injury	N	%
Home	953	58.6
Place for recreation	132	8.1
Street and highway	119	7.3
Trade and service area	116	7.1
Industrial and construction area	83	5.1
Other residence (e.g. - friend's house)	76	4.7
Farm	61	3.8
School, other institution and public administrative area	12	0.7
Sports or athletics area	8	0.5
Residential Institution	6	0.4
Other specified place	61	3.7
Total	1627	100.0

The kitchen was the place of injury for 44 per cent of paediatric cases and 35 per cent of adult cases that sustained the burn injury at home. The next most common places of burn injury occurrence for paediatric cases were the living room/playroom/family room (18 per cent) and the garden/yard (11 per cent). The garden/yard was the second most common place of injury for adult cases (23 per cent) followed by the living room/playroom/family room (13 per cent).

Tables 6a and 6b outline common activities being performed at the time of injury for paediatric and adult cases. Playing, participating in a leisure activity and being near a person preparing food or drink were the most common activities at the time of injury for paediatric cases. Of the children two years of age and younger who sustained a scald injury (n=311), nearly half of these injuries occurred whilst near a person preparing food or drink (46 per cent). These results are consistent with the previous BRANZ annual reports.

Consistent with previous annual reports, cooking, participating in a leisure activity, and working for income were the most common activities resulting in a burn injury in adults. Of the adults cases whose activity at the time of injury was recorded as working for income, and there was a recorded place of injury, a third (n=87, 34 per cent) occurred in at a 'Trade or service area', followed by and 'Industrial or construction area' (n=80, 32 per cent). These figures are very similar to the previous reporting year.

In the 20 to 29 years age group, leisure activities accounted for 30 per cent of burns and the place of injury was in the home or another person's residence in just over half of the cases (51 per cent). In the 60 years and over age group, the most common activity at the time of injury was cooking (32 per cent) and the most common place of injury was the home (76 per cent). This is consistent with the previous BRANZ annual reports.

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

Activity at the time of injury	N	%
Playing	258	28.6
Leisure activity (excluding sporting activity)	228	25.3
Near person cooking	218	24.2
Cooking	44	4.9
Eating/drinking	44	4.9
Bathing	37	4.1
Sleeping/resting	17	1.9
Driving	10	1.1
Other specified activities	46	5.0
Total	902	100.0

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

Activity at the time of injury	N	%
Cooking	361	21.9
Leisure activity (excluding sporting activity)	337	20.4
Working for income	253	15.3
Sleeping/resting	106	6.4
Driving	100	6.1
Household maintenance	69	4.2
Vehicle maintenance	64	3.9
Self- harming	47	2.9
Gardening	42	2.5
Eating/drinking	37	2.3
Bathing	35	2.1
Other vital activities	34	2.1
Cleaning	29	1.8
Suspected illegal activity	17	1.0
Near person cooking	11	0.7
Other types of unpaid work	9	0.5
Other specified activities	100	6.0
Total	1651	100.0

Drug and/or alcohol involvement

For the majority of cases (87 per cent), there was no documented suspicion of drug or alcohol involvement and this is consistent with previous BRANZ annual reports. A documented suspicion of alcohol only, without drug involvement was recorded in 10 per cent of cases, drugs without alcohol in less than two per cent of cases and a combination of drugs and alcohol was recorded in one 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 and/or drug involvement.

Location of burn injury by region (Australian Sites)

Consistent with previous years, over half (60 per cent) of burns admissions to Australian units occurred in major cities according to the Australian Bureau of Statistics Classification of Remoteness [3]. A further 32 per cent occurred in regional Australia and eight per cent in remote areas. The rate of burn injury resulting in burns unit admission per 100,000 population is almost eight-fold higher for very remote areas compared to major cities. All burn units are located in major cities, highlighting the implications for transport and pre-hospital care, as well as for provision of rehabilitation. Table 7 shows the total rate of burn injury resulting in burns unit admission per 100,000 population, and the rate for non-indigenous and indigenous Australians. The rate of admission to Australian burns units for the Aboriginal and Torres Strait Islander population is more than double that of the non-indigenous population. However the severity of burn injuries were not significantly different between the indigenous and non-indigenous populations as measured by the pattern of burn size and length of hospital stay.

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

Remoteness Category	Rate per 100,000 population		
	Total	Non-indigenous	Indigenous
Major cities of Australia	5.4	5.3	8.4
Inner regional Australia	4.4	4.4	6.4
Outer regional Australia	14.4	14.1	18.3
Remote Australia	13.1	14.5	5.4
Very remote Australia	41.9	46.6	36.9
Total rate of injury	6.3	6.1	14.4

Burn Injury Severity

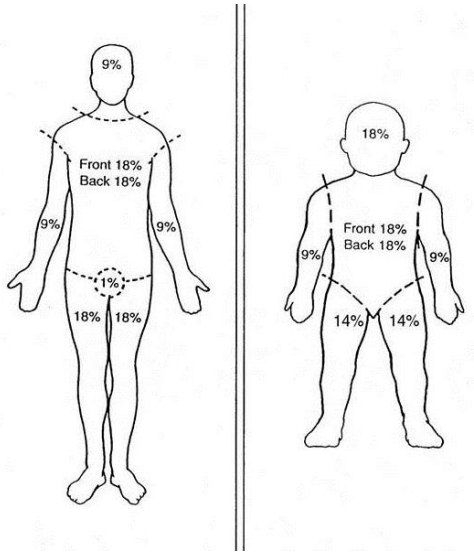
This section outlines the severity of burn, by burn size (percentage total body surface area burnt, percentage TBSA), burn depth and the presence of an inhalation injury.

Total Burn Surface Area (per cent TBSA)

A burn of less than 10 per cent TBSA was recorded for 84 per cent of adult and paediatric cases and this finding is consistent with previous BRANZ annual reports. For paediatric patients, 89 per cent sustained a burn of less than 10 per cent TBSA and less than two per cent sustained a burn that was greater than 20 per cent TBSA. For adult patients, 82 per cent of cases experienced a burn less than 10 per cent TBSA and six per cent sustained a burn that was greater than 20 per cent TBSA. Less than two per cent of adult cases involved a burn of 50 per cent or greater TBSA. Table 8 shows the distribution of TBSA for paediatrics and adult cases.

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

% TBSA category	Paediatrics		Adults	
	N	%	N	%
0-9%	849	88.8	1393	81.9
10-19%	92	9.6	205	12.1
20-49%	15	1.6	83	4.9
≥ 50%	-	0	19	1.1
TOTAL	956	100.0	1700	100.0



Rule of Nines – example of a burn assessment tool

The size of the burn alone is not the only measure for admission to a burns unit in Australia and New Zealand and ANZBA admission criteria extends to smaller burns but in special areas (face, hands, feet, perineum and major joints) elderly patients, pregnant patients and those with other comorbidities to be admitted for specialised burns treatment (Appendix 8). Of the adult patients with a burn less than 10 per cent TBSA (n=1393, 82 per cent), 20 per cent involved the face, 34 per cent were hand burns and 17 per cent involved burns to feet.

Seventy per cent of burn injuries reported to the American NBR in 2014 were less than 10 per cent TBSA. Previous studies in the USA have shown that a high proportion of burn patients meeting criteria for admission to burns units were managed at non-burns unit hospitals. Therefore, the difference noted in the distribution of burn size between the American NBR and BRANZ could be due to greater compliance with guidelines for admission to a burn unit in Australia and New Zealand (Appendix 8). Alternatively, another possibility is that patients with less serious injuries that may not require specialised burn care, are in some instances still being admitted to burns centres in Australia and New Zealand.

Burn Depth

As described in previous annual reports, improvements in the BRANZ database from July 2010 allowed for greater accuracy of reporting in burn depth. BRANZ reports on burn depth by documenting the presence of injuries involving superficial-dermal, mid-dermal, deep-dermal and/or full thickness burns. The burn depth was recorded for 92 per cent of cases in the fifth reporting year. Of these 37 per cent (n=886) had reported superficial dermal burns, 53 per cent (n=1248) had reported mid dermal burns and 44 per cent (n=1037) had deep dermal burns.

A full thickness burn was documented for 17 per cent of cases (n=406) and this is consistent with previous reporting years (21 per cent in 2011-2012 and 20 per cent in 2012-2013). Of the cases documented as having a full thickness burn, the per cent TBSA value of the full thickness area was known in 85 per cent (n=344) of the cases. Table 9 outlines the number of cases where the percentage TBSA of full thickness burn size was recorded. The proportion of cases with coded full thickness burns over 10 per cent TBSA was 11 per cent and is consistent with previous reporting years.

Table 9: Per cent value of full thickness area in patients with full thickness burns

% full thickness TBSA	**N**	**%**
< 10 % full thickness	307	89.2
10-19 % full thickness	20	5.8
20-49 % full thickness	9	2.6
≥50 % full thickness	8	2.3
Total	344	100.0

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's medical record. There is currently no consensus across BRANZ sites for defining and the reporting of inhalation injuries given the challenges in recognising and diagnosing an inhalation injury. A documented inhalation injury was recorded for seven per cent of adult cases (n=113) and less than one per cent of paediatric cases. Of the patients who died following their burn injury, 46 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 that is associated with the standard of care documented is also given. 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 sustaining the injury is best practice in order to reduce the area of skin affected by the burn, the depth of the burn and for pain management [4-6]. Prolonged extensive irrigation of burns may be detrimental if the patient becomes excessively cold, and, the symptoms of hypothermia need to be monitored, particularly in children with larger burns [4, 5, 7, 8].

Seventy-four per cent (n=1874) of all cases were reported to have received a burn cooling intervention at the scene of injury. Consistent with the previous year, eighty per cent of paediatric cases and 71 per cent of adult cases, received burn cooling at the scene of injury.

Cool running water was the method of cooling at the scene of injury in 90 per cent of these cases (both paediatric and adult) that received a burn cooling method (Table 11). The time from injury to application of water to the burn was within three hours of injury in 98 per cent of cases, which is similar to previous years. However, 77 per cent of paediatric cases, and 58 per cent of adult cases, were cooled with water for less than 20 minutes.

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

Scene of injury	Paediatrics		Adults	
	N	%	N	%
Cool running water applied	652	89.6	1023	90.2
Within three hours of injury ** of cases where cool running water applied*	631	98.2	999	98.0

A technique other than the application of cool running water was recorded for 21 per cent of the cases where cooling was applied at the scene of injury (n=408). The most common 'other' methods using water were emersion in buckets of water, splashing water on burn area and emersion in rivers, pools, lakes or sea. The application of ice (ice packs or ice wrapped in a cloth) and the application of wet towels/cold compression in various forms were also commonly used as 'other' cooling methods. A variety of substances other than water and ice (E.g. - aloe vera gels, toothpaste, herbal dressings,

butter, various creams) were reported in about a quarter of the cases that used 'other'methods. There was also some overlap between the methods used and the cooling techniques described were consistent with previous reporting years. Many of these treatments are not effective or appropriate, and some may be detrimental first aid for burn injury.

What was the referral source to the burns unit?

Consistent with previous annual reports, approximately half of both the paediatric (57 per cent) and adult cases (52 per cent) were transferred to the burns unit from another hospital. The proportion of cases that were directly transported from the scene of injury via ambulance to the burns unit was 15 per cent for paediatric patients and 20 per cent for adult cases. These figures are consistent with previous reporting years.

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 BRANZ hospital significantly influences 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 and mode of transfer, 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 as to why the admission to a burns unit is greater than two hours. This data will assist in developing acceptable timeframes for admission of patients to a BRANZ hospital, identify if pre burns unit care was appropriate and monitor outcomes of care where there have been delays. It is recognized that delayed admission may constitute appropriate care for specific injuries and in specific environments.

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 20 per cent TBSA in adult cases and greater than ten per cent TBSA in paediatric cases are considered as major burns by ANZBA.

When adult patients with a burn size greater than 15 per cent TBSA were referred from another hospital, the referring hospital made contact with the burns unit within one hour of injury in 75 per cent of cases, compared to 55 per cent in 2012-2013 and 60 per cent in 2012-2013. However, for paediatric cases with a burn size greater than 10 per cent TBSA, contact was made within one hour in 18 per cent of cases and considerable variation has been seen in this time factor over the last reporting years (31 per cent in 2012-2013, 25 per cent in 2011-12 and 15 per cent in 2010-11).

Figure 6a and 6b show the median time from injury to admission for paediatric and adult cases for each reporting year. Only those cases that require emergency admission to hospital (paediatric patients with over 10 per cent TBSA and adult patients with over 20 per cent TBSA) are included. The median values for time to admission for both paediatric and adult cases are consistent over the five reporting years.

Figure 6a: Time to Admission for paediatric cases (>10 per cent TBSA) for years 1-5

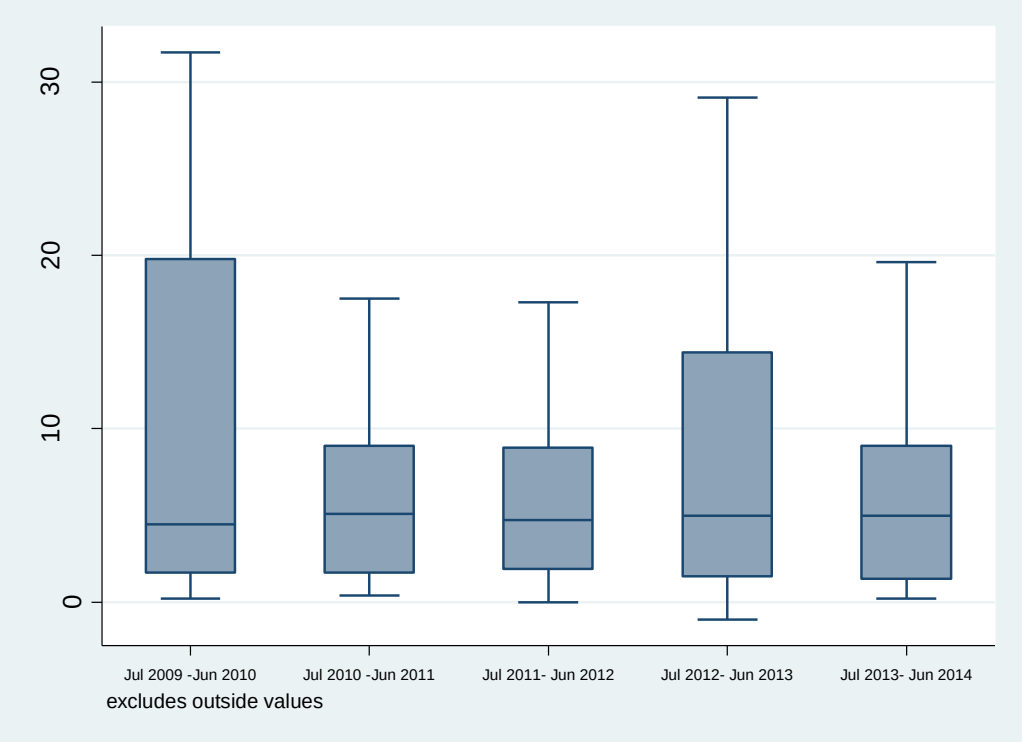
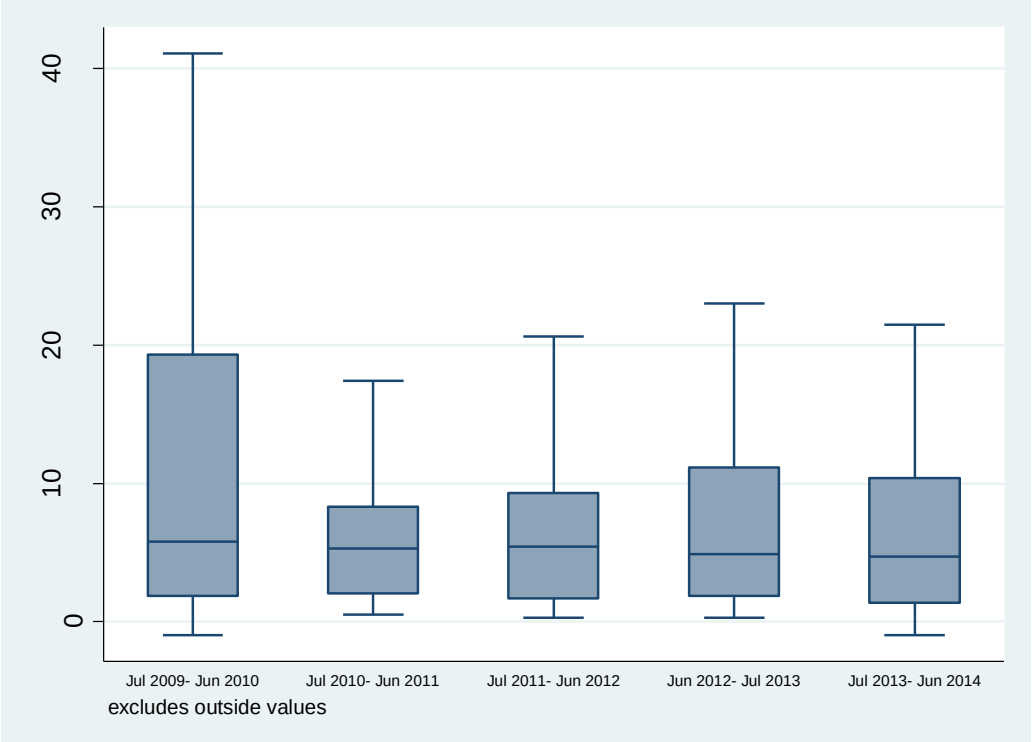


Figure 6b: Time to Admission for adult cases (>20 per cent TBSA) for years 1-5



For 57 per cent of patients transferred from another hospital, the reason for the delay in transfer was usually a result of the geographical distance from the scene of the burn injury to the burns unit, and for 22 per cent of cases, this delay was attributed to transport issues. For 18 per cent of cases, the delay occurred due to the patient not presenting to the referral hospital in a timely manner. It is also important to note that in some cases patients were provided with burns expertise through Telehealth before arrival at the burn centre.

For adult cases transferred from the scene of injury to the burns unit with a burn size greater than 15 per cent TBSA, 68 per cent of cases arrived at a BRANZ hospital within two hours of injury and 94 per cent arrived within six hours. In paediatric cases with a burn size greater than 10 per cent TBSA, 71 per cent of patients arrived at a BRANZ hospital within two hours of injury and 91 per cent arrived within six hours of injury.

Burn unit performance

The following section outlines burns 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 61 per cent of paediatric cases, and 66 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 45 per cent of cases, followed by the burn care nurse coordinator/or nurse practitioner (22 per cent), burns consultant (12 per cent), and burns fellow (six per cent).

For adult cases, where assessment was documented within 72 hours, the person conducting the assessment was the burns registrar in 27 per cent of cases, followed by burns fellow in 23 per cent of cases, the burns consultant for 19 per cent, and the burn care nurse coordinator/or nurse practitioner for 13 per cent of cases.

In other instances for both paediatrics and adults, the burn wound assessment was carried out by the burns resident, a senior burns nurse or by an emergency department clinician.

Senior Burns Clinician assessment

It is common practice that burns that are more serious are assessed and managed by a Senior Burns Clinician. A Senior Burns Clinician is defined as a 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 per cent TBSA), a Senior Burns Clinician assessment was documented in 76 per cent of cases, compared to 78 per cent in 2012-2013, 87 per cent in 2011-2012 year and 79 per cent in the 2010-11 year. This assessment was documented to have occurred within 24 hours of admission for 66 per cent of paediatric cases, which is consistent with previous reporting years.

For adult cases with major burns (greater than 15 per cent TBSA), a Senior Burns Clinician assessment was documented in 80 per cent of cases. This assessment occurred within 24 hours of admission for 63 per cent of adult cases and this figure is comparable with previous reporting years. The proportion of patients that received a senior burn clinician assessment within 24 hours was 75 per cent in 2010-2011, 55 per cent in 2011-2012 and 69 per cent in 2012-2013.

Theatre for burn wound excision

Seventy-four per cent of all cases underwent at least one burn wound management procedure in theatre and this is consistent with previous reporting years. Table 12 outlines the percentage of paediatric and adult cases that had each procedure. One case may have multiple procedures recorded but data is collected only for the first time to theatre for a particular procedure. The 'other' procedures were predominately primary wound closure, free flap, scrub and dress and the application of dressing such as negative pressure wound dressings.

Burn wound debridement and skin grafting was completed for 47 per cent of paediatric and adult cases. For cases where a full thickness burn was recorded, only 70 per cent of paediatric cases and 79 per cent of adult cases underwent debridement and grafting. These figures are comparable with the previous reporting years. The proportion of paediatric and adult patients with full thickness burns that underwent debridement and skin grafting was 83 and 84 per cent in 2011-2012, and 81 and 84 per cent 2012-2013. However, since debridement and grafting is the recommended acceptable management for full thickness burns, this data requires further examination. Of the patients that had a full thickness burn where the size of the burn was documented (n=344) in the fifth reporting year, the full thickness per cent TBSA was less than one per cent in about a quarter (28 per

cent) of the cases. More detailed analysis is required of surgical treatment of documented full thickness burns in BRANZ over the five reporting years.

The median (IQR) time to grafting from injury was 11 (7.6-14.2) days for paediatric cases, which is consistent with the previous year. For adult cases, the median time to grafting from injury was 5.9 (3.4-10.5) days, which is also consistent with the previous year.

Table 12: Percentage of burn wound management procedures

	Paediatric cases		Adult cases	
Procedure	**N**	**%**	**N**	**%**
Procedures related to debridement				
Debridement and skin grafting	388	46.5	808	47.1
Debridement and temporary skin closure product e.g. Biobrane™	136	16.3	382	22.3
Debridement only	102	12.2	248	14.5
Debridement and skin cell product (e.g. CEA)	72	8.6	162	9.4
Debridement and dermal reconstructive product e.g. Integra™	*	<0.5	11	0.6
Total debridement procedures	701	84.1	1611	93.9
Other procedures not outlined above				
Dressing change in theatre only	107	12.8	16	0.9
Escharotomy/Fasciotomy/Amputation or combination	*	<0.5	11	0.6
Other	22	2.6	78	4.5
Total Other procedures	133	15.9	105	6.1
Total Theatre Procedures	**834**	**100.0**	**1716**	**100.0**

Physical functioning assessment

Rehabilitation following burn injury requires a coordinated approach from a specialised multi-disciplinary team to minimise the consequences of burns, such as scarring, contractures and loss of function [9-11]. Allied health burn clinicians are responsible for assessing burns patients and commencing rehabilitation as early as possible.

Ideally, burns rehabilitation commences during the acute treatment phase. Of the paediatric patients who had burns greater than 10 per cent TBSA and a stay in hospital for more than 24 hours (n=79), 88 per cent had documentation of a physical functioning assessment by a physiotherapist or occupational therapist within 48 hours of admission, which is consistent with the previous reporting year (86 per cent). For adult patients, with burns greater than 15 per cent TBSA and a stay in hospital for more than 24 hours (n=138), 89 per cent had documentation of a physical functioning assessment within 48 hours of admission, which is also consistent with the previous reporting year (88 per cent).

Enteral / parenteral feeding

Burn injury increases the body's metabolic requirements. The early provision of an adequate supply of nutrients is considered crucial in reducing the effects of metabolic abnormalities [10, 12-14], and in reducing the risk of gastrointestinal dysfunction and infective complications. Of the paediatric cases with a burn greater than 10 per cent TBSA (n=91), supplementary feeding (either enteral or parenteral) was documented as commencing within 24 hours of admission for 47 per cent of patients, lower than the 72 per cent reported in the previous year. For adult cases with a burn greater than 20 per cent TBSA (n=154), supplementary feeding was documented as commencing within 24 hours for 69 per cent of patients, which was higher than observed in the last reporting period (55 per cent).

In-hospital Outcome 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 reported for four per cent of paediatric cases and 15 per cent of adult cases, which is consistent with previous reporting years. Of the paediatric cases with a burn greater than 10 per cent TBSA, an ICU admission occurred for 18 per cent of cases. For adult cases with a burn size greater than 15 per cent TBSA, an ICU admission occurred for 61 per cent of cases. The median (IQR) length of stay in ICU was 62 (26-178) hours for paediatric cases compared to 86 (19-293) hours in 2011-12 and 54 (21-235) hours in 2010–11. For adult cases the median (IQR) length of stay in ICU was 67 (33-138) hours compared to 50 (24-177) in 2011-2012 and 67 (31-192) in 2010-11.

The majority of patients (93 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, 40 (33-86) hours for paediatric cases and 84 (38–256) hours for adult cases.

The median (IQR) hours of ventilation for cases admitted to ICU was 15 (0-102) for paediatric cases and 27 (6-73) for adult cases. These numbers are consistent with the previous reporting period.

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 is considered indicative of renal impairment.

Of the paediatric cases admitted to ICU, eGFR was recorded for only three patients and no case demonstrated a negative change (>30 ml/min/1.73m2). For adult cases admitted to ICU, the eGFR was recorded for 78 per cent of cases (n=184). Of these, six cases (three 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 infection is associated with increased risk of mortality in burn injured patients [21, 22]. A blood culture was collected during the inpatient stay in 27 per cent of adult cases (n=466) and 37 per cent of paediatric cases (n=357). This rate of blood culture collection is comparable to previous reporting years. The proportion of burn patients who underwent blood culture collection increased markedly with burns greater than 20 per cent TBSA where 56 per cent of adult, and 60 per cent of paediatric, cases had a blood culture taken. For paediatric cases, three per cent of all cases had at least one positive blood culture (n=12). This figure is markedly lower than the 14 per cent and 23 per cent reported in 2012-2013 and 2011-2012 reporting periods.

A positive blood culture was reported in five per cent of all adult cases (n=21), which is not a marked decrease from the eight per cent and seven per cent of cases reported in in 2012-2013 and 2011-2012, respectively.

Weight recorded and weight loss

Measuring the patient's weight is important for the initial fluid resuscitation of the burn patient and for monitoring weight loss. Weight loss following burn injury can affect patient outcomes in terms of healing potential and rehabilitation outcomes. Extended length of stay is associated with weight loss and associated poorer outcomes [10, 13, 23].

Of the paediatric patient, with a length of stay greater than two weeks (n=91, 10 per cent), 95 per cent had their weight measured and documented within three to five days of admission, and 60 per cent of these patients had a weekly weight documented during their hospital stay. Weight loss was recorded for four paediatric patients.

For adult cases, with a length of stay greater than two weeks (n=287, 17 per cent), 45 per cent had their weight measured and documented within three to five days of admission. A weekly weight was conducted and documented for 45 per cent of these patients. Weight loss was recorded in 34 per cent of these patients. The documented weight loss during the episode of admitted patient care ranged from 0.5 to 4 kg for paediatric cases and from 0.5 to 21 kg for adult cases. The documented median (IQR) weight loss was 1.3 (0.65-2.9) kg for paediatric cases and 5 (2.7-6.2) kg for adult cases. In severe burn injury, some degree of weight loss may be unavoidable. It is necessary to develop an understanding of treatment factors that minimize weight loss and the degree to which weight loss and loss of lean body mass is avoidable.

Length of stay

The length of admission is associated with increased case complexity, and is impacted by treatment protocols[24]. Cases that did not survive to discharge, or where the length of stay was less than 24 hours, were excluded from the analysis of length of stay.

Consistent with the 2011-2012 and 2012-2013 reporting years, the median (IQR) length of stay for paediatric patients was four (two to nine) days. Figure 7a shows the distribution of length of stay by percentage TBSA grouping for paediatric patients.

The median (IQR) length of stay for adult cases was six (2-11) days which is comparable with the median length of stay reported in 2011-2012 and 2012-2013 which were seven (3-13) and five (2-11) Figure 7b shows the distribution of hospital length of stay by percentage TBSA for adults.

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

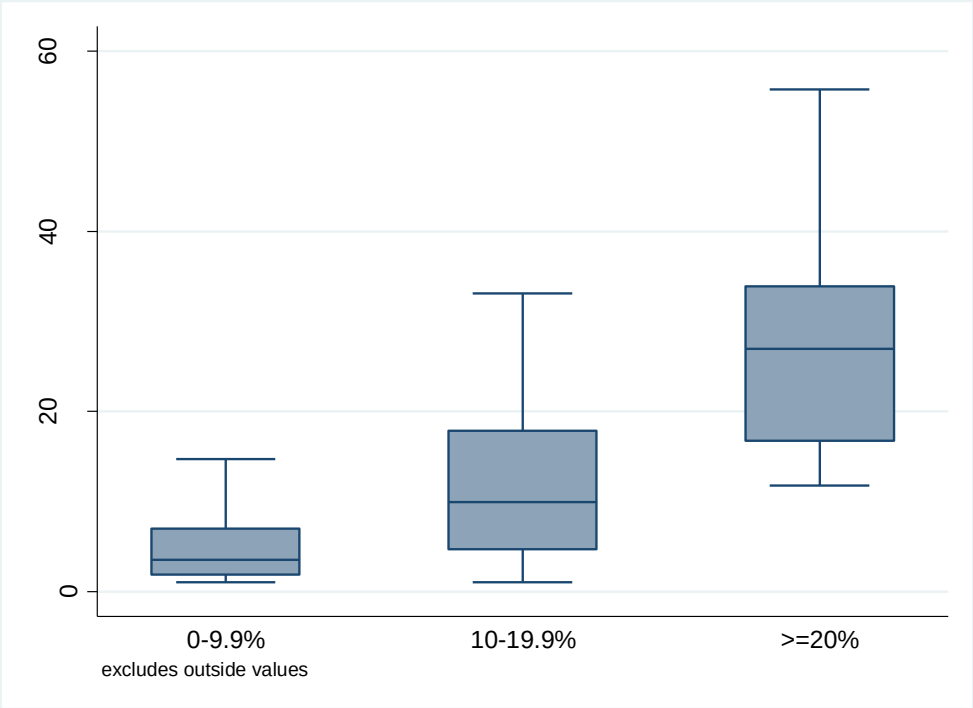
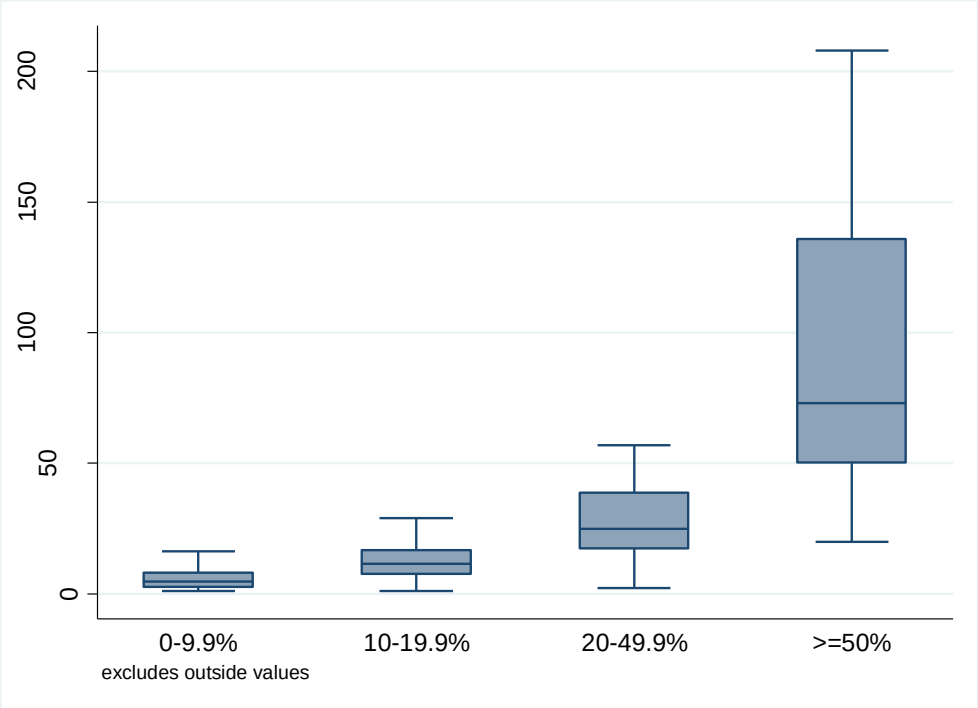


Figure 7b: Distribution of length of stay by percentage TBSA – Adults (excluding deaths)



Larger burns were associated with a greater hospital length of stay for both paediatric and adult cases. The average length of stay across BRANZ population was 10 days. This figure is comparable to the average length of stay of eight days reported in the American NBR.

Deaths

Overall, 24 (one per cent) patients died before hospital discharge and all of these patients were adults. This in-hospital death rate was lower than the reported American NBR death rate of three per cent, most likely reflecting the differences in the distribution of burn size noted earlier between the registries.

The proportion of patients who died increased with burn size. Of the 19 patients who had a TBSA greater than 50 per cent, 10 (53%) died. Of the patients who died, an inhalation injury was present in 11 (46 per cent) cases. These figures are consistent with the previous reporting year.

A reason for death was recorded for 92 (n=22) per cent of cases, with burns shock (n=8) and multi-system organ failure (n=7) the most common reasons for death.

Of the 24 patients who died during their hospital stay, active treatment was not commenced for five of the cases and these patients received only palliative care. Active treatment was commenced and withdrawn for 17 of the patients who died during their hospital stay. Nine of the 24 patients died within 24 hours of admission and the cause of death was recorded as burns shock, cerebrovascular cause or multi-system organ failure. The median (IQR) length of stay for patients who died during their hospital stay was 8 (2-15) days.

Discharge status

Most patients (88 per cent) were discharged to their usual residence and four per cent were discharged to Hospital in the Home (Table 13). Transfer to another acute hospital, or inpatient rehabilitation, were other common destinations on departure from hospital.

Table 13: Discharge Disposition

Discharge Disposition	N	%
Usual residence/ home	2334	88.0
Hospital in the Home	112	4.2
Other acute hospitals	47	1.8
Inpatient Rehabilitation	45	1.7
Died	24	0.9
Other healthcare accommodation, unless usual place of residence	14	0.53
Another BRANZ Hospital	13	0.5
Left against medical advice/ own risk	10	0.4
Psychiatric hospital	5	0.2
Other destination	49	1.9

Readmissions

A total of 103 paediatric cases (11 per cent) were readmitted within 28 days of discharge and the majority (85 per cent) were reported as a planned readmission, which is consistent with previous reporting years. 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 past reporting years the readmission rate was less for adults. Only seven per cent of adult cases (n=115) experienced a readmission within 28 days of discharge. In contrast to the paediatric patients, the majority of these cases (n=72, 63 per cent) were reported as 'unplanned' 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 was 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 BRANZ inclusion criteria are included in reports.
- Only the first acute admission that meets BRANZ 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 BRANZ 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, which limits detailed comparison with earlier BRANZ reporting years. Therefore, this report has largely focused on comparisons with the 2010-11, 2011-12 and 2012-2013 reporting years.
- 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 the current work being undertaken to review and validate the quality indicators, will be used to develop standards of acceptable quality of care performance that will be monitored and benchmarked in the future.

Conclusion

Data are presented for 2656 burn cases admitted to 15 of the 17 designated burn units across both Australia and New Zealand for the 12-month period July 2013 to June 2014. Consistent with the previous year, data completeness was 95 to 100 per cent for most core data items including the patient, burn event, admission, percentage TBSA, ICU and discharge details.

The demographic and aetiological profile of burn injury resulting in admission to Australian and New Zealand burns units was highly consistent with previous years. In particular, males aged 20 to 29 years were at high risk of sustaining a flame burn injury and children one year of age were at risk of sustaining a scald burn injury. These groups remain a high priority for injury prevention initiatives.

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 burns unit occurred, the vast majority of burns were less than 10 per cent TBSA. However, 72 per cent of all cases required theatre for a burn wound management procedure, indicating the severity of even the smaller burns and the importance of injury prevention campaigns.

While quality of care data is presented in this report, comparisons against an acceptable standard of performance and between units are not currently being performed. Current evaluation and validation of the quality indicators is currently underway and will inform revision of these indicators, and the basis for benchmarking of burns unit performance.

References

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

[2] American Burn Association. National Burn Repository 2014 .Available at: http://www.ameriburn.org/2014NBRAnnualReport.pdf

[3] Australian Bureau of Statistics. Australian Standard Geographical Classification (ASGC). Remoteness Areas, July 2011. Available at: http://www.abs.gov.au/websitedbs/D3310114.nsf/home/remoteness+structure

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Glossary

Burn Depth:	Burns are described according to the depth of injury to the skin layers and are classified into superficial dermal, mid-dermal, deep-dermal and full thickness burns [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, e.g. 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 percentage 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 a 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 of toxic products of combustion can result in early systemic effects or delayed inflammation of distal airways and alveoli with impaired gas exchange. Inhalation injuries are associated with significant morbidity and increased mortality, but have no agreed diagnostic criteria [29].
Senior burn clinician:	A burn surgeon who is the head of the 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.
Per cent Total Body Surface Area (TBSA) burn:	The common measure of area 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 one per cent of their TBSA [25].

Appendix 1: Data Completeness

Within each section, the level of completeness of each data item is defined according to whether or not the section had data entered, or by 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 or 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)	Not entered/not stated/ inadequately described: n (per cent)	Total n (per cent)
Date of Birth	2646 (100%)	-	2646 (100%)
Date of Injury	2646 (100%)	-	2646 (100%)
Time of Injury	2344 (88.6%)	302 (11.4%)	2646 (100%)
Gender	2645 (99.9%)	1 (<1%)	2646 (100%)
Ethnicity or Country of Birth	2613 (98.6)	33 (1.6%)	2646 (100%)
Residential Postcode	2638 (99.7%)	8 (<1%)	2646 (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	2646 (100%)	-	2646 (100%)
Time of Admission	2646 (100%)	-	2646 (100%)
Fund	2633 (99.5%)	13 (<1%)	2646 (100%)
Admission Type	2646 (100%)	-	2646 (100%)
Referral Source	2646 (100%)	-	2646 (100%)

Event Section	Complete and valid response: n (per cent) eligible	Not entered/not stated/ inadequately described: n (per cent)	Total (per cent)
Cause - Primary	2643 (99.9%)	3 (<1%)	2646 (100%)
Accelerant	2631 (99.4%)	15 (<1%)	2646 (100%)
Accelerant Type	482 (98.8%)	5 (<1%)	487 (100%)
Explosion/Flash	2613 (98.6)	33 (1.6%)	2646 (100%)
Activity when injured	2543 (96.1%)	103 (3.9%)	2646 (100%)
Place of injury	2545 (96.2%)	101 (3.8%)	2646 (100%)
Intent of injury	2638 (99.7%)	8 (<1%)	2646 (100%)
Event Postcode	2418 (91.4%)	228 (8.6%)	2646 (100%)
Drug/Alcohol Involvement	2333 (88.2%)	313 (11.8%)	2646 (100%)
Inhalation Injury	2646 (100%)	-	2646 (100%)
Transfer Delay - Geographical	2098 (98.5%)	32 (1.5%)	2130 (100%)
Transfer Delay - Patient Initiated	2097(98.5%)	33 (1.6%)	2130 (100%)
Transfer Delay - Transport-related	2080 (97.7%)	50 (2.3%)	2130 (100%)
Transfer Delay – ED/OP managed	2107(98.9%)	23 (1%)	2130 (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	2520 (95.2%)	126 (4.7%)	2646 (100%)
Cool Running Water	1853 (99.3%)	13 (<1%)	1866 (100%)
Water Minutes	1606 (96.3%)	62 (3.7%)	1668 (100%)
Water Hours	1654 (99.2%)	14 (<1%)	1688 (100%)
Hydrogel	1811 (97.0%)	55 (3.0%)	1866 (100%)
Other Cooling Techniques	394 (96.3%)	15 (3.7%)	409 (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	2567 (97.1%)	77 (2.9%)	2644 (100%)
Superficial	683 (99.4%)	4 (<1%)	687 (100%)
Mid dermal	1020 (99.4%)	6 (<1%)	1026 (100%)
Deep dermal	896 (99.6%)	4 (<1%)	900 (100%)
Full thickness	339 (99.4%)	2 (<1%)	341 (100%)
Assessed By	2543 (96.2%)	101 (3.8%)	2644 (100%)
Assessed Date/Time	2570 (97.2%)	74 (2.8%)	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	2616 (98.9%)	30 (1.2%)	2646 (100%)
Surgeon Assessment Date & Time	1487 (100%)	-	1487 (100%)
Physical Function Assessment	130 (95.6%)	6 (4.4%)	136 (100%)
Enteral /Parenteral Feeding	2533 (95.7%)	113 (4.3%)	2646 (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	2639 (99.7%)	7 (<1%)	2646 (100%)
ICU Stay	273 (100%)	-	273 (100%)
ICU Readmission	272 (99.6%)	1 (<1%)	273 (100%)
Ventilation Hours	204 (100%)	-	204 (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)	251 (91.9%)	22 (8.0%)	273 (100%)
Blood Cultures	2633 (99.5%)	13 (<1%)	2646 (100%)
Positive Swab on Admission	2638 (99.7%)	8 (<1%)	2646 (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 result 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. 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	2643 (99.9%)	3 (<1%)	2646 (100%)
Death Cause	23 (100%)	-	23 (100%)
Decision	23 (100%)	-	23 (100%)
Decision Date	21 (91.3%)	2 (8.7%)	23 (100%)
Discharge Date &Time	2646 (100%)	-	2646 (100%)

'Decision' refers to the treatment decision made as in whether to withdraw or withhold medical treatment in the case of patients who died.

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	279 (78.6%)	76 (21.4%)	355 (100%)
Weight Weekly	271 (76.3%)	84 (23.6%)	355 (100%)
Weight Loss	166 (72.5%)	63 (27.5%)	229 (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.

Appendix 2: Management Committee Membership

Belinda Gabbe	Monash University, DEPM	BRANZ Project Supervisor, Senior Research Fellow
Harini de Silva	Monash University, DEPM	BRANZ Project Coordinator
Jessica Callaghan	Monash University, DEPM	BRANZ Research Assistant
Mimi Morgan	Monash University, DEPM	Research Program Manager, Critical Care Division

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)	✓	✓
Harini de Silva	Monash	Project Coordinator	✓	✓
Jessica Callaghan	Monash	Project Officer	✓	✓
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	✓	✓
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 Specialties		✓
Linda Quinn	SA, WCH	Burns - Advanced Clinical Practice Consultant	✓	
Fiona Wood	WA, RPH	Head of Burns Unit	✓	
Dale Edgar	WA, RPH	Senior Physiotherapist / McComb Clinical Research Manager (Past ANZBA President)	✓	
Joy Fong	WA, RPH	Clinical Nurse Consultant		✓

NAME	SITE	TITLE	Steering Committee	Reference Committee
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		✓
Bethany Farley	Julian Burton Burns Trust	Manager, Projects and Programs	✓	

Appendix 4: BRANZ Data Collectors

NAME	STATE	SITE	TITLE
Helen Donaldson	VIC	Alfred	Burn Registry Nurse
Kathy Bicknell	VIC	Royal Children's	Burns CNC
Kelly Stockton	QLD	Royal Children's	Clinical Research Manager
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
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
Lynne Walker	NZ	Waikato	CNS
Krystal Chaffe	NZ	Middlemore	Burns Nurse
Supra Pebberti	NZ	Middlemore	Ward Clerk

Appendix 5: BRANZ 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 BRANZ hospitals. Sixteen of the 17 burns units have ethics approval to submit data to BRANZ and the remaining site (Royal Brisbane and Women's Hospital in Queensland) is in the process of obtaining approval. For this reporting period, 15 sites contributed data (Table 14). 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 14: Australian and New Zealand BRANZ 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, and 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 Units	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/Hospitals/RNSH
Concord General Repatriation Hospital	NSW	http://www.slhd.nsw.gov.au/Concord/
Children's Hospital Westmead Hospital	NSW	http://www.schn.health.nsw.gov.au/parents-and-carers/our-services/burns/chw
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 adequate building, equipment, qualifications and the 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 included in BRANZ have been reported in previous annual reports and are currently under review for further clarification and amendment. Data was received from 11 of the 17 sites (65 per cent response rate) and the questions required a yes/no response only.

STRUCTURAL QUALITY INDICATORS	Number of centers that responded	Yes (n)	Yes (%)
1. Is a Burns Surgeon available on call 24 hours?	13	11	85%
2. Is a Burns theatre available on a 24-hour basis?	13	10	77%
3. (a) Is Multidisciplinary care provided within the Burns unit?	13	13	100%
(b) Are weekly multidisciplinary team meetings Conducted in the burns unit?	13	13	100%
4. Does your unit routinely complete infection Surveillance swabs on admission?	13	9	69%

Appendix 8: ANZBA Referral Criteria

ANZBA
Australian & New Zealand Burn Association

Care • Prevention • Research • Education

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;
- 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