ANNUAL REPORT

1st July 2015 – 30th June 2016

BRANZ

Burns Registry of Australia and New Zealand

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Foreword

The Burns Registry of Australia and New Zealand (BRANZ) continues to develop: it informs prevention campaigns and supports quality improvement projects and burns clinical research across our two countries. Now in its eighth year in its current form, I am pleased to present our 7th Annual Report.

This reporting year is notable for the publication of our first benchmarking paper, which compares clinical practices and outcomes of treatment for the ten contributing units which treat adult patients. This paper demonstrates significant risk-adjusted differences in treatment areas fundamental to burn care, and significant variation in length of stay and mortality outcomes between units. Such variation serves as a flag that signals the need for further unit based investigation of practice and outcomes, and demonstrates the value of clinical quality registries such as the BRANZ in monitoring care and supporting quality improvement initiatives. Benchmarking is supported by involved burns clinicians and demonstrates confidence in data quality and analysis provided to the Registry for the purposes of improving quality of care.

The registry itself continues to improve, and in 2016, all specialist Burns Units in Australia and New Zealand were contributing their data. Because of the highly centralised arrangements for provision of specialist burn care in Australia and New Zealand, this means that the registry now includes virtually all serious burn injuries that reach hospital in our two countries, and adds significantly to the value of the registry from a prevention and epidemiologic perspective. A review of quality indicators in the registry is now complete and a revised set of indicators has been introduced in July 2016 for the next annual reporting period. The Burns Quality Improvement Program (BQIP) also continues to develop, and we are making headway with a project to begin international benchmarking of outcomes with the US and other national burns associations.

The BRANZ is recognised as a world leader in burns clinical quality registries, and has been developed by committed clinicians from many disciplines dedicated to providing a world-class service. It provides the only opportunity for burn care clinicians in our region to audit their practice and outcomes, and compare these with their peers. Ongoing support by clinicians, and adequate and secure resourcing will help to ensure that burn-injured patients in our region receive the highest standard of care.

We commend this report to you.

Heather Cleland

Chair,

Steering Committee BRANZ

Fiona Wood

President,

Australian and New Zealand Burn Association (ANZBA)

Contents

Executive Summary

This is the seventh 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. In addition, process of care and outcome quality indictors are embedded in the registry. These data make it possible to monitor burn injury incidence and improve our understanding of burn causation. The data can be used to develop targeted prevention campaigns and to identify objective and verifiable data on treatment, outcomes and quality of care in burn injury management. 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 2,817 burns patients treated at 16 burn units over the 12-month period from 1st July 2015 to 30th June 2016. Adults represented 67 per cent of all cases and males accounted for 67 per cent. Children aged 1 to 2 years accounted for 30 per cent of paediatric cases while 20 to 29 year olds accounted for 24 per cent of adult cases. Flame (34 per cent) and scald burns (35 per cent) were the primary cause of burn injury. Scald burns were the predominant cause for paediatric patients accounting for 53 per cent of all burns. For adults, flame burn was the predominant cause. The vast majority (94 per cent) of burns were considered unintentional.

A burn cooling intervention was provided at the scene of injury in 72 per cent of cases. The median (IQR) time from injury to admission to a BRANZ hospital was 18 (3-161) hours for paediatric cases and 17 (4-102) hours for adult cases. A burn of less than 10 per cent total body surface area (TBSA) was recorded for 84 per cent of cases. Three quarters of all cases underwent a burn wound management procedure in theatre and, half of these cases required skin grafting. The median (IQR) length of stay (LOS) was 4 (2-8) days for paediatric cases and 5 (3-11) days for adult cases (excluding deaths and LOS less than 24 hours). Less than two per cent of all cases died in-hospital and the majority of cases (88 per cent) were discharged to their usual residence. Thirteen per cent of paediatric cases were readmitted within 28 days of discharge and the majority (79 per cent) were reported as planned readmissions. A readmission was also recorded for eight per cent of adult cases, however, the majority (49 per cent) were 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. In 2016, BRANZ completed a review of quality indicators and on July 1 2016, new and updated quality indicator variables were added to the database. New quality indicator variables include whether an accepted diagram (such as the rule of nine) was used to calculate the per cent of TBSA, and screening of nutritional status.

About this report

This is the seventh annual report of the Burns Registry of Australia and New Zealand (BRANZ). Data collected between the 1st July 2015 and 30th June 2016 (Year 7) is summarised in this report. Sixteen of the 17 BRANZ sites (12 out of 13 Australian sites and 3 out of the 4 New Zealand sites) contributed data with 2817 cases entered.

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 sixteen BRANZ sites that contributed to this report, five sites treat paediatric patients, five sites treat adult patients and six sites treat both paediatric and adult patients.

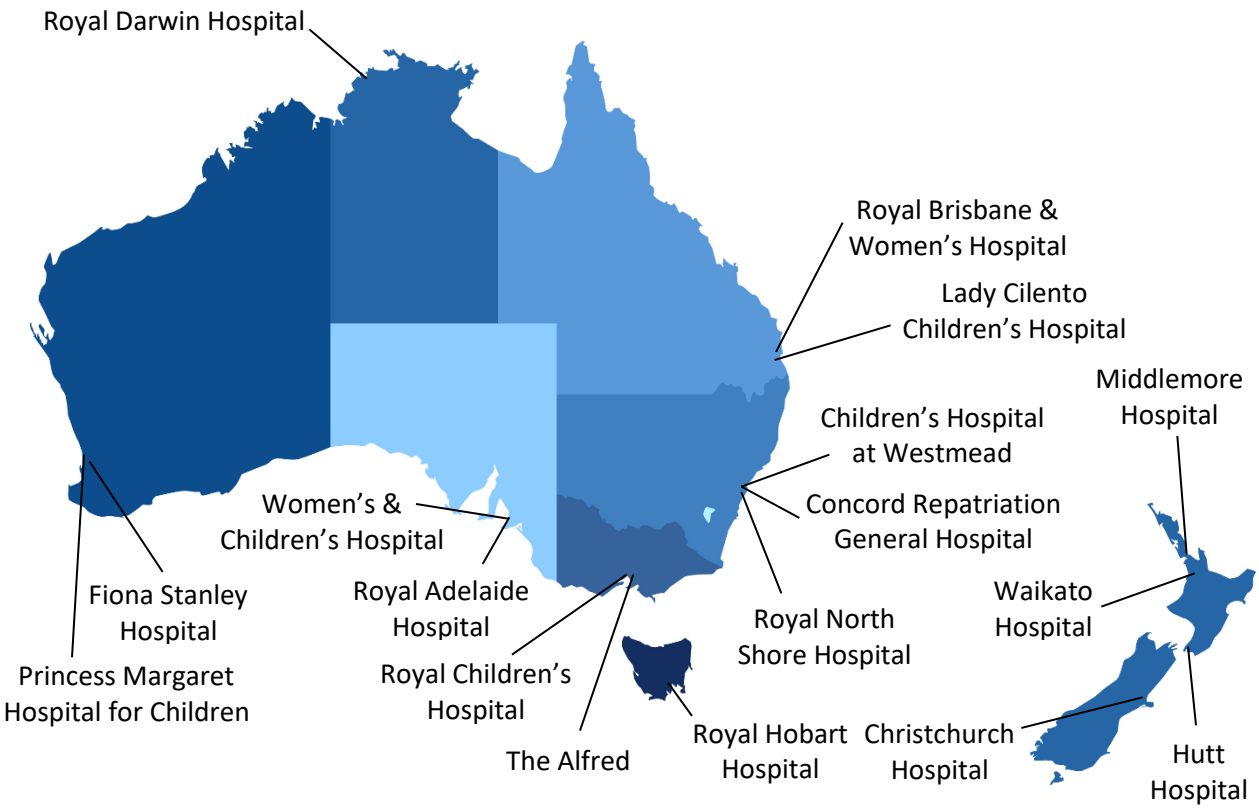
The report describes the registry, as well as the profile, treatment and outcomes of burns unit admissions from 1st July 2015 to 30th June 2016. Quality of care data related to processes of care is also provided. Where appropriate, data has been compared to previous annual report periods. Data has also been compared with the American Burn Association's National Burn Repository (NBR) 2016 (1) report of data from 2006 to 2016, when NBR comparable summary data is available.

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 was 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 Department of Epidemiology and Preventive Medicine (DEPM) Monash University.

Figure 1: Designated burns units across Australia and New Zealand



The registry has been funded by ANZBA with additional funding from the Julian Burton Burns Trust (2008-2013), the Australian Commission on Safety and Quality in Health Care (2008-2009), 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 (2013-2017). 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 seventh year of reporting (July 2015 to June 2016), all 16 of the 17 BRANZ sites with ethics approval contributed data to the seventh 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. Support improved service planning;

v. Provide data to underpin development of best practice clinical guidelines and initiatives;

vi. Enable benchmarking of 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. In 2015, a quality indicator working party was convened to review and develop improved quality indicators for the registry, and in July 2016, new indicators were added and existing quality indicators were updated.

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 https://www.branz.org. In the seventh 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. International Society for Burn Injuries Congress, Miami, August-September 2016: Water First Aid Is Beneficial In Humans Post-Burn: Evidence from a Bi-National Cohort Study. Dale Edgar.

2. Australian and New Zealand Burns Association Annual Scientific Meeting, Melbourne, October 2015: Water First Aid Is Beneficial In Humans Post-Burn: Evidence from a Bi-National Cohort Study. Dale Edgar.

3. Australian and New Zealand Burns Association Annual Scientific Meeting, Melbourne, October 2015: The Value of Measuring Variance in Burn Practice? John McNeil.

4. Australian and New Zealand Burns Association Annual Scientific Meeting, Melbourne, October 2015: BRANZ – What is the Data Telling Us? Heather Cleland.

5. Australian and New Zealand Burns Association Annual Scientific Meeting, Melbourne, October 2015: BRANZ Adult Long-Term Outcomes Pilot Study. Belinda Gabbe.

6. Australian and New Zealand Burns Association Annual Scientific Meeting, Melbourne, October 2015: ANZBA's Burn Quality Improvement Program. Yvonne Singer.

BRANZ was presented at many educational seminars during the 2015-2016 reporting period, including:

1. ANZBA online seminar series and the ANZBA Nursing Seminar Forum, Melbourne. Yvonne Singer.
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. Yvonne Singer.

Publications

During the reporting period, the following studies were published using BRANZ data:

1. Gabbe BJ, Cleland H, Watterson DM, Schrale R, McRae S, Parker C, et al. Long term outcomes data for the Burns Registry of Australia and New Zealand: Is it feasible? Burns. 2015 Dec;41(8):1732–40.

2. Wood FM, Phillips M, Jovic T, Cassidy JT, Cameron P, Edgar DW, et al. Water First Aid Is Beneficial In Humans Post-Burn: Evidence from a Bi-National Cohort Study. PLOS ONE. 2016 Jan 25;11(1):e0147259.

3. Cleland H, Greenwood JE, Wood FM, Read DJ, Wong She R, Maitz P, Castley A, Vandervord JG, Simcock J, Adams CD, Gabbe BJ. The Burns Registry of Australia and New Zealand: progressing the evidence base for burn care. (2016)Med J Aust. Mar 21;204(5):195.

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 not 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 by participating sites on BRANZ during the seventh year (1st July 2015 to 30th June 2016) was 2817, with 1889 adult cases (16 years of age and older) and 926 paediatric cases (15 years of age and under).

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 seven 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 limit the capacity to carry out comparisons between sites and over time. The number of contributing sites has increased over time, and with the exception of one site (Site M), sites have consistently contributed their data.

Figure 2: Reporting year trends in burn patients

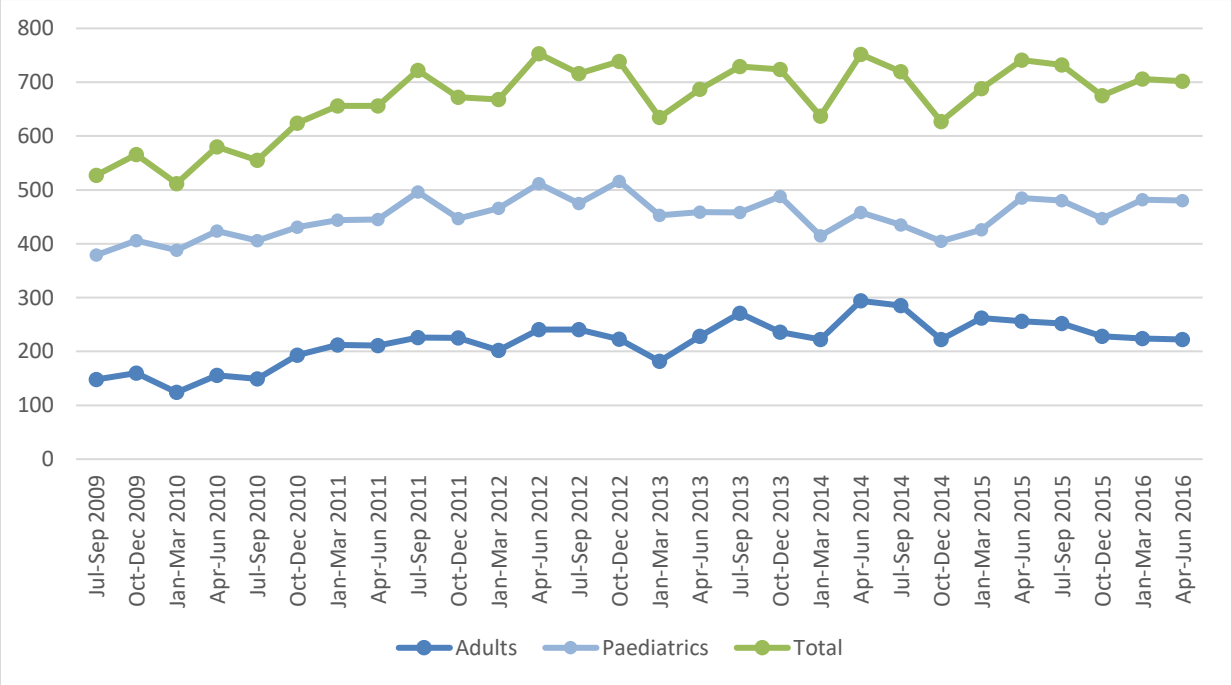


Table 1: Site case numbers per reporting year

Site	2009-10	2010-11	2011-2012	2012-13	2013-14	2014-15	2015-16	TOTAL
A	282	262	303	283	247	246	283	1,916
B	224	173	205	162	110	148	129	1,151
C	237	269	262	274	270	231	291	1,834
D	84	80	89	100	94	88	80	615
E	333	321	329	386	354	301	351	2,375
F	196	266	232	168	180	177	190	1,409
G	0	136	217	220	195	174	177	1,119
H	9	0	20	13	130	134	105	411
I	55	85	75	83	96	81	91	566
J	2	65	84	75	79	64	83	452
K	0	62	104	88	86	106	121	567
L	121	92	103	78	71	66	77	608
M	0	0	0	52	90	101	6	249
N	192	236	273	289	263	267	237	1,757
P	245	219	238	236	276	298	260	1,772
Q	205	225	281	270	301	284	334	1,900
Total	2,185	2,491	2,815	2,777	2,842	2,776	2,815	18,701

Demographic Profile of Hospitalised Burn Patients

Figures 3a and 3b show the age distribution by gender for paediatric and adult cases. Sixty-seven per cent of all cases were males and they represented the majority of cases in all age groups. Thirty per cent of paediatric cases were aged 1 to 2 years while 24 per cent of the adult cases were aged 20 to 29 years. These figures are consistent with the previous six BRANZ reporting years. The findings are also consistent with the American National Burn Repository (American NBR) 2016 annual report where males represented 68 per cent of cases, 30 per cent of paediatric cases were aged 1 to 2 years and 21 per cent of the adult cases were aged 20 to 29 years.

Figure 3a: Age distribution by gender – paediatric cases

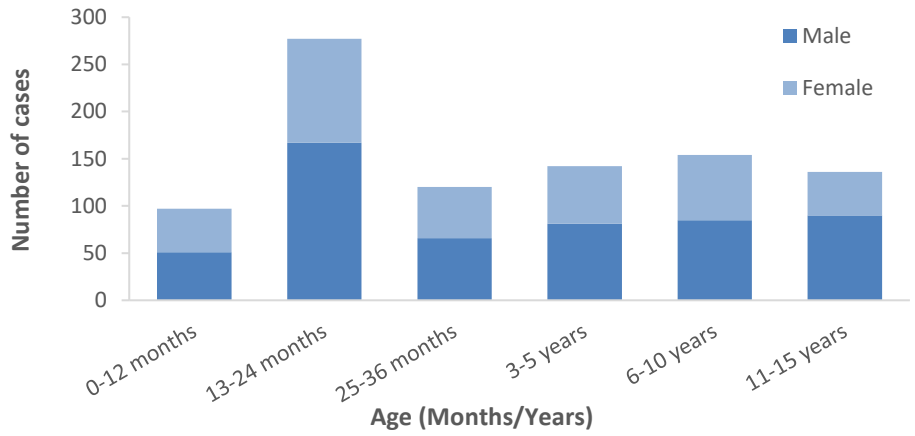
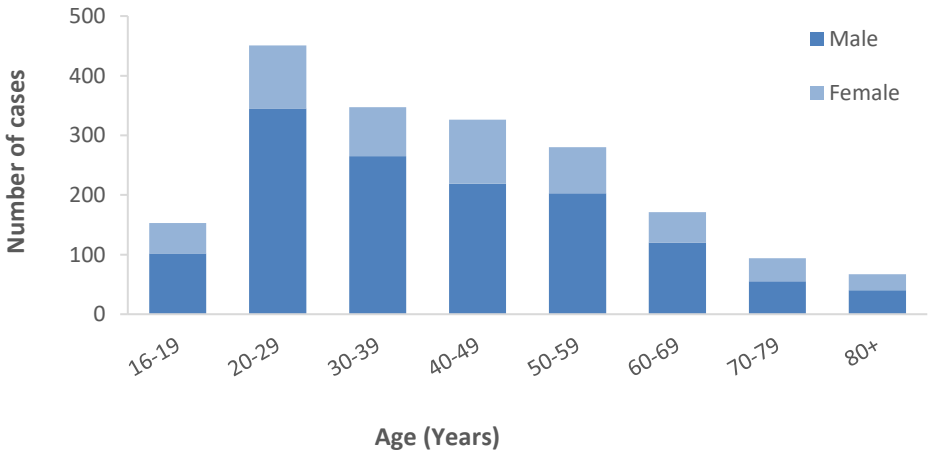


Figure 3b: Age distribution by gender – adult cases



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). In 2015-16 BRANZ recorded 2,416 admissions to Australian sites and 401 admissions to New Zealand sites.

The majority of cases admitted to Australian burns units were born in Australia (n=1,929, 81 per cent). Indigenous Australians accounted for 9 per cent of the Australian born admissions, consisting of 11 per cent of paediatric cases and 7 per cent of adult cases. This is consistent with proportions of both adult and paediatric indigenous cases in the previous reporting year. Of the patients admitted to Australian burns units, 450 were recorded as being born overseas. The country of birth was missing for 37 cases.

Of the New Zealand burn admissions, 51 per cent (n=174) were classified as 'New Zealander' and a further 26 per cent of cases (n=90) were classified as 'New Zealand Maori'. There were 69 patients classified as 'Other Oceanian descent'. These were predominantly Samoan (n=30, 43 per cent of other Oceanian and 9 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	%
Australian Peoples	1,929	81
North-West European	89	4
Southern and Eastern European	68	3
South-East Asian	60	3
Southern and Central Asian	53	2
North African and Middle Eastern	48	2
New Zealand Peoples	47	2
North-East Asian	28	2
Peoples of the Americas	24	1
Sub-Saharan African	18	<1
Oceanian (other)	15	<1

Region of Ethnicity - New Zealand Units	N	%
Oceanian	340	86
South East Asian	15	4
Southern and Central Asian	14	4
North East Asian	9	2
Peoples of the Americas	6	2
North West European	*	1
Southern and Eastern European	*	<1
North African and Middle Eastern	*	<1
Sub-Saharan African	*	<1

* Less than five cases

Most cases admitted to Australian burns units were funded by the Australian Health Care Agreement (n=1982, 82 per cent). A further 9 per cent (n=207) were covered under the relevant workers compensation scheme in each state or territory and 6 per cent (n=151) 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=395, 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 35 per cent, flame burns for 34 per cent, and contact burns for 16 per cent of all cases. The 2016 data from the American NBR also identified flame burns and scalds as the most common aetiology, however flame related injuries were more frequent (41 per cent) than scald injuries (33 per cent) in reporting USA burn units.

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 these groups. The most common overall cause for burn injury among paediatric cases was scalds (53 per cent) followed by contact (22 per cent) and flame (11 per cent) injuries. Scald burns were the most common cause of injury across all paediatric age groups except 11-15 years, in which flame burns were slightly more common. This contrasts with last year, when scald burns were also most common in the 11-15-year group, but is consistent with earlier previous years.

The most common overall cause of adult burn injuries was flame (45 per cent) followed by scald burns (27 per cent) and contact burns (14 per cent). In the adult age range of 16 to 79 years, flame burn was the most common cause of injury, and scald burns were the predominant cause of burn injuries for 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	61	191	66	63	62	42	**485**	**50**
Contact	22	55	29	31	33	31	**201**	**22**
Flame	*	5	*	19	32	43	**103**	**11**
Friction	*	12	18	22	20	7	**82**	**9**
Chemical	5	*	*	*	*	6	**20**	**2**
Radiant Heat (no contact to source)	*	*	*	*	*	*	**8**	**<1**
Cooling	*	*	*	*	*	*	*	**<1**
Electrical	*	*	*	*	*	*	*	**<1**
Pressurised gas/air (non-flame)	*	*	*	*	*	*	*	**<1**
Other	*	*	*	*	*	*	*	**<1**
Total	**96**	**271**	**119**	**141**	**154**	**136**	**917**	**100**

* 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	66	218	153	150	124	70	39	15	**835**	**45**
Scald	43	110	87	73	71	49	36	36	**505**	**27**
Contact	20	53	48	52	46	24	8	7	**258**	**14**
Chemical	6	26	22	22	19	10	*	*	**110**	**6**
Friction	13	27	14	12	*	5	*	*	**76**	**4**
Radiant Heat (no contact to source)	*	*	*	9	7	8	5	5	**42**	**2**
Electrical	*	7	14	*	7	*	*	*	**37**	**2**
Pressurised gas/air (non-flame)	*	*	*	*	*	*	*	*	*	**<1**
Cooling	*	*	*	*	*	*	*	*	*	**<1**
Other specified cause	*	*	*	*	*	*	*	*	*	**<1**
Total	**153**	**448**	**345**	**325**	**278**	**168**	**93**	**66**	**1,876**	**100**

* Less than five cases

Figure 4a: Frequency of flame, scald and contact burns by paediatric age group

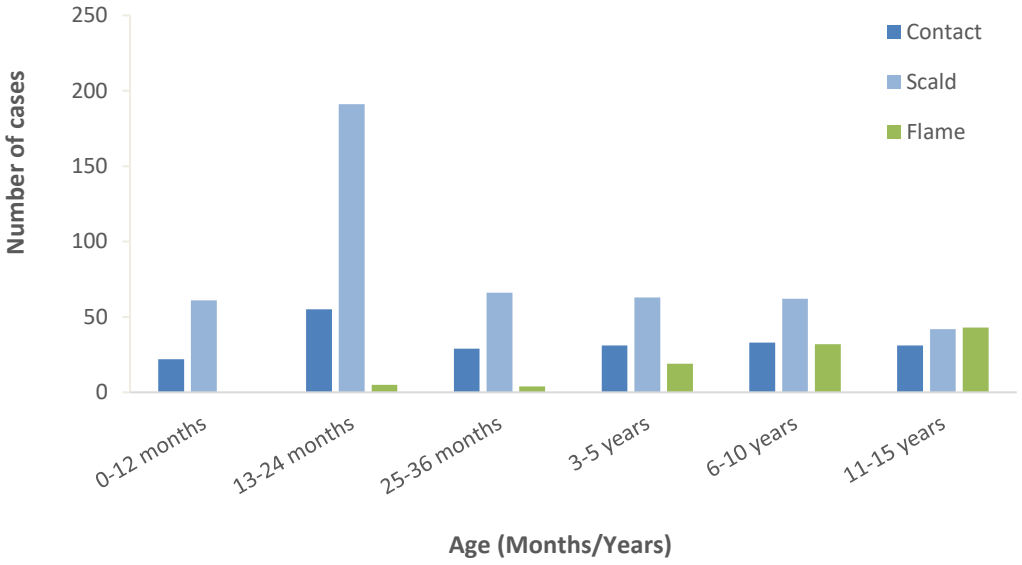
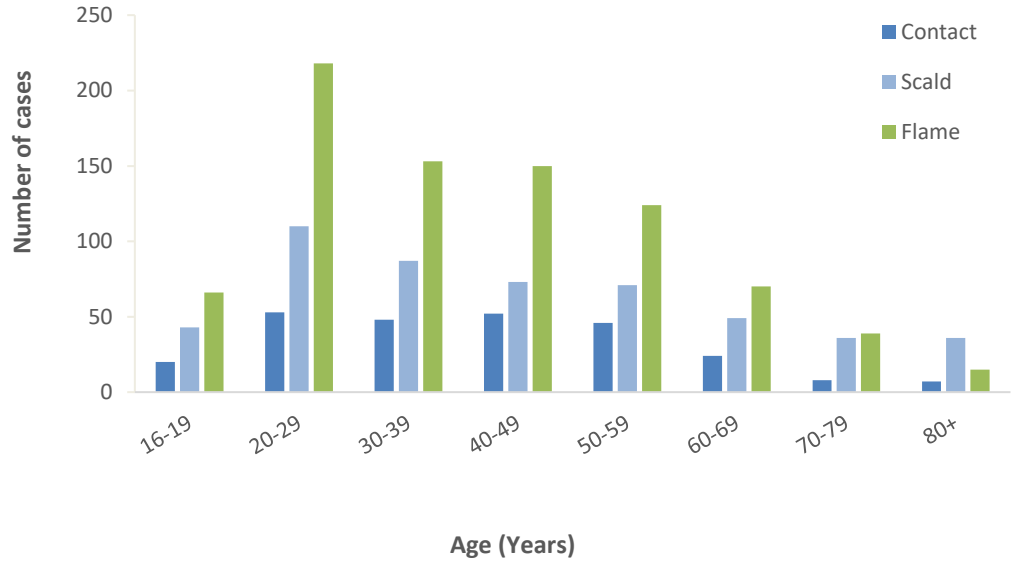


Figure 4b: Frequency of flame, scald and contact burns by adult age group



The most common sub-causes of paediatric and adult burn injuries are shown in Tables 4a and 4b. These sub-causes accounted for 80 per cent of paediatric cases and 66 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 or thermos and scald injury from food. In adult cases, flame burns resulting from a campfire, bonfire or burn-off were the most common sub-cause, followed by scald burns from water from a saucepan, kettle, jug, billy, urn or thermos and scalds due to fat or oil. The three most common sub-causes of burn injury in both adults and paediatrics have been consistent over the past five years, however scald burns from water from a saucepan kettle jug, billy, urn or thermos replaced scalds due to fat or oil as the second most prevalent sub-cause in adult cases this year.

In 54 per cent of flame burn cases, an accelerant was used to ignite or enhance the flame. Petrol was the most common accelerant used (52 per cent) followed by methylated spirits (11 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	158	17
Scald	Water from saucepan/kettle/jug/billy/urn	131	14
Scald	Food (liquid/solid)	92	10
Contact	Vehicle Exhaust	49	5
Friction	Treadmill	45	5
Contact	Coals/Ashes	44	5
Scald	Water from tap/bath/shower	37	4
Flame	Campfire/Bonfire/Burn-off	34	4
Scald	Fat/Oil	28	3
Friction	via Vehicle or Motorbike	27	3
Flame	Lighter/Matches	18	2
Contact	Iron	17	2
Contact	Hot Metal	16	2
Contact	Hair wand/straightener	16	1
Contact	Electrical/Gas Heater	13	1

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

Cause	Sub-Cause	N	%
Flame	Campfire/Bonfire/Burn-off	252	14
Scald	Water from saucepan/kettle/jug/billy/urn	128	7
Scald	Fat/Oil	105	6
Flame	Other	103	6
Chemical	Alkali	77	4
Flame	Gas/Gas Bottle	77	4
Scald	Hot beverage	64	3
Flame	Lighter or Matches	58	3
Flame	Vehicle/Engine parts	58	3
Friction	via Vehicle or Motorbike	56	3
Contact	Hot Metal	53	3
Scald	Food (liquid/solid)	53	3
Flame	Welder/grinder	50	3
Flame	Other source	45	2
Flame	BBQ	42	2

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 date of injury. While the primary burn cause was recorded for all patients, a burn injury sub-cause was recorded for 98 per cent of adult (n=1,850) adult and paediatric (n=909) 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 includes electric, wood, gas, open fireplace and any other heater types. Burn injuries caused by heaters showed a seasonal trend in paediatric injuries with most cases occurring during winter (n=17, 52 per cent). There was only one injury caused by a heater recorded in the summer months. Heater burns were predominantly contact or flame injuries and there were no injuries in paediatric cases caused by radiant heat. Scald injuries caused by hot beverages occurred consistently over the seasons. In contrast, scald injuries caused by water from a saucepan, kettle, jug, billy, urn or thermos occurred more frequently in winter (31 per cent). These proportions are different from the previous year.

Burns caused by contact with a vehicle exhaust were more prevalent in summer and autumn (66 per cent) compared to the spring and winter months. These injuries were commonly sustained when riding or being a passenger on a motorbike, quad bike or trail bike and the majority of children sustaining these injuries (77 per cent, n=38) were between 6 and 15 years of age.

The highest incidence of contact burns caused by coal and ashes (39 per cent) occurred in autumn. The incidence of flame burn injuries caused by campfires, bonfires and burn-offs was lowest during the summer months (9 per cent) and highest during spring (41 per cent).*Adult cases*

In adult cases, more than half of burns caused by heaters (61 per cent) and hot water bottles (61 per cent) occurred in winter (Figure 5b), reflecting the higher levels of exposure to these items in the cooler months. While winter still had more adult burns caused by coals and ashes than any other season, in contrast to previous years this proportion was less than half (31 per cent). Most barbeque related burns caused flame injuries (n=42, 91 per cent) and most cases occurred during spring, summer and autumn. Use of an accelerant was recorded for 74 per cent (n=31) of the flame burns resulting from barbeques.

Flame burns from welders and friction burns from vehicles and motorbikes showed a seasonal pattern different to the last reporting period, but similar to earlier previous reporting periods where there was a higher incidence in summer. A higher incidence of flame welder burns occurred in summer (32 per cent) and autumn (30 per cent) compared to winter (20 per cent) and spring (18 per cent). A higher incidence of friction burns from vehicles and motorbikes was seen in summer (29 per cent) and autumn (25 per cent).

Consistent with paediatric cases, the number of adult burn injuries caused by campfires, bonfires and burn-offs was lowest in the summer months (n=34, 13 per cent), compared to 29 per cent (n=73) occurring in autumn, 33 per cent (n=82) in winter, and 25 per cent (n=63) during spring (Figure 5b).

Figure 5a: Seasonal trends by paediatric age group

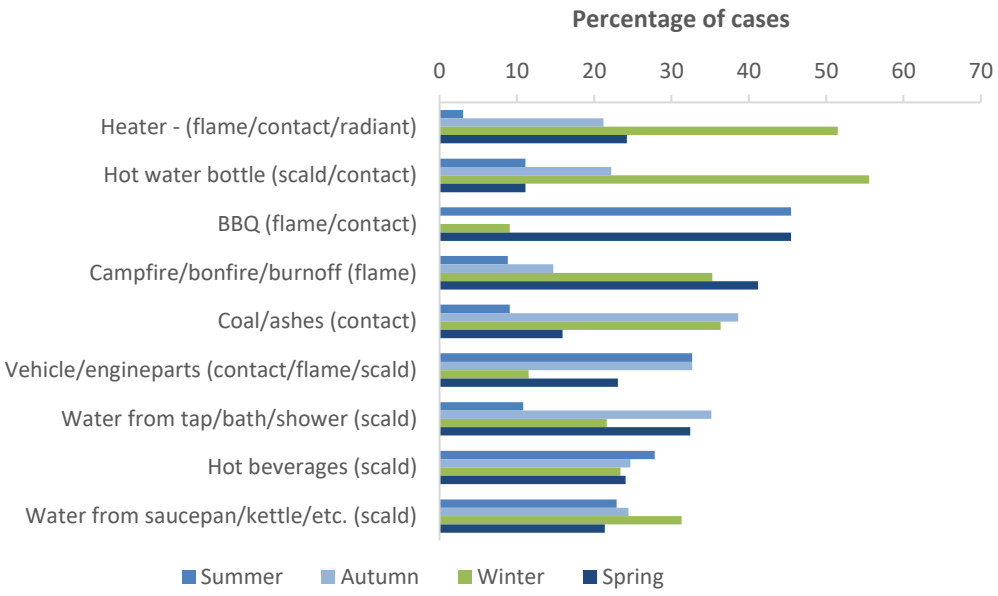
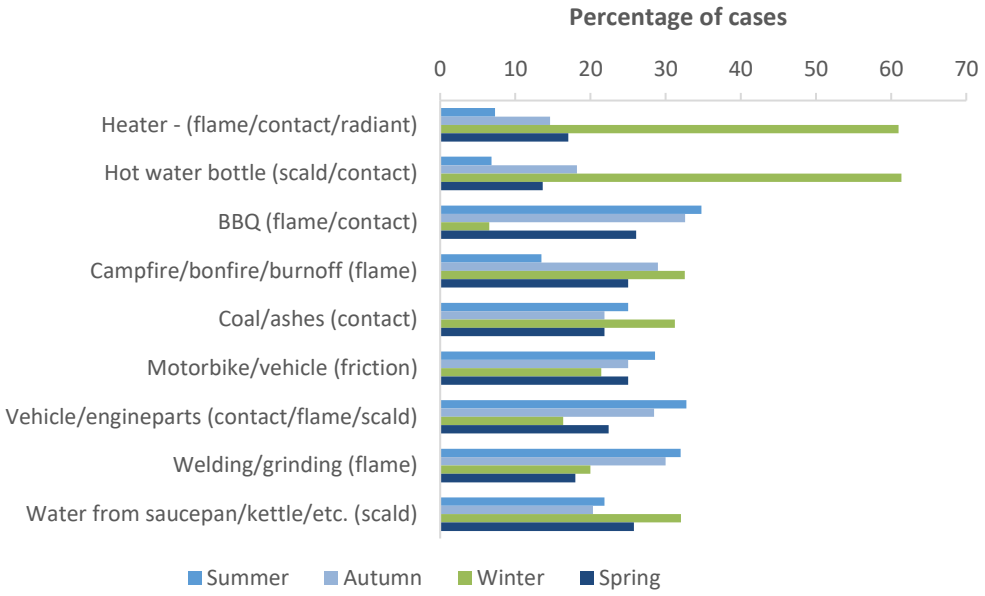


Figure 5b: Seasonal trends by adult age group



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

Intent, place and activity of injury

The majority of burns patients (94 per cent) sustained their injury during unintentional events. Intentional self-harm accounted for three per cent of all cases. The remaining cases included assaults, adverse effects or complications of medical treatment, or the intent was not known. Compared to unintentional burn cases, a higher proportion of intentional self-harm cases sustained injuries that were greater than 10 per cent TBSA (39 versus 15 per cent).

The place of injury for paediatric and adult cases are summarised in Tables 5a and 5b. Most burn injuries occurred at home (62 per cent). This finding is consistent with previous reporting years and the American NBR. In 75 per cent of paediatric cases and 55 per cent of adult cases, the injury occurred at home.

Table 5a: Place of injury – paediatrics

Place of injury	N	%
Home	675	75
Other residence (e.g. friend's House)	69	8
Place for recreation	58	6
Street and highway	23	3
School, other institution and public administrative area	21	2
Farm	12	1
Trade and service area	8	<1
Industrial and construction area	*	<1
Other specified place	32	4
Total	901	100.0

* Less than five cases

Table 5b: Place of injury – adults

Place of injury	N	%
Home	997	55
Trade and service area	176	10
Place for recreation	136	8
Street and highway	123	7
Other residence (e.g. friend's House)	118	7
Industrial and construction area	77	4
Farm	75	4
School, other institution and public administrative area	21	1
Residential Institution	9	<1
Sports or athletics area	5	<1
Other specified place	74	4
Total	1,811	100.0

The kitchen was the place of injury for 46 per cent of paediatric cases and 31 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 or family room (18 per cent) and the garden or yard (12 per cent). In adults, the garden or yard (not including garden shed) (24 per cent) was the next most common place of injury, followed by the living room (11 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=298), 63 per cent of these injuries occurred whilst near a person preparing food or drink. This is consistent with previous reporting years.

The most common activities resulting in a burn injury in adults were cooking, participating in a leisure activity, and working for income. 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, half (n=132, 49 per cent) occurred at a 'trade or service area', followed by an 'industrial or construction area' (n=74, 28 per cent). These figures are similar to the previous reporting year.

In the 20 to 29 years age group, leisure activities accounted for 24 per cent of burns and the place of injury was in the home in more than a third (38 per cent) of cases, followed by trade and service areas (17 per cent). This is different from the previous reporting period, in which 'other residence' was the second most frequent place of injury in this age group. In the 60 years and over age group, the most common activity at the time of injury was cooking (24 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	268	31
Near person cooking	262	30
Leisure activity (excluding sporting activity)	98	11
Cooking	47	5
Eating/drinking	36	4
Driving	30	3
Sleeping/resting	26	3
Bathing	17	2
Other specified activities	38	4
Total	984	100

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

Activity at the time of injury	N	%
Cooking	379	21
Leisure activity (excluding sporting activity)	346	19
Working for income	268	15
Sleeping/resting	138	8
Household maintenance	115	6
Driving	98	5
Self- harming	74	4
Vehicle maintenance	55	3
Other vital activities	44	2
Eating/drinking	40	2
Gardening	37	2
Bathing	36	2
Suspected illegal activity	27	1
Cleaning	20	1
Other types of unpaid work	20	1
Near person cooking	16	<1
Sports activity	9	<1
Other specified activities	104	6
Total	1,836	100

Drug and alcohol involvement

For the majority of cases (86 per cent), there was no documented suspicion of drug or alcohol involvement and this is consistent with previous BRANZ annual reports. In adult cases, documented suspicion of alcohol only, without drug involvement, was recorded in 15 per cent of cases, drugs without alcohol in three per cent of cases and a combination of drugs and alcohol was recorded in two per cent of cases. Blood testing for alcohol or drug involvement is not routinely conducted for all burn patients and therefore the information captured is based on medical record documentation of suspicion of, or known alcohol 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 (2). A further 35 per cent occurred in regional Australia and five per cent in remote areas. The rate of burn injury resulting in burns unit admission per 100,000 population is over twice as high for very remote areas compared to major cities. In the previous reporting period, the rate was almost three times as high. 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 triple that of the non-indigenous population. The severity of burn injuries was not significantly different between the indigenous and non-indigenous populations as measured by the pattern of burn size but median length of hospital stay was longer for indigenous patients (six versus three days).

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	9	7	19
Inner regional Australia	11	10	18
Outer regional Australia	14	10	43
Remote Australia	25	16	67
Very remote Australia	20	13	24
Total rate of injury	10	9	33

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.

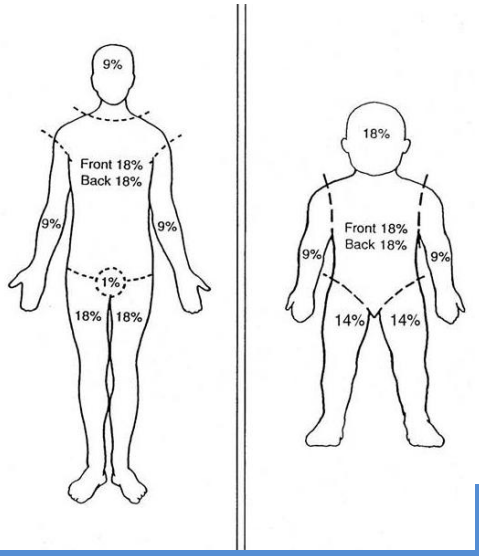
Total Burn Surface Area (per cent TBSA)

A burn of less than 10 per cent TBSA was recorded for 84 per cent of adult and paediatric cases admitted to burns centres and this finding is consistent with previous BRANZ annual reports. Appendix 8 details indications for admission to burns units of people with relatively small surface area burns. In addition, increasing specialization and newer burn wound management technologies may play a part in the transfer of these patients. 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.

In Australia and New Zealand, as in all high income countries, massive burn injuries are uncommon injuries. For paediatric patients, 88 per cent sustained a burn of less than 10 per cent TBSA and three 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 seven 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%	815	88	1,544	82
10-19%	81	9	213	11
20-49%	25	3	97	5
≥ 50%	5	<1	35	2
TOTAL	926	100	1,889	100



As detailed in Appendix 8, the size of the burn alone is not the only measure for admission to a burns unit in Australia and New Zealand; and ANZBA criteria for specialised burns treatment include: smaller burns to special areas (face, hands, feet, perineum and major joints), elderly patients, pregnant patients and those with other comorbidities. Of the adult patients with a burn less than 10 per cent TBSA (n=1,540, 82 per cent), 17 per cent involved the face, 32 per cent were hand burns and 18 per cent involved burns to the feet.

Seventy-six per cent of burn injuries reported to the American NBR in 2016 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 hospitals other than specialist burn centres. The difference noted in the distribution of burn size between the American NBR and BRANZ could be due to differences in compliance with guidelines for admission to a burn unit in Australia and New Zealand (Appendix 8).

Burn Depth

As described in previous annual reports, improvements in the BRANZ database from July 2010 allowed for greater accuracy of reporting burn depth. BRANZ reports on burn depth by documenting the presence of injuries involving superficial-dermal, mid-dermal, deep-dermal and full thickness burns. Burn injuries can include multiple areas of multiple depths. The burn depth was recorded for 93 per cent of cases in the 2015-16. Of these, 38 per cent (n=944) had reported superficial dermal burns, 54 per cent (n=1,329) had reported mid dermal burns and 40 per cent (n=1,013) had deep dermal burns.

A full thickness burn was documented for 22 per cent of cases (n=530) and this is consistent with the previous reporting period. Of the cases documented as having a full thickness burn, the per cent TBSA value of the full thickness area was known in 88 per cent (n=464) 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 greater than 10 per cent of the TBSA was 14 per cent, which is higher than the previous reporting year (10 per cent).

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

% full thickness TBSA	**N**	**%**
< 10 % full thickness	395	86
10-19 % full thickness	20	4
20-49 % full thickness	27	6
≥50 % full thickness	18	4
Total	460	100

While per cent full thickness burn is considered, along with total size of burn, to be a major prognostic indicator, a deep partial thickness burn also requires surgical management for optimal outcomes, and is of relevance in considering prognosis, resource implications and quality – especially scarring - outcomes.

Inhalation injury

Inhalation injuries are suspected or diagnosed on the basis of a history of mechanism of injury, smoke exposure, clinical presentation and diagnostic investigations (most notably bronchoscopic findings). Burns to the oropharynx and upper airway can result in swelling and possible airway obstruction within the first few hours after injury. Lower airway damage due to inhalation of the products of combustion can result in impaired gas exchange and respiratory failure. An inhalation injury is recorded if it is documented in the patient's medical record. There is currently no consensus globally or 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 six per cent of adult cases (n=106) and less than one per cent of paediatric cases. A higher proportion of inhalation injuries in adults is consistent with flame being the most common cause of burn injury in adults. Of the patients who died following their burn injury, 44 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 (first aid) 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: this reduces the depth of the burn and pain (3–6). Prolonged extensive irrigation of burns may be detrimental if the patient becomes cold, and hypothermia must be avoided, particularly in children with larger burns who are particularly susceptible to its development (3,4,7,8). 'Cool the burn and warm the patient'.

Seventy-two per cent (n=1,655) of all cases were reported to have received a burn cooling intervention at the scene of injury. A higher proportion of paediatric cases (77 per cent) received burn cooling at the scene of injury than adult cases (69 per cent), which is consistent with previous reporting years.

Cool running water was the method of cooling at the scene of injury in 89 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, 63 per cent of paediatric cases, and 49 per cent of adult cases, received cool running water for less than 20 minutes. This was a lower proportion than the previous reporting period.

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

Scene of injury	Paediatrics		Adults	
	N	%	N	%
Running water method of cooling	558	91	910	89
Within three hours of injury ** of cases where cool running water applied*	548	99	878	98

A technique other than the application of cool running water was recorded for 19 per cent of the cases where cooling was applied at the scene of injury (n=313). The most common 'other' methods using water were immersion in buckets of water, splashing water on the burn area and immersion in rivers, pools, lakes or the sea. The application of ice (ice packs or ice wrapped in a cloth) and the application of wet towels or 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 (55 per cent) and adult cases (51 per cent) were transferred to a 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 14 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 for all patients on the length of time taken to admission from time of injury, and reasons the admission to a burns unit takes longer 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 median (IQR) time from injury to admission to a BRANZ hospital was 18 (3-162) hours for paediatric cases and 17 (4-102) hours for adult cases.

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 for patients requiring transfer. The BRANZ collects information relating to notification of the receiving burns unit hospital for burns size greater than 15 per cent TBSA in adult cases and greater than 10 per cent TBSA in paediatric cases.

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 63 per cent of cases, compared to the same proportion in 2014-2015 and 75 per cent in 2013-2014. However, for paediatric cases with a burn size greater than 10 per cent TBSA, contact was made within one hour in 11 per cent of cases and this is lower than in previous reporting periods (20 per cent in 2014-2015 and 18 per cent in 2013-2014).

Figure 6a and 6b show the median and distribution of time from injury to admission for paediatric and adult cases for each reporting year. Only those cases that require emergency admission to hospital for major burns (paediatric patients with over 10 per cent TBSA and adult patients with over 15 per cent TBSA) are included. The median values for time to admission for both paediatric and adult cases have remained consistent.

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

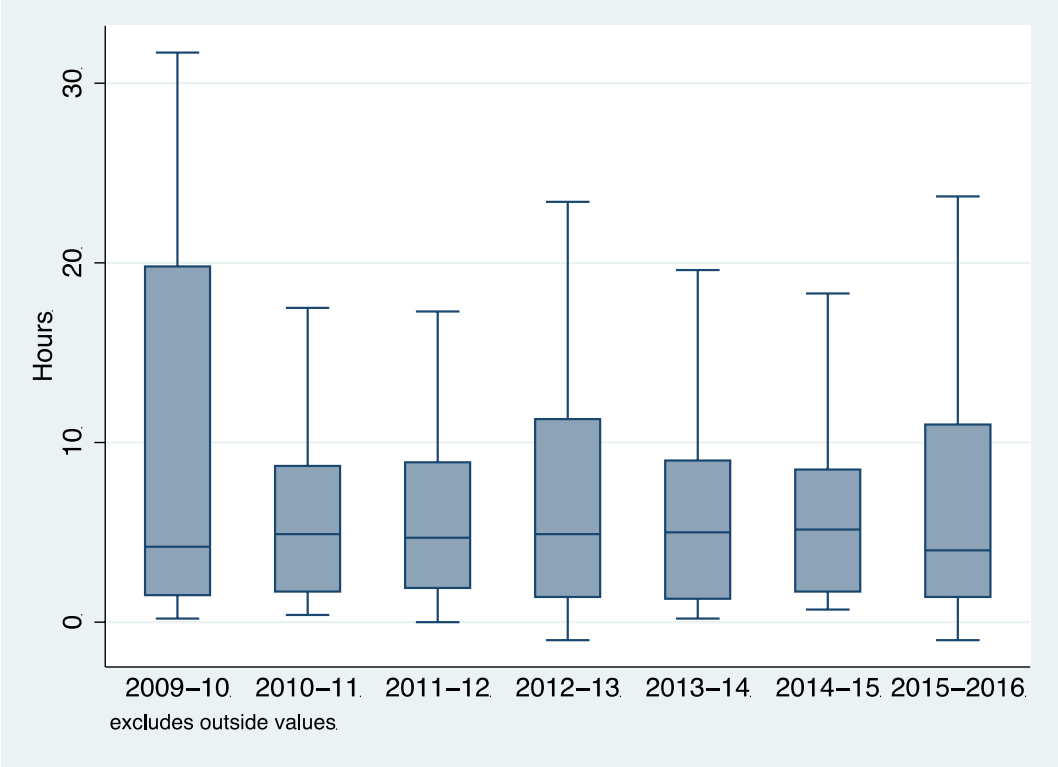


Figure 6b: Time to Admission for adult cases (>15 per cent TBSA) for years 1-6

For 61 per cent of patients transferred from another hospital, the reason for longer transfer time was usually a result of the geographical distance from the scene of the burn injury to the burns unit, and for nine 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, 57 per cent of cases arrived at a BRANZ hospital within two hours of injury and 91 per cent arrived within seven hours. In paediatric cases with a burn size greater than 10 per cent TBSA, 89 per cent of patients arrived at a BRANZ hospital within two hours of injury and 96 per cent of patients (all but one) arrived within three 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 within 72 hours of admission.

In 99 per cent of paediatric cases, and 96 per cent of adult cases, a wound assessment within 72 hours of admission to hospital was documented. This is higher than the previous reporting year (93 per cent for paediatrics and 89 per cent for adults) and much higher than the period before that (61 per cent for paediatrics and 66 per cent for adults). For paediatric cases, the burn registrar recorded the burn wound assessment within 72 hours of admission for 43 per cent of cases, followed by the burns consultant (20 per cent), burn care nurse coordinator or nurse practitioner (10 per cent), and burns fellow (seven per cent).

For adult cases, where assessment was documented within 72 hours, the person conducting the assessment was the burns registrar in 30 per cent of cases, followed by the burns consultant (25 per cent), burn care nurse coordinator or nurse practitioner (19 per cent), and burns fellow (11 per cent).

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 90 per cent of cases, consistent with the previous reporting period but significantly higher than 2013-2014 (78 per cent). This assessment was documented to have occurred within 24 hours of admission for 74 per cent of paediatric cases, which is slightly lower than the previous reporting period (79 per cent).

For adult cases with major burns (greater than 15 per cent TBSA), a Senior Burns Clinician assessment was documented in 68 per cent of cases, compared to 57 per cent in 2014-15 and 80 per cent in 2013-14. This assessment occurred within 24 hours of admission for 92 per cent of adult cases, which is consistent with the previous reporting period.

Theatre for burn wound excision

Seventy-four per cent of all cases underwent at least one burn wound management procedure in an operating theatre and this is consistent with previous reporting years. Table 12 outlines the percentage of paediatric and adult cases that had a particular procedure. One case may have multiple procedures recorded but data is collected only for the first time to theatre for a particular procedure. Thus the registry captures all the types of wound procedures performed for each patient, but not how many. 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 61 per cent of paediatric and adult cases. For cases where a full thickness burn was recorded, only 79 per cent of paediatric cases and 83 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 78 and 83 per cent in 2014-2015, and 70 and 79 per cent in 2013-2014, respectively. However, since debridement and grafting is the recommended acceptable management for all but very small full thickness burns, this data requires further examination. Of the patients who had a full thickness burn where the size of the burn was documented (n=460) in the seventh reporting year, the full thickness per cent TBSA was less than one per cent in 35 per cent of cases.

The median (IQR) time to grafting from injury was 11 (7-15) days for paediatric cases, which is consistent with the previous year. For adult cases, the median time to grafting from injury was 6 (4-11) days, which is consistent with the previous reporting period. The consequences (in terms of the development of hypertrophic scarring), of early conservative management (followed by grafting at 2 weeks) of paediatric burns, are currently not well understood.

Table 12: Percentage of burn wound management procedures

	Paediatric		Adult	
Procedure	**N**	**%**	**N**	**%**
Procedures related to debridement				
Debridement and skin grafting	349	53	926	65
Debridement and temporary skin closure product e.g. Biobrane™	120	18	341	24
Debridement only	136	21	283	20
Debridement and skin cell product (e.g. CEA)	72	11	175	12
Debridement and dermal reconstructive product e.g. Integra™	7	1	16	1
Total debridement procedures	678	-	1,741	-
Other procedures not outlined above				
Dressing change in theatre only	130	84	31	19
Escharotomy/Fasciotomy/Amputation or combination	*	2	26	16
Other	22	14	109	66
Total Other procedures	155	-	166	-
Total Theatre Procedures (by type)	**833**	-	**1732**	-

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=80), 84 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 (80 per cent). For adult patients, with burns greater than 15 per cent TBSA and a stay in hospital for more than 24 hours (n=163), 83 per cent had documentation of a physical functioning assessment within 48 hours of admission, which is also consistent with the previous reporting year (87 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. Of the paediatric cases with a burn greater than 10 per cent TBSA (n=80), supplementary feeding (either enteral or parenteral) was documented as commencing within 24 hours of admission for 64 per cent of patients, consistent with the 61 per cent reported in the previous year. For adult cases with a burn greater than 15 per cent TBSA (n=160), supplementary feeding was documented as commencing within 24 hours for 56 per cent of patients, which is consistent with the previous reporting period (54 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 five per cent of paediatric cases and 13 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 42 per cent of cases. This is slightly higher than the previous reporting period (35 per cent). For adult cases with a burn size greater than 15 per cent TBSA, an ICU admission occurred for 65 per cent of cases, consistent with the previous year (60 per cent). The median (IQR) length of stay in ICU was 119 (43-365) hours for paediatric cases compared to 49 (19-163) hours in 2014-15. For adult cases, the median (IQR) length of stay in ICU was 79 (36-192) compared to 60 (31-187) hours in 2014-15.

The majority of patients (87 per cent) with a documented inhalation injury were admitted to ICU. The median ICU length of stay was similar to all ICU admissions for paediatric (121 hours, IQR 85-176) and adult cases (82 hours, IQR 41-287) with a documented inhalation injury.

The median (IQR) hours of ventilation for cases admitted to ICU was 158 (55-297) for paediatric cases and 48 (18-166) for adult cases. These numbers are higher than the previous reporting period (paediatric 38 hours and adult 38 hours).

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 renal function.

Of the paediatric cases admitted to ICU, eGFR was recorded for only four patients and no cases demonstrated a negative change (>30 ml/min/1.73m2). For adult cases admitted to ICU, the eGFR was recorded for 77 per cent of cases (n=149) and nine cases 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 (22,23). A blood culture was collected during the inpatient stay in 33 per cent of adult cases (n=615) and 36 per cent of paediatric cases (n=333). This rate of blood culture collection is consistent with previous the previous reporting year (29 per cent of adult cases and 36 per cent of paediatric cases). The proportion of burn patients who underwent blood culture collection was higher for cases with major burns. A blood culture was taken in 66 per cent of adult cases with a burn greater than 15 per cent TBSA and five per cent of paediatric cases with a burn greater than 10 per cent TBSA.

For paediatric cases, two per cent of all cases had at least one positive blood culture (n=6). This figure is consistent with the previous two reporting years, however it is markedly lower than the 14 per cent reported in the 2012-13 reporting period. At least one positive blood culture was reported in 7 per cent of all adult cases who had blood cultures taken (n=40), which is consistent with the previous reporting year.

Weight recorded and weight loss

Measuring the patient's weight is important for monitoring weight loss and nutritional care. 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 (10,13,24).

Of the paediatric patients, with a length of stay greater than two weeks (n=58), 86 per cent had their weight measured and documented within three to five days of admission, and 45 per cent of these patients had a weekly weight documented during their hospital stay. Weight loss was recorded for seven paediatric patients.

For adult cases, with a length of stay greater than two weeks (n=257), 51 per cent had their weight measured and documented within three to five days of admission. A weekly weight was documented for 47 per cent of these patients. Weight loss was recorded in 46 per cent of these patients.

The documented weight loss during the episode of admitted patient care ranged from 0.2 to 10 kg for paediatric cases and from 3 to 87 kg for adult cases. The documented median (IQR) weight loss was 1 (0.2-2) kg for paediatric cases and 10 (3-10) 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 minimise 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, mostly extent of burn, and is impacted by treatment protocols (25). 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.

The median (IQR) length of stay for paediatric patients was four (2-8) days, consistent with previous reporting periods. 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 5 (3-11) days, consistent with previous reporting periods. Figure 7b shows the distribution of hospital length of stay by percentage TBSA for adults.

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 eight days. This figure is comparable to the average length of stay of eight days reported in the American NBR, even though the average burn size in the NBR is larger than that in the BRANZ.

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

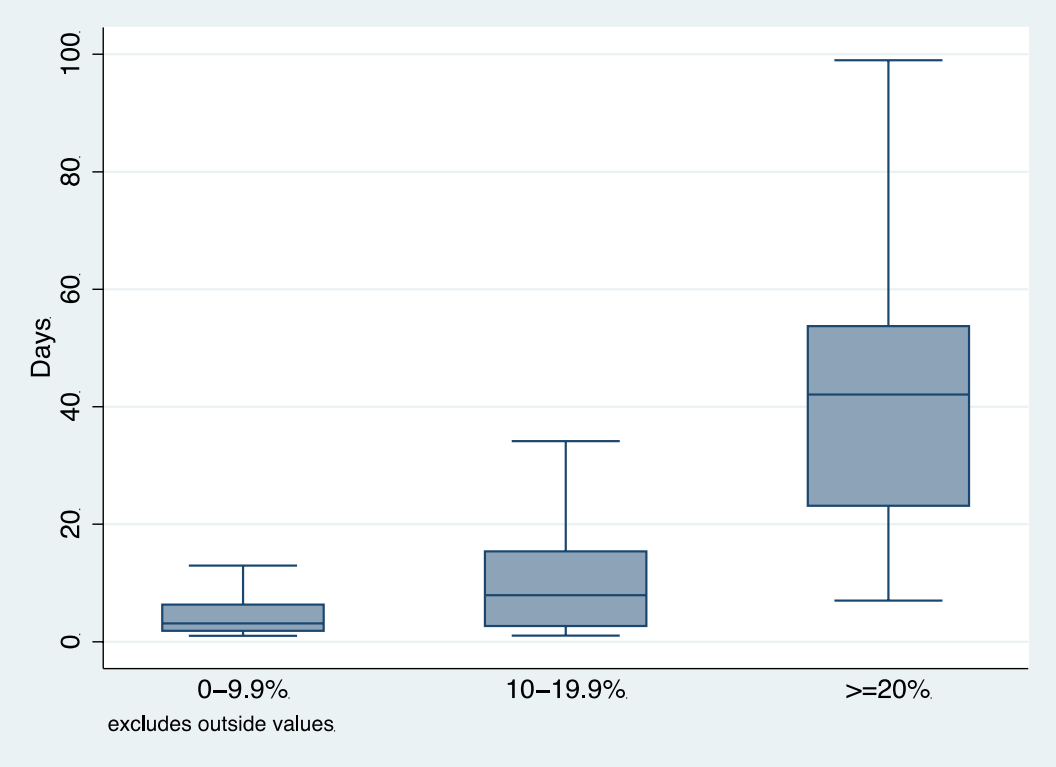
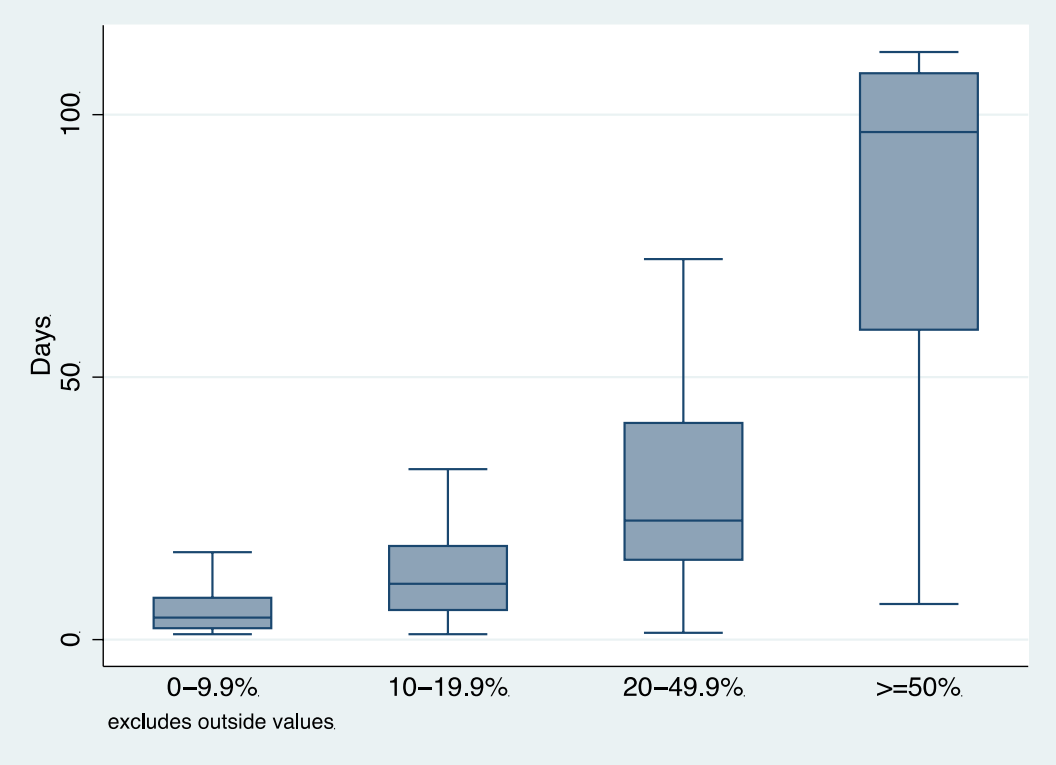


Figure 7b: Distribution of length of stay by percentage TBSA – Adult cases (excluding deaths)



Deaths

Overall, 33 (less than two 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. This rate is not corrected for burns severity or other prognostic factors.

The proportion of patients who died increased with burn size. Of the 42 patients who had a TBSA greater than 50 per cent, 20 (48 per cent) died. This figure is higher than the previous reporting period (35 per cent) but consistent with earlier reporting periods (53 per cent in 2013-14). Of the patients who died, an inhalation injury was present in 14 (42 per cent) cases.

A reason for death was recorded for all but one of the patients who died before hospital discharge, with multi-system organ failure (n=13) and burns shock (n=7) the most common reasons for death.

Of the 33 patients who died during their hospital stay, active treatment was not commenced for six of the cases. Active treatment was commenced but later ceased for 24 of the patients who died during their hospital stay. Ten of the 33 patients died within 24 hours of admission and the cause of death was recorded as burns shock or multi-system organ failure. The median (IQR) length of stay for patients who died during their hospital stay was 5 (1-21) days. The median (IQR) age of patients who died during their hospital stay was 56 (42-73) years old. Twelve patients (36%) who died during their hospital stay had a burn injury related to intentional self-harm and had ‘self-harming’ recorded as their activity during acquisition of burn injury.

Discharge status

Most patients (89 per cent) were discharged to their usual residence and 3 per cent were discharged to Hospital in the Home (Table 13). Transfer to another acute hospital or inpatient rehabilitation centre were other common destinations on departure from hospital.

Table 13: Discharge Disposition

Discharge Disposition	N	%
Usual residence/ home	2,479	89
Hospital in the Home	83	3
Other acute hospitals	48	2
Inpatient Rehabilitation	36	1
Died	33	1
Other healthcare accommodation, unless usual place of residence	26	1
Left against medical advice/ own risk	23	1
Another BRANZ Hospital	12	<1
Psychiatric hospital	9	<1
Other destination	34	1

Readmissions

A total of 119 paediatric cases (13 per cent) were readmitted within 28 days of discharge and the majority (79 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 eight per cent of adult cases (n=145) experienced a readmission within 28 days of discharge. In contrast to the paediatric patients, 49 per cent of these cases (n=71) were reported as 'unplanned' for wound healing issues 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 after 2010-11.
- 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 2,817 burn cases admitted to 16 of the 17 designated burn units across both Australia and New Zealand for the 12-month period July 2015 to June 2016. 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 98 per cent of all cases that received burn cooling at the scene of injury. Where an injury requiring admission to a burns unit occurred, the vast majority of burns were less than 10 per cent TBSA. However, 74 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.

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Glossary

Burn Depth:	Burns are described according to the depth of injury to the skin layers and are classified into superficial dermal, mid-dermal, deep-dermal and full thickness burns (26).
Burn Injury classifications (26)	• 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 (27).
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.'* (28) 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 (29).
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 (26).
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 (30).
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 (26).

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	%
Date of Birth	2815/2817	100
Date of Injury	2817/2817	100
Time of Injury	2137/2817	76
Gender	2816/2817	100
Ethnicity or Country of Birth	2776/2817	99
Residential Postcode	2793/2817	99

Admission Section	Complete and valid response	
	n	%
Admission Date/Time	2817/2817	100
Insurance or Fund Source	2814/2817	100
Presentation Type	2817/2817	100
Admission Type	2817/2817	100
Referral Source	2817/2817	100
Referral Centre Date/Time	1683/2311	73
Admitted via Outpatients	2255/2259	100
Is Patient a Burns Consult	2817/2817	100

Burn Cooling Section	Complete and valid response	
	n	%
Burn Cooling Completed	2323/2817	82
Cool running water	1643/1655	99
Cool running water minutes	1417/1468	97
Cool running water within 3 hours of injury	1448/1468	99
Cool running water applied by	1432/1468	98
Hydrogel dressing applied	1649/1655	100
Hydrogel dressing applied by	43/47	91
Application of Other Cooling	1654/1655	100

Admission Section	Complete and valid response	
	n	%
Primary cause	2795/2817	99
Accelerant Involvement	2779/2817	99
Accelerant Type	488/504	97
Activity when burn injury occurred	2714/2817	96
Place where burn injury occurred	2714/2817	96
Intent when burn injury occurred	2808/2817	100
Injury Event Postcode	2465/2817	88
Drug/alcohol involvement	2817/2817	100
Inhalation injury	2813/2817	100

Burn Assessment Section (Burns Unit)	Complete and valid response

	n	%
Was the burn size documented?	2789/2816	99
Assessment Date/Time	2718/2816	97
Assessed By	2654/2816	94
Burn depth recorded?	2709/2816	96
Superficial Dermal - Yes/No	2476/2537	98
Superficial Dermal %	733/735	100
Mid Dermal - Yes/No	2440/2537	96
Mid Dermal %	1035/1047	99
Deep Dermal - Yes/No	2494/2537	98
Deep Dermal %	828/833	99
Full Thickness - Yes/No	2451/2537	97
Full Thickness %	460/464	99

Assessment Quality Indicators Section	**Complete and valid response**	
	n	**%**
Theatre for burn wound management	2813/2817	100

Inpatient Section	**Complete and valid response**	
	n	**%**
ICU Admission	2808/2817	100
ICU Admission Date/Time	285/285	100
ICU Discharge Date/Time	285/285	100
Mechanical Ventilation	209/210	100

Discharge Section	**Complete and valid response**	
	n	**%**
Disposition from hospital	2791/2817	99
Discharge Date/Time	2817/2817	100

Appendix 2: Management Committee Membership

Belinda Gabbe	Monash University, DEPM	BRANZ Project Supervisor, Senior Research Fellow
Kylie Dyson	Monash University, DEPM	BRANZ Research Fellow
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)	✓	✓
Kylie Dyson	Monash	Research Fellow	✓	✓
Heather Cleland	VIC, Alfred	Head of Burns Unit / Acting Chair SC	✓	
Yvonne Singer	VIC, Alfred	Victorian State Burns Education Program Coordinator	✓	✓
Samara Rosenblum	VIC, Alfred			✓
Kathy Bicknell	VIC, RCH	Burns Co-ordinator	✓	✓
Roy Kimble	QLD, LCCH	Head of Burns Unit	✓	
Bronwyn Griffin	QLD, LCCH	Clinical Research Manager		✓
Jason Miller	QLD, RBWH	Consultant Burns Surgeon	✓	
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	✓	✓
Rebecca Schrale	TAS, Royal Hobart	Clinical Nurse Consultant, Burns	✓	✓
Andrew Castley	TAS, Royal Hobart	Head of Burns Unit		✓
Sallyann 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		✓
Rochelle Kumis	SA, RAH	Acting Senior Dietitian, Burns Unit	✓	✓
Amy Jeeves	SA, WCH	Plastic Surgeon, Burns Unit	✓	
Linda Quinn	SA, WCH	Burns - Advanced Clinical Practice Consultant	✓	
Fiona Wood	WA, FSH	Head of Burns Unit	✓	

NAME	SITE	TITLE	Steering Committee	Reference Committee
Dale Edgar	WA, FSH	Senior Physiotherapist / Fiona Wood Foundation Director of Clinical Research (Past ANZBA President)	✓	
Sharon Rowe	WA, FSH	Clinical Nurse Consultant		✓
Tania McWilliams	WA, Princess Margaret	Clinical Nurse Consultant		✓
Lisa Martin	WA, Princess Margaret	Clinical Research Nurse, McComb Foundation		✓
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
Samara Rosenblum	VIC	Alfred	Data Collector Burns Registry
Kathy Bicknell	VIC	Royal Children's	Burns CNC
Bronwyn Griffin	QLD	Lady Cilento Children's Hospital	Clinical Research Manager
Teresa Matthews	QLD	Royal Brisbane & Women's	Database Manager
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
Sallyann McRae	SA	Royal Adelaide	Burns Nurse
Lois Robinson	SA	Women's & Children's	Data entry clerk
Graeme McLeod	WA	Fiona Stanley	Burns MDT Facilitator
Penelope Cox	WA	Fiona Stanley	Burns Nurse
Lisa Martin	WA	Princess Margaret	Research Nurse
Margaret Brennan	NT	Royal Darwin	Burns CNC IP
Megan Hook	NT	Royal Darwin	Admin Clerk
Margaret Conaglen	NZ	Christchurch	Nurse Educator
Mandy Arnett	NZ	Christchurch	Ward Clerk
Louise Le Grelle	NZ	Christchurch	Burns Nurse
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, 16 sites contributed data (Table 14). Of these sites, five sites treat paediatric patients only, five sites treat adult patients only and six 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
Fiona Stanley	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's & Children's	South Australia	Paediatrics
Royal Adelaide	South Australia	Adults
Lady Cilento	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
Fiona Stanley Hospital	WA	http://www.fsh.health.wa.gov.au/Our-services/Service-Directory/Burns
Princess Margaret Hospital	WA	http://www.pmh.health.wa.gov.au/general/about_us/
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/
Lady Cilento Hospital	QLD	https://www.childrens.health.qld.gov.au/referapatient/list-specialities/burns/
Royal Brisbane & Women's Hospital	QLD	www.rbwh.com.au
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.. Data was received from 5 of the 17 sites (29 per cent response rate) and the questions required a yes/no response only.

STRUCTURAL QUALITY INDICATORS	Number of centres that responded	Yes (n)	Yes (%)
1. Is a Burns Surgeon available on call 24 hours?	6	6	100%
2. Is a Burns theatre available on a 24-hour basis?	6	6	100%
3. (a) Is Multidisciplinary care provided within the Burns unit?	6	6	100%
(b) Are weekly multidisciplinary team meetings Conducted in the burns unit?	6	6	100%
4. Does your unit routinely complete infection Surveillance swabs on admission?	6	5	83%

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