# ANNUAL REPORT

1st July 2017 – 30th June 2018

# BRANZ

Burns Registry of Australia and New Zealand

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BRANZ Chief Investigators, members of BRANZ Steering and Reference Committees, and BRANZ Data Collectors are listed at the end of the report.

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# Foreword

We are pleased to present the ninth Annual Report of the Burns Registry of Australia and New Zealand (BRANZ), covering the period between the 1st July 2017 and 30th June 2018. The registry provides a comprehensive view of burn injury and its management in Australia and New Zealand: this year, all 17 specialist burns units (13 Australian sites and four New Zealand sites) contributed data on 3,459 cases.

Currently the registry provides information and data to inform burns prevention campaigns, and for research purposes. Benchmarking quality of care between units, in order to identify the best performing units and areas for improvement in care delivery, is the subject of a separate research project, to be completed in July 2019, and funded by the HCF Research Foundation.

The significant variation in care and outcomes between Australian and New Zealand specialist burns units can only be identified, monitored, and addressed through the BRANZ. Consequently, we welcomed the recent commitment of the Australian Commonwealth and State Governments to establish a consistent national approach to funding clinical quality registries, which we expect will provide sustainable funding to the BRANZ in the future.

In the meantime, the BRANZ has robust governance with strong clinician engagement, has achieved international recognition as a leader in the area of quality data collection, and has contributed significantly to the ongoing work of improving burn prevention and care in Australia and New Zealand.

Our report this year highlights a growing social and clinical problem – that of burns in the elderly. Older members of our society are frequently frail and may be poorly supported, or are the victims of neglect and abuse. They have relatively poor outcomes after burn injury, and decision making with respect to best management strategies can be difficult. Information from our registry can help to focus prevention strategies and ensure most appropriate treatments for this vulnerable group. Recovery after burns can be especially challenging for older people, who show tremendous determination and resilience, and we thank Noelene and her husband Bob for sharing their story with us some years after Noelene's injury.

We commend this report to you.

**Heather Cleland**

**Chair**
**BRANZ Steering Committee**

**Jeremy Rawlins**

**President**
**Australian and New Zealand Burn Association**

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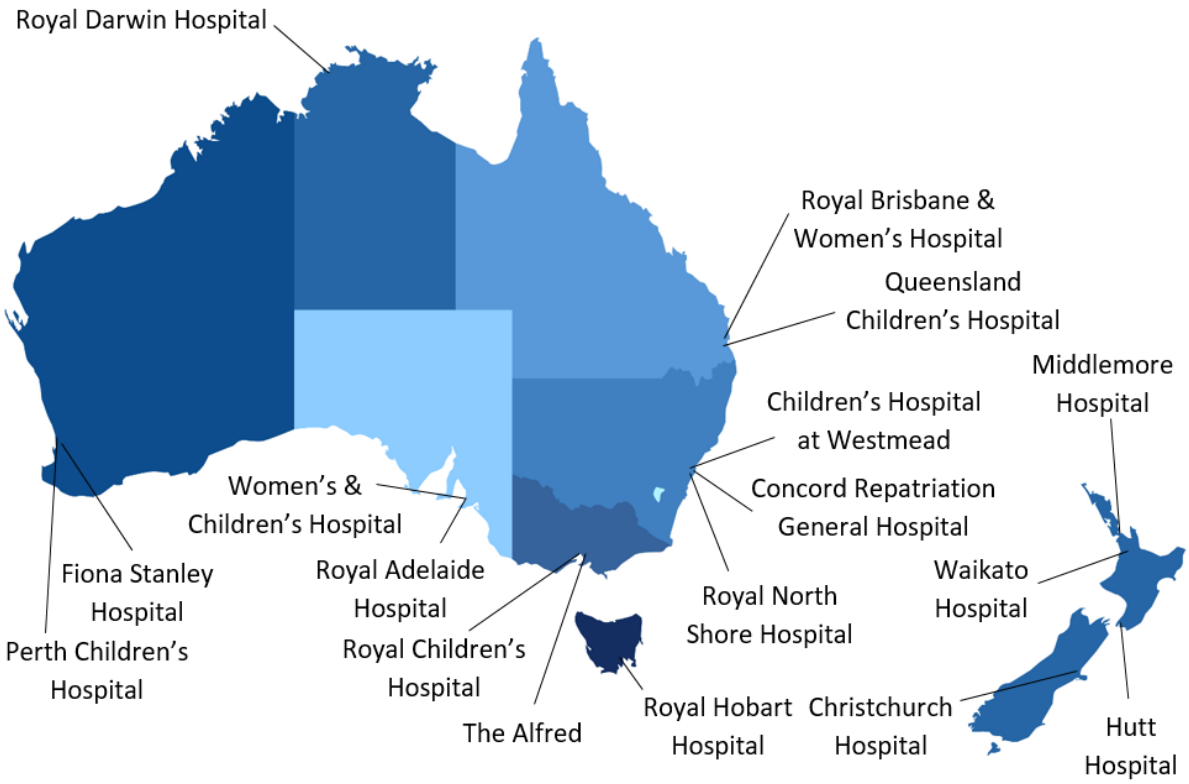
## About the Burns Registry of Australia and New Zealand (BRANZ)

This clinical quality registry captures epidemiological, quality of care, and outcome data for adult and paediatric burns patients treated in Australian and New Zealand. The project is a collaboration between the Australian and New Zealand Burn Association (ANZBA) and Monash University, Department of Epidemiology and Preventive Medicine (DEPM). All 17 specialist burns units in Australia and New Zealand contribute to the BRANZ (Figure 1). Of these, five sites treat paediatric patients only, six sites treat adult patients only, and six sites treat both adult and paediatric patients.

**Figure 1: Designated burns units across Australia and New Zealand**




The overall purpose of the registry is to monitor burn injury incidence and 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.

We are supported by 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 (2013-2020)
- The Australasian Foundation for Plastic Surgery (2013-2017)
- The Clipsal by Schneider Electric National Community Grants Program (2017)
- The HCF Research Foundation (2018-2019).

Individual burns centres also contribute funding to ensure the ongoing sustainability of the BRANZ.

## About this Report

This is the ninth annual report of the Burns Registry of Australia and New Zealand (BRANZ). Data collected between the 1st July 2017 and 30th June 2018 (Year 9) is summarised here. All 17 BRANZ sites (13 Australian sites and four New Zealand sites) contributed data with 3,459 cases entered. The sites that participated all had Institutional Ethics Committee (IEC) approval and local resources for data collection that enabled them to contribute data to the registry.

The report describes the profile, treatment, and outcomes of burns unit admissions from 1st July 2017 to 30th June 2018. Quality of care data related to processes of care is also provided. Where appropriate, data are compared to previous annual report periods. Data has also been compared with the American Burn Association's National Burn Repository (NBR) 2017 (1) report of data from 2008 to 2017 in instances where the NBR reports comparable summary data.

While quality of care data are presented in this report, comparisons against an acceptable standard of performance or 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 serve as the basis for benchmarking of burn unit performance.

Further details regarding the Registry and its governance can be found in the Appendices.

## Year at a Glance

# Who is admitted to burns units?

**3,549** patients were admitted to burns units in the 2017-18 year

This is a **5% increase** from the 3,295 patients admitted in the 2016-17 year

**2,457** patients were adults

This accounts for 71% of the total population

**43%** of adult burns are due to a **flame**

**1,002** patients were children

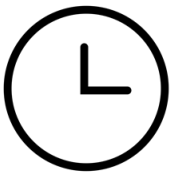
This accounts for 29% of the total population

**56%** of burns in children are due to a **scald**

# Pre-Hospital Management

**23%** of children did not receive the recommended first aid for burn injuries

**15%** of children and **18%** of adults were transported to a BRANZ hospital from the scene of the injury

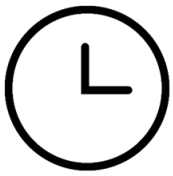


The median time for injury to admission for adults with severe burns was **5.1 hours**

# Burn Unit Performance



**76%** of cases underwent at least one procedure in the operating theatre



The median time from injury to skin grafting was **seven days** in adults and **12 days** in children

**77%** of adults with a severe burn (≥ 20% TBSA) were admitted to the ICU

**23%** of adults with a burn exceeding 20% TBSA had at least one positive blood culture

**37%** of adults did not receive venous thromboembolism prophylaxis

**56%** of patients with a burn exceeding 50% TBSA died

# Special Focus

## Burns in Older Adults

Burn injuries affect people of all ages, but less attention has focused on burns in older populations. Understanding the incidence, characteristics, and impact of burn injuries in individuals over the age of 65 is important for prevention and treatment, especially as the proportion of older people in the population is increasing. The number of older adults in Australia is projected to exceed eight million by 2054 (2). The frail elderly are especially at risk of sustaining burn injury, and may have poorer outcomes compared with younger cohorts.

- **Patient Characteristics**
    - Since July 2009, 12 per cent of all adult patients (n=2,241) recorded by the BRANZ were over the age of 65. In the 2017-2018 reporting period, 13 per cent of all adult patients (n=331) were over the age of 65.
    - In 2017, the incidence of burn injuries in older adults was 7.4 per 100,000 people. This is lower than the 11.9 per 100,000 for young adults (16-30 years) and the 9.5 per 100,000 middle-aged adults (30-64 years).
    - Thirty-eight per cent of older adult burns patients were female, compared to 27 per cent for the young adults and 29% for the middle-aged adults. In patients over the age of 80, 48 per cent of burns patients were female.
- **Burn Injury Characteristics**
    - The most common cause of burn injuries in older adults was a scald, with 42 per cent of older adults sustaining a scald. This exceeds the 23 per cent of young adults and 27 per cent of middle-aged adults with a scald, as flame injuries are the most common cause of the burn in these age groups.
    - A greater proportion of burns in older adults occurred in the home, with 81 per cent of older adults sustaining their burn injuries in the home. The kitchen was the most common location of burn injuries in older adults (32 per cent), followed by the garden (17 per cent) and the living room (13 per cent). Forty-two per cent of young adults and 59 per cent of middle-aged adults sustained their burn at home.
- **Management of Burn Injuries**
    - Seventy per cent of older adults went to theatre for a surgical procedure, compared to 76 per cent of young adults and 76 per cent of middle-aged adults. However, 76 per cent of the older adults who went to theatre received a skin graft, compared to only 61 per cent of young adults and 67 per cent of middle-aged adults.

- **Outcomes Following Burn Injury**

    - Older adults spend longer in hospital than young and middle-aged adults. The median length of stay for older adults is almost nine days, while the median length of stay for young and middle-aged adults is four and five days, respectively.

    - Sixty-seven per cent of older adults were discharged to their home or usual place of residence following their admission to a BRANZ hospital, which is lower than the 87 per cent of young adults and the 82 per cent of middle-aged adults that were discharged to home.

    - Five per cent of older adults died during their hospital admission, which is a larger proportion compared to the less than one per cent of young adults and the two percent of middle-aged adults who died.

## Noelene's Story

*On the 4th of September 2016, Noelene collapsed in her shower and sustained serious scalds to her hand, arm, shoulder, back, and legs. Her injuries covered more than 30 percent of her body. Bob, her husband of 60 years, assisted Noelene and provided first aid to before paramedics transported her to the Victorian Adult Burns Service at the Alfred. Noelene spent more than 80 days in hospital and underwent more than 40 procedures, including dressing changes and surgeries. Read on to hear about how her accident has changed both her and Bob's lives.*

"It was a Monday night, and I was planning on having an early night after watching the 10 o'clock news", recalled Noelene. "I remember getting into the shower, but I don't know how I fell. I must have hit the hot water tap on the way down."

*Bob and Noelene*

Noelene had a history of collapsing, but in the past, she had realised what was happening beforehand and did not get in the shower to prevent accidents like this happening. "This time things turned out differently", explained Bob.

"I had sat down to clean my hearing aids after Noelene had gone into the bathroom. After I had finished and put them back in, I couldn't hear her. I stuck my head into the bathroom and found her collapsed in the corner. She had her left hand up to protect herself from the water."

Due to the severity of her injuries, Noelene was initially admitted to the intensive care unit (ICU) at the Alfred. "The first week was very touch and go", said Bob. "I knew the injuries were bad, but I didn't realise how bad until the staff were asking me how far we wanted to go with artificial resuscitation. It was a very shocking experience."

Things improved once Noelene was transferred to the specialist burns ward after being discharged from the ICU. "She was absolutely spoilt by the staff, they really raised the bar for me on that one", Bob laughed. "The staff at the Alfred were amazing, after a while they started to treat me like I was their grandmother. They would come in and we would just chat about their lives. Getting to know and interact with the staff like that was nice, as it served as a bit of a distraction from what I was going through on a daily basis", Noelene elaborated.

Bob recounted one of the more light-hearted moments of Noelene's stay in the burns ward as she progressed with her rehabilitation. "It was quite funny when Noelene was being walked around the ward with the vacuum pump on. It was a three person job and quite the procession—there one nurse in front of her clearing a path, one walking with her to help her stay balanced, and one nurse behind pushing the pump!"

Transitioning back to life at home has not necessarily been easy. "It takes longer for her to get into bed at night than it used to", said Bob. "She tries to take advantage of anything she can to avoid getting into the shower." Noelene went onto explain, "I haven't stood up in the shower since I came home from hospital. Now I use a stool to sit down. I reckon I could stand in the shower now, but I've lost a lot of confidence."

A major challenge in returning home for Noelene has been the loss of independence. "Before the accident I did everything around the house. Since I've been home, it's been harder to do that. There are days where I want to do things—such as going down to the shops—but I can't do them. Home help has started coming one day a week, which has been excellent. I was against it originally—I didn't want anyone else to have to do my jobs."

Bob, who has cared for Noelene full-time since their return home, has also struggled. "About three months after she was home, I really hit the roof. It's a very stressful process, and I've only had two days break since the accident" Bob shared. "You just have to find some way to release the tension so that you don't blow a fuse. When I feel myself getting stressed I make sure that I take some time to sit outside and listen to classical music."

"One of the other big things that has been difficult to adjust to since coming home is the fact that I'm just so tired", Noelene said. "I still sleep most of the day. I can still go to sleep alright most nights, but there are some nights when I don't sleep and I'll just sit up." Other smaller challenges exist. "One of the things that's upsetting her at the moment is that she can't wear her wedding ring", said Bob. "She hasn't been able to wear her rings since before the accident."

Now, nearly three years after the accident, things are starting to improve for Bob and Noelene. "We've started going out on Saturday nights with my younger sister Carol", Noelene explained. "We're doing a circuit of all the local RSL's—we go and have a meal, Carol and I can play the pokies, and Bob can sit and relax over a few glasses of wine. Being able to get out and meet people like that has been a real help."

Noelene is keen to share her story to raise awareness of how severely injuries such as these can impact people's lives. "To other elderly people—just be careful in the shower. I know what it's like, and I am very worried about other people who live by themselves or are in retirement villages. You need to be careful."

# Results

## Number of Burn Cases

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

## Key Points

- There were 1,002 paediatric patients admitted to Australian and New Zealand burns units. Approximately one third of these were toddlers under two years of age.
- Aboriginal and Torres Strait Islanders are more than three times as likely to be admitted to hospital with a burn injury than other Australians.
- Within Australia, the rate of burn injuries in very remote areas is approximately three times higher than the rate in major metropolitan cities.

**BRANZ burn cases**

The total number of burn cases recorded by participating sites on BRANZ during the ninth reporting year (1st July 2017 to 30th June 2018) was 3,459, with 2,457 adult cases (16 years of age and older) and 1,002 paediatric cases (15 years of age and under).

**Registry admissions by quarter**

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 eight 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. All sites now contribute their data.

**Figure 2: Reporting quarterly trends in burn admissions**

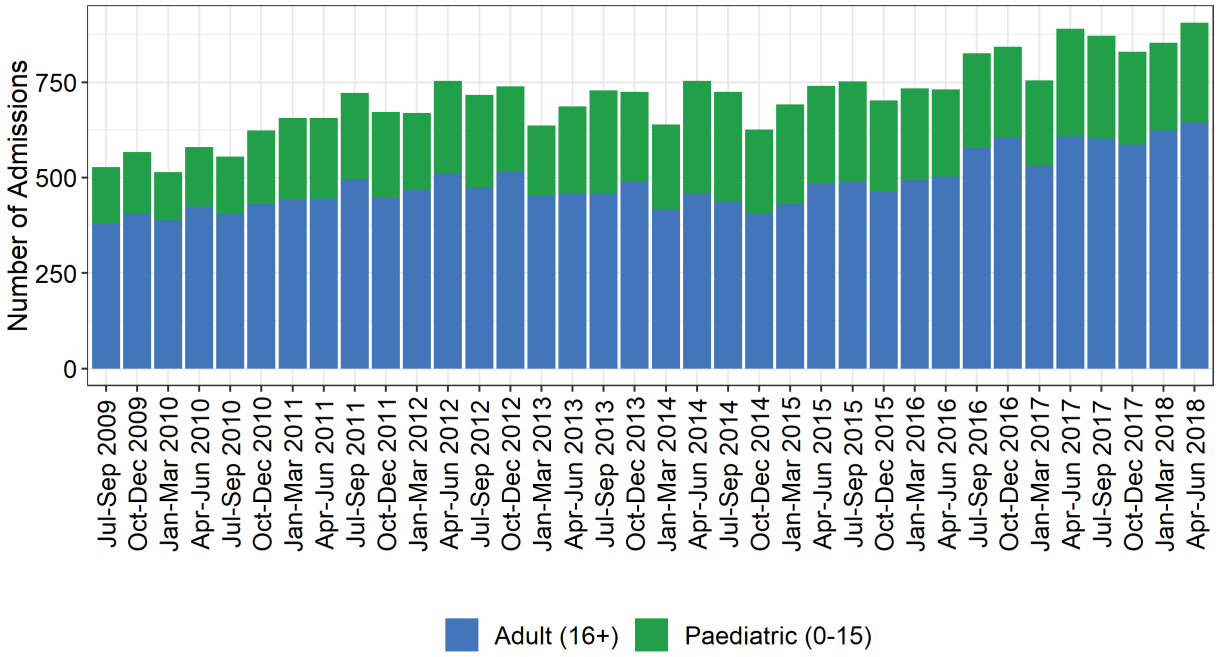


**Table 1: Site case numbers per reporting year**

| Site | 2009-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| **A** | 544 | 304 | 284 | 247 | 256 | 283 | 333 | 352 | 2,603 |
| **B** | 398 | 205 | 163 | 110 | 148 | 129 | 110 | 106 | 1,369 |
| **C** | 506 | 262 | 274 | 270 | 231 | 292 | 358 | 403 | 2,596 |
| **D** | 166 | 89 | 100 | 94 | 88 | 81 | 106 | 132 | 856 |
| **E** | 654 | 329 | 386 | 354 | 301 | 352 | 299 | 313 | 2,988 |
| **F** | 462 | 232 | 168 | 180 | 177 | 190 | 172 | 158 | 1,739 |
| **G** | 136 | 217 | 220 | 195 | 174 | 177 | 176 | 171 | 1,466 |
| **H** | 9 | 20 | 13 | 130 | 135 | 105 | 123 | 98 | 633 |
| **I** | 142 | 75 | 83 | 96 | 81 | 91 | 83 | 92 | 743 |
| **J** | 67 | 84 | 75 | 80 | 64 | 83 | 62 | 77 | 592 |
| **K** | 62 | 104 | 88 | 86 | 106 | 121 | 112 | 99 | 778 |
| **L** | 213 | 103 | 78 | 71 | 66 | 77 | 95 | 93 | 796 |
| **M** | 0 | 0 | 52 | 93 | 109 | 100 | 99 | 149 | 602 |
| **N** | 428 | 273 | 289 | 263 | 266 | 243 | 233 | 227 | 2,222 |
| **O** | 0 | 0 | 0 | 0 | 0 | 1 | 385 | 409 | 795 |
| **P** | 462 | 238 | 236 | 276 | 297 | 260 | 261 | 270 | 2,300 |
| **Q** | 431 | 281 | 270 | 301 | 284 | 334 | 306 | 310 | 2,517 |
| **Total** | 4,680 | 2,816 | 2,779 | 2,846 | 2,783 | 2,919 | 3,313 | 3,459 | 25,595 |

## Demographic Profile of Hospitalised Burn Patients

Figures 3a and 3b show the age distribution by gender for paediatric and adult cases. Sixty-eight per cent of all cases were males and they represented the majority of cases in all age groups. Twenty-nine per cent of paediatric cases were aged one to two years while 23 per cent of the adult cases were aged 20 to 29 years. These figures are consistent with the previous eight BRANZ reporting periods. These findings are also consistent with figures from the NBR, where males are more predominant than females and the adult burn incidence declines with age (1).

**Figure 3a: Age distribution by gender - Paediatric cases**

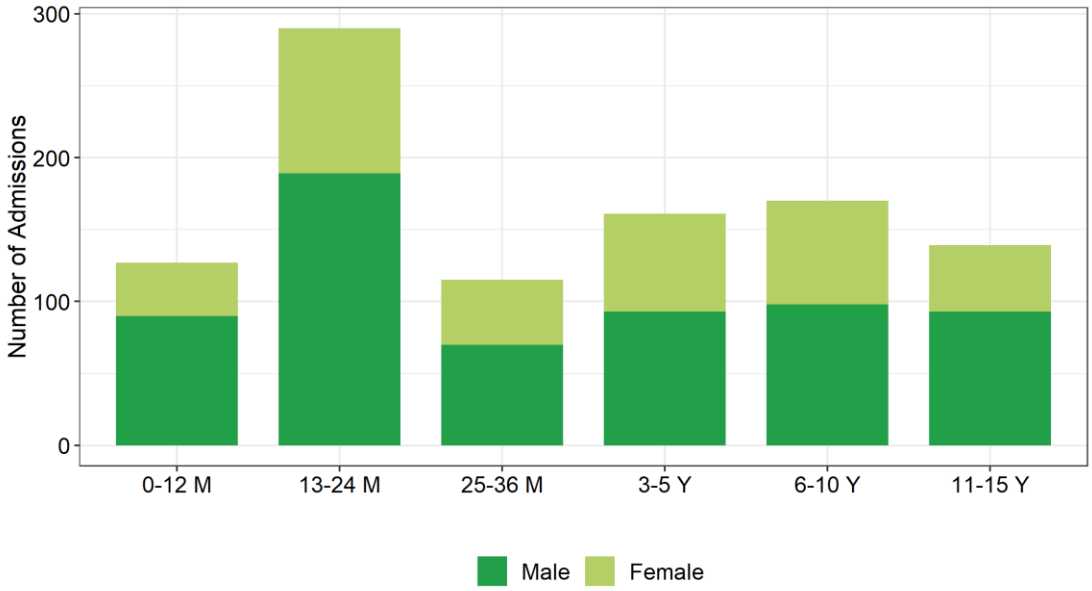
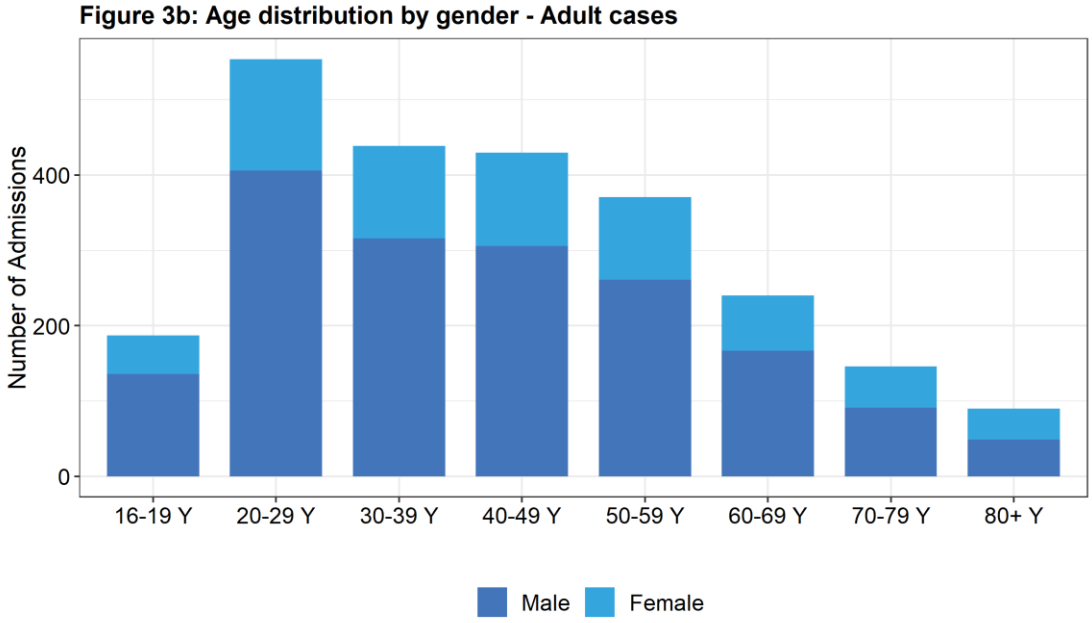



**Figure 3b: Age distribution by gender - Adult cases**



Australian hospitals routinely collect the 'country of birth' of their patients, whereas New Zealand hospitals record the 'ethnicity' of their patients. Ethnicity is a measure of cultural affiliation, as opposed to race, nationality, or citizenship. Therefore the data are reported separately for New Zealand and Australian burn centres (Table 2). In 2017-2018 BRANZ recorded 2,976 admissions to Australian sites and 483 admissions to New Zealand sites.

The majority of cases admitted to Australian burns units were born in Australia (n=2,395, 81 per cent). Indigenous Australians accounted for eight per cent of the Australian born admissions, consisting of 12 per cent of paediatric cases and six 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, 548 were recorded as being born overseas. The country of birth was missing for 33 cases.

Of the New Zealand burn admissions, 52 per cent (n=214) were classified as 'New Zealander' (i.e., a New Zealander who is not of Maori descent), and a further 32 per cent of cases (n=132) were classified as 'New Zealand Maori'. There were 57 patients classified as 'Other Oceanian descent'. These were predominantly Samoan (n=27, 49 per cent of other Oceanian and seven per cent of total New Zealand admissions) but also included Cook Island Maori, Tongans, Niueans, and other Pacific Islanders.

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

| Region of birth - Australian Units | N | % |
|---|---|---|
| Australian Peoples | 2,395 | 81 |
| North-West European | 114 | 4 |
| Southern and Central Asian | 71 | 2 |
| South-East Asian | 69 | 2 |
| North-East Asian | 65 | 2 |
| Southern and Eastern European | 61 | 2 |
| New Zealand Peoples | 54 | 2 |
| North African and Middle Eastern | 36 | 1 |
| Sub-Saharan African | 32 | 1 |
| Oceanian (other) | 23 | <1 |
| People of the Americas | 23 | <1 |

| Ethnicity - New Zealand Units | N | % |
|---|---|---|
| New Zealander | 214 | 52 |
| New Zealand Maori | 132 | 32 |
| Samoan | 27 | 7 |
| Tongan | 14 | 3 |
| Australian | 13 | 3 |
| Other Pacific Island | 9 | 2 |
| Cook Island Maori | * | <1 |
| Niuean | * | <1 |

* Less than five cases

Most cases admitted to Australian burns units were funded by the Australian Health Care Agreement (n=2445, 82 per cent). A further eight per cent of the admissions to Australian burns units (n=237) were covered under the relevant workers compensation scheme in each state or territory and eight per cent of the admissions to Australian burns units (n=224) were funded through various private health insurance schemes. Examples of other sources of funding in cases admitted to Australian burns units were third party

motor vehicle insurance, the Department of Veterans Affairs, the Department of Defence, and reciprocal health care agreements.

Ninety-eight per cent of cases admitted to New Zealand burns units were funded by the Accident Compensation Corporation (n=471) which is the comprehensive, no-fault personal injury insurance scheme for all New Zealand residents and visitors to the country. Other sources of funding of cases admitted to New Zealand burns units were the Ministry of Health, Surgical Services Contract, and private health insurers.

**Location of burn injury by region (Australian Sites)**

Consistent with previous years, over half (59 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 35 per cent occurred in regional Australia, and six per cent in remote areas.

The rate of burn injury resulting in burns unit admission per 100,000 population is approximately three times as high for very remote areas compared to major cities. This is an increase in the rate from the previous reporting period. 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 3 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 as measured by the pattern of burn size was significantly different between the indigenous and non-indigenous populations (more burns between 10 and 49% TBSA in indigenous population). The median length of hospital stay was longer for indigenous patients (six versus three days).

**Table 3: 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 | 9 | 28 |
| Inner regional Australia | 13 | 13 | 29 |
| Outer regional Australia | 16 | 15 | 41 |
| Remote Australia | 32 | 24 | 73 |
| Very remote Australia | 27 | 30 | 24 |
| **Total rate of injury** | 11 | 10 | 35 |

## What Was the Cause and Location of the Burn Injury?

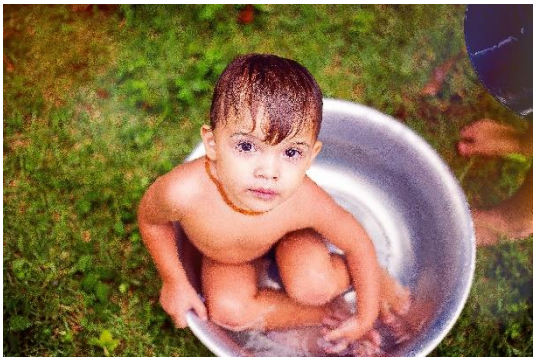
This section outlines the cause of burn injury, the activities leading to injury, the places of injury, and the geographical region of the injury across Australia and New Zealand.

## Key Points

- Sixty-three per cent of burns are sustained in the home, with nearly half of paediatric burns occurring in the kitchen
- Three per cent of burns were sustained as the result of intentional self-harm. These injuries are likely to be more severe than non-intentional injuries
- Alcohol and/or drugs were suspected to be involved in 15 per cent of all burn injuries

### Burn Injury Cause

Consistent with previous years, scalds and flame burns were the most common causes of burn injury. Scalds accounted for 36 per cent, flame burns for 34 per cent, and contact burns for 17 per cent of all cases. Recent data from the American NBR also identified flame and scalds as the most common aetiology, accounting for 76 per cent of burns between them (1).



Tables 4a and 4b 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 (56 per cent) followed by contact (23 per cent) and flame (10 per cent) injuries. Scald burns were the most common cause of injury across all paediatric age groups. This is consistent with the previous reporting period.

The most common overall cause of adult burn injuries was flame (43 per cent) followed by scald burns (28 per cent) and contact burns (15 per cent). In the adult age range of 16 to 69 years, flame burn was the most common cause of injury and scald burns were the predominant cause of burn injuries for patients aged over 70 years.

**Table 4a: 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 | 81 | 214 | 60 | 78 | 85 | 42 | 560 | 56 |
| Contact | 34 | 58 | 26 | 37 | 38 | 34 | 227 | 23 |
| Flame | * | * | 5 | 15 | 26 | 45 | 95 | 10 |
| Friction | * | 5 | 16 | 25 | 15 | 7 | 71 | 7 |
| Chemical | * | 6 | * | * | * | * | 16 | 2 |
| Radiant Heat | * | * | * | * | * | * | 16 | 2 |
| Electrical | * | * | * | * | * | * | 8 | 1 |
| Cooling | * | * | * | * | * | * | 4 | <1 |
| Pressurised gas/air | * | * | * | * | * | * | 2 | <1 |
| Other | * | * | * | * | * | * | 1 | <1 |
| **Total** | **127** | **289** | **115** | **160** | **170** | **137** | **1,000** | **100** |

* Less than five cases

**Table 4b: 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 | 87 | 241 | 211 | 194 | 153 | 101 | 52 | 22 | 1,061 | 43 |
| Scald | 36 | 131 | 111 | 118 | 104 | 80 | 68 | 47 | 695 | 28 |
| Contact | 39 | 80 | 57 | 66 | 55 | 37 | 17 | 15 | 366 | 15 |
| Chemical | 8 | 47 | 23 | 25 | 26 | 11 | 2 | 2 | 144 | 6 |
| Friction | 9 | 31 | 12 | 6 | 9 | * | * | * | 73 | 3 |
| Electrical | 6 | 13 | 12 | 8 | 9 | * | * | * | 52 | 2 |
| Radiant Heat | * | * | 6 | 7 | 12 | * | * | * | 38 | 2 |
| Pressurised gas/air | * | * | * | * | * | * | * | * | 6 | <1 |
| Cooling | * | * | * | * | * | * | * | * | 5 | <1 |
| Other | * | * | * | * | * | * | * | * | 4 | <1 |
| Total | 187 | 549 | 436 | 426 | 370 | 240 | 146 | 90 | 2,444 | 100 |

* Less than five cases

**Figure 4a: Age distribution by burn cause - Paediatric cases**

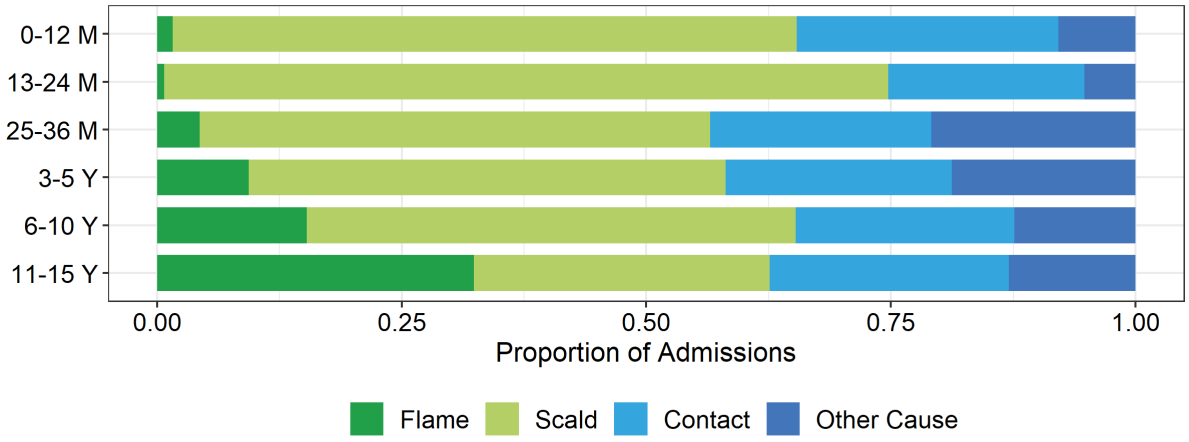
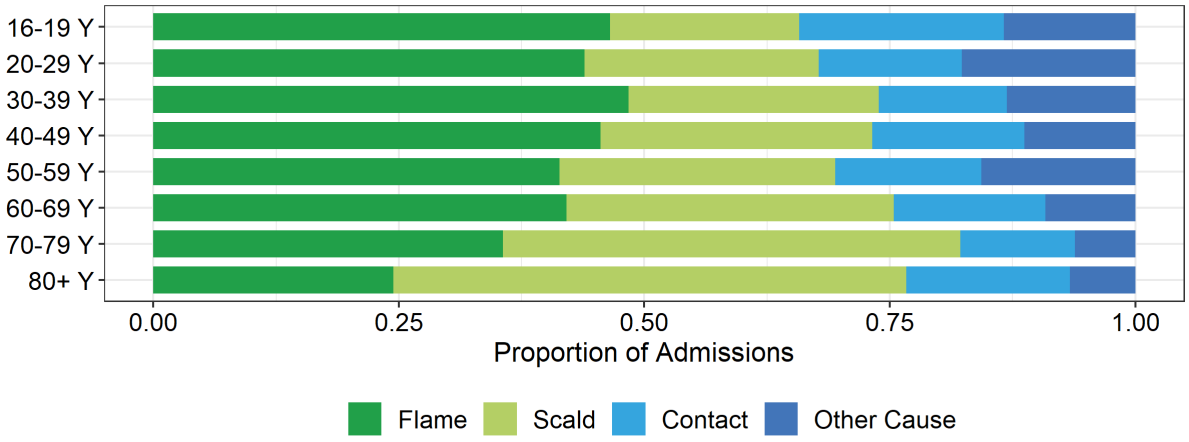



**Figure 4b: Age distribution by burn cause - Adult cases**




The most common sub-causes of paediatric and adult burn injuries are shown in Tables 4a and 4b. These sub-causes accounted for 79 per cent of paediatric cases and 69 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 due to fat or oil and flame burns from other causes. The three most common sub-causes of burn injury in both adults and paediatrics have been consistent over the past six years.

In 60 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), and has been the predominant accelerant for all BRANZ reporting years.

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

| Cause | Sub Cause | N | % |
|---|---|---|---|
| **Scald** | Hot Beverages | 173 | 18 |
| **Scald** | Water from saucepan/kettle/jug/billy/urn | 154 | 16 |
| **Scald** | Food (liquid/solid) | 93 | 9 |
| **Contact** | Coals/ashes | 66 | 7 |
| **Contact** | Vehicle exhaust | 46 | 5 |
| **Friction** | Treadmill | 37 | 4 |
| **Scald** | Fat/oil | 34 | 3 |
| **Scald** | Water from tap/bath/shower | 31 | 3 |
| **Flame** | Campfire/bonfire/burn-off | 30 | 3 |
| **Flame** | Lighter/matches | 23 | 2 |
| **Friction** | Vehicle/motorbike | 21 | 2 |
| **Scald** | Water from hot-water bottle | 20 | 2 |
| **Contact** | Iron | 19 | 2 |
| **Contact** | Hot metal | 16 | 2 |
| **Scald** | Water from basin/sink/bucket | 14 | 1 |

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

| Cause | Sub-Cause | N | % |
|---|---|---|---|
| **Flame** | Campfire/bonfire/burn-off | 326 | 14 |
| **Scald** | Fat/oil | 196 | 8 |
| **Flame** | Other cause | 157 | 7 |
| **Scald** | Water from saucepan/kettle/jug/billy/urn | 151 | 6 |
| **Chemical** | Alkali | 98 | 4 |
| **Flame** | Vehicle/engine parts | 87 | 4 |
| **Scald** | Food (liquid/solid) | 82 | 3 |
| **Flame** | Gas/gas bottle | 82 | 3 |
| **Contact** | Coals/ashes | 81 | 3 |
| **Scald** | Hot beverages | 73 | 3 |
| **Contact** | Hot metal | 71 | 3 |
| **Flame** | Lighter/matches | 67 | 3 |
| **Flame** | Welder/grinder | 67 | 3 |
| **Contact** | Vehicle exhaust | 63 | 3 |
| **Friction** | Vehicle/motorbike | 58 | 2 |

### 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 (26 versus four per cent).

The place of injury for paediatric and adult cases are summarised in Tables 5a and 5b. Most burn injuries occurred at home (63 per cent). This finding is consistent with previous reporting years and the American NBR, where 74 per cent of all burn injuries occurred at home (1).

**Table 5a: Place of injury – paediatrics**

| Place of injury | N | % |
|---|---|---|
| Home | 733 | 76 |
| Other residence (e.g. friend's house) | 75 | 8 |
| Place for recreation | 73 | 8 |
| Street and highway | 19 | 2 |
| Trade and service area | 12 | 1 |
| Farm | 9 | 1 |
| Sports or athletics area | 5 | 1 |
| School, other institution and public administrative area | * | <1 |
| Residential institution | * | <1 |
| Other specified place | 34 | 4 |
| Total | 963 | 100 |

* Less than five cases

**Table 5b: Place of injury – adults**

| Place of injury | N | % |
|---|---|---|
| Home | 1,332 | 57 |
| Trade and service area | 197 | 8 |
| Place for recreation | 181 | 8 |
| Street and highway | 150 | 6 |
| Other residence (e.g. friend's house) | 136 | 6 |
| Industrial and construction area | 123 | 5 |
| Farm | 79 | 3 |
| School, other institution and public administrative area | 16 | 1 |
| Residential Institution | 14 | <1 |
| Sports or athletics area | 7 | <1 |
| Other specified place | 91 | 4 |
| Total | 2,326 | 100 |

The kitchen was the place of injury for 45 per cent of paediatric cases and 34 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 (25 per cent) was the next most common place of injury, followed by the living room (eight per cent).

Tables 6a and 6b outline common activities performed at the time of injury for paediatric and adult cases. Playing, being near a person preparing food or drink, and participating in a leisure activity 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 59 per cent (n=197) 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 for whom there was a recorded place of injury, 48 per cent (n=173) occurred at a 'trade or service area', followed by an 'industrial or construction area' (n=116, 32 per cent). These figures are similar to the previous reporting year.

In the 20 to 29 years age group, leisure activities accounted for 23 per cent of burns and the place of injury was in the home for 218 (42 per cent) cases, followed by a 'trade or service area' (11 per cent). This is different from the previous reporting period, in which a 'place for recreation' 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 (26 per cent). This is consistent with the previous reporting periods.

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

| Activity at the time of injury | N | % |
|---|---|---|
| Playing | 293 | 31 |
| Near person cooking | 264 | 28 |
| Leisure activity (excluding sporting activity) | 111 | 12 |
| Eating/drinking | 54 | 6 |
| Cooking | 52 | 5 |
| Bathing | 36 | 4 |
| Sleeping/resting | 23 | 2 |
| Other vital activities | 18 | 2 |
| Driving | 17 | 2 |
| Sports activity | 9 | 1 |
| Cleaning | 6 | 1 |
| Working for income | 5 | 1 |
| Self-harming | 5 | 1 |
| Gardening | * | <1 |
| Suspected illegal activity | * | <1 |
| Household maintenance | * | <1 |
| Other types of unpaid work | * | <1 |
| Vehicle maintenance | * | <1 |
| Education | * | <1 |
| Other specified activities | 40 | 4 |
| Total | 949 | 100 |

* Less than five cases

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

| Activity at the time of injury | N | % |
|---|---|---|
| Cooking | 501 | 21 |
| Leisure activity (excluding sporting activity) | 408 | 17 |
| Working for income | 376 | 16 |
| Sleeping/resting | 167 | 7 |
| Household maintenance | 139 | 6 |
| Driving | 121 | 5 |
| Self-harming | 97 | 4 |
| Vehicle maintenance | 89 | 4 |
| Other vital activities | 71 | 3 |
| Gardening | 58 | 2 |
| Other types of unpaid work | 49 | 2 |
| Eating/drinking | 46 | 2 |
| Cleaning | 45 | 2 |
| Bathing | 42 | 2 |
| Suspected illegal activity | 32 | 1 |
| Playing | 15 | 1 |
| Near person cooking | 15 | 1 |
| Sports activity | 12 | 1 |
| Education | * | < 1 |
| Other specified activities | 103 | 4 |
| Total | 2,226 | 100 |

* Less than five cases

### Drug and alcohol involvement

There was a documented suspicion of drug and/or alcohol involvement in 21 per cent of adult burn injuries. 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.

## Burn Injury Severity

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

## Key Points

- The majority of burn injuries in Australia and New Zealand are less than 10 per cent of the TBSA
- Massive burn injury (equal to or exceeding 50 per cent TBSA) is an extremely rare event in children in Australia and New Zealand, accounting for less than one per cent of cases
- Six per cent of adult burn injuries had documented evidence of an inhalation injury

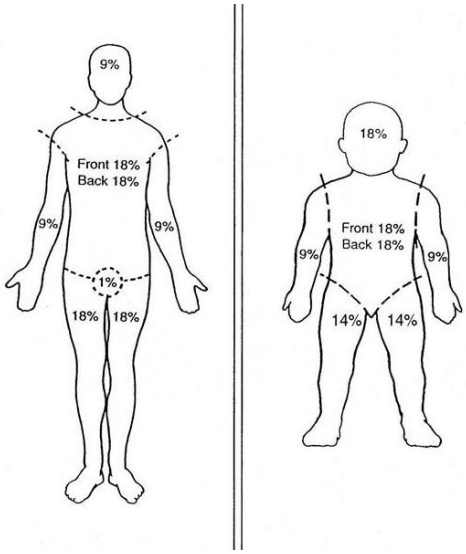
### Percent Total Body Surface Area (TBSA)

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 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 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% | 889 | 89 | 2,006 | 82 |
| 10-19% | 93 | 9 | 281 | 11 |
| 20-49% | 17 | 2 | 130 | 5 |
| ≥ 50% | * | <1 | 40 | 2 |
| **TOTAL** | 1,002 | 100 | 2,457 | 100 |

* Less than five cases




**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 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 (Appendix 8). Of the adult patients with a burn less than 10 per cent TBSA (n=2,006, 82 per cent), 17 per cent involved the face, 32 per cent were hand burns, and 20 per cent involved burns to the feet.

More than 67 per cent of burn injuries reported by the American NBR were less than 10 per cent TBSA (1). 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. 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 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 burn depth. The BRANZ reports on burn depth by documenting the presence of injuries involving superficial, mid-dermal, deep dermal, and full thickness burns. Burn injuries can include multiple areas of multiple depths. The burn depth was recorded for 95 per cent of cases in the 2017-2018 reporting period. Of these, 49 per cent (n=1,549) had reported superficial dermal burns, 48 per cent (n=1,428) had reported mid dermal burns, and 45 per cent (n=1,323) had deep dermal burns.

A full thickness burn was documented for 31 per cent of cases (n=930), which is a slight increase from the previous reporting period. Of the cases documented as having a full thickness burn, the percentage TBSA

value of the full thickness area was known in 88 per cent (n=821) 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 12 per cent, a slight decrease from the previous reporting period.

**Table 9: Distribution of patients with full thickness burns by burn size**

| % full thickness TBSA | N | % |
|---|---|---|
| < 10 % full thickness | 718 | 88 |
| 10-19 % full thickness | 44 | 5 |
| 20-49 % full thickness | 29 | 4 |
| ≥ 50 % full thickness | 21 | 3 |
| **Total** | 812 | 100 |

### Inhalation injury

Significant inhalation injury is associated with increased morbidity and mortality and is suspected on the basis of a history of mechanism of injury, smoke exposure, clinical presentation and diagnostic investigations. Burns to the oropharynx and upper airway can 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 globally or across BRANZ sites for diagnostic criteria and classification of severity of inhalation injuries. A documented inhalation injury was recorded for six per cent of adult cases (n=150) 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, 65 per cent had sustained an inhalation injury.

# How were the Burns Patients Managed Prior to Admission to the Burns Unit?

This section describes the pre-hospital phase and burn cooling (first aid) response, the referral process, and transfer times. Quality indicator data is also given. Along with animal studies, research utilising data collected by the BRANZ has established the validity of current recommendations for burn first aid (4-8).

## Key Points

- Eighty per cent of all cases received some form of first aid following the burn injury, with 88 per cent of paediatric cases receiving some form of first aid. Seventy-six per cent of paediatric cases received the gold standard of first aid, which is 20 minutes of cool running water within three hours of injury
- The median time to admission to a BRANZ hospital was 20 hours

### 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 reduces the area and depth of the burn (4, 5, 7, 8).

Eighty per cent (n=2,607) of all cases were reported to have received some form of first aid following the burn injury. A higher proportion of paediatric cases (88 per cent) received some form of first aid than adult cases (78 per cent), which is consistent with previous reporting years.

Twenty minutes of cool running water within three hours was the form of applied first aid in 77 per cent paediatric cases and in 76 per cent of adult cases that received first aid following the burn injury (Table 10). Twenty-three per cent of paediatric cases and 24 per cent of adult cases that received first aid other than 20 minutes of cool running water within three hours of the burn injury.

**Table 10: Documented First Aid Following Burn Injury**

| | Paediatrics | | Adults | |
|---|---|---|---|---|
| | N | % | N | % |
| First Aid Applied | 841 | 89 | 1,766 | 78 |
| Was the first aid 20 minutes of cool running water within three hours of injury? | 663 | 77 | 1,280 | 76 |


**What was the referral source to the burns unit?**

Consistent with previous annual reports, approximately half of both the paediatric (50 per cent) and adult cases (46 per cent) were transferred to a burns unit from another hospital. The proportion of cases that were directly transported to the burns unit from the scene of injury via ambulance was 15 per cent for paediatric patients and 18 per cent for adult cases. The paediatric figure is consistent with the previous reporting period, while the adult figure represents a decrease compared to the previous reporting period.

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

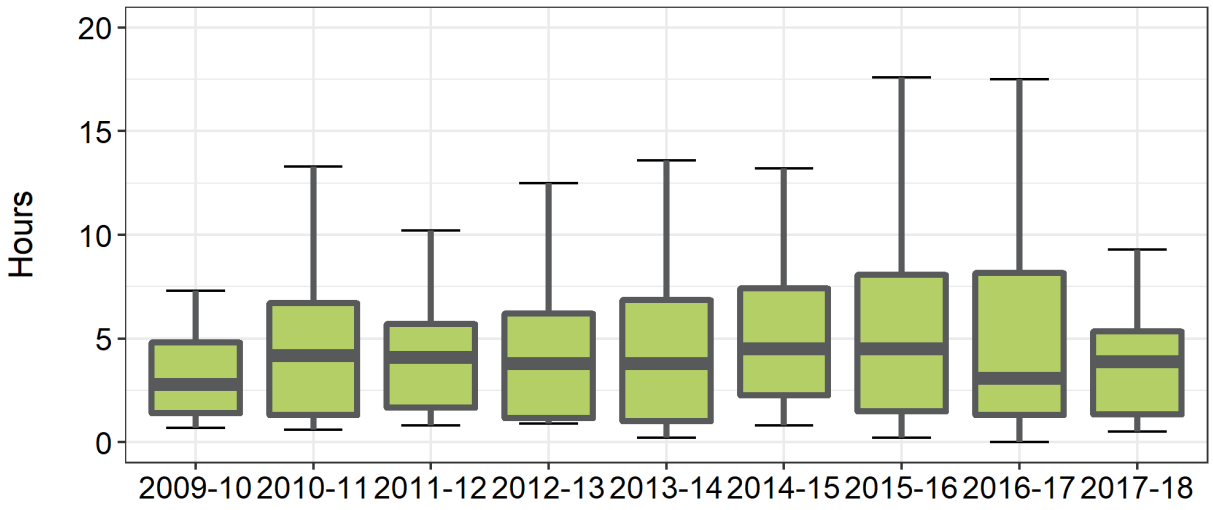
The time taken for a burn patient to be admitted from the scene of the burn injury to a BRANZ hospital significantly influences initial medical and surgical management of burn injuries. Given the centralised structure of burn care services across Australia and New Zealand, and the geographical size and 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 BRANZ 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 median (IQR) time from injury to admission to a BRANZ hospital was 20 (3-170) hours for paediatric cases and 20 (4-112) 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 and in triaging the patients requiring transfer. A burn size greater than 20 per cent TBSA in adult cases and greater than 15 per cent TBSA in paediatric cases can be considered as a major burn.

Figures 5a and 5b 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 for major burns (paediatric patients with over 15 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 have remained consistent.

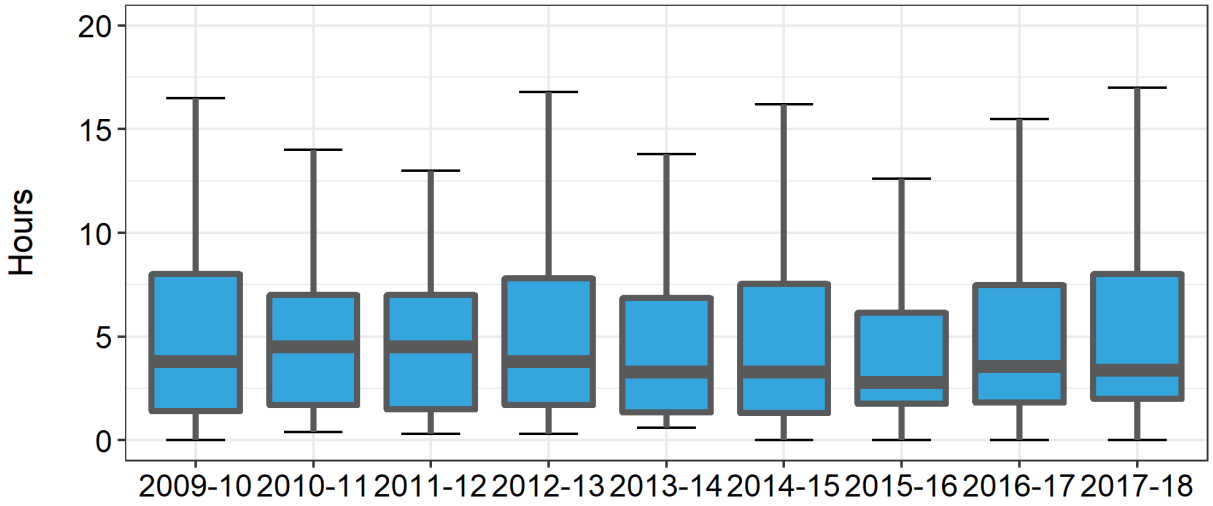
For adult cases with a burn size greater than 20 per cent TBSA, 46 percent of cases arrived at a BRANZ hospital within two hours of injury, and 95 percent arrived within seven hours. In paediatric cases transferred from the scene of injury to the specialist burn unit with a burn size greater than 15 per cent TBSA, 80 per cent of patients arrived at a BRANZ hospital within two hours of injury, and 80 per cent of patients arrived within three hours of injury.

**Figure 5a: Time to admission - Paediatric cases (TBSA > 15%)**




*Excludes outside values.*

**Figure 5b: Time to admission - Adult cases (TBSA > 20%)**




*Excludes outside values.*

# 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.

## Key Points

- Seventy-six per cent of admitted cases underwent at least one procedure in the operating theatre
- Eight per cent of all adult cases had at least one positive blood culture
- Only 63 per cent of adult patients received venous thromboembolism prophylaxis

### Wound assessment

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

In 99 per cent of paediatric cases, and 97 per cent of adult cases, their definitive burn wound assessment was documented within 72 hours of admission to hospital. This is consistent with the previous reporting year (99 per cent for paediatrics and 96 per cent for adults) and higher than the period before that (93 per cent for paediatrics and 89 per cent for adults). For paediatric cases, the burn registrar recorded the burn wound assessment within 72 hours of admission for 61 per cent of cases, followed by the burns consultant (nine per cent), burn care nurse coordinator or nurse practitioner (five per cent), and burns fellow (four per cent).

For adult cases, where assessment was documented within 72 hours, the person conducting the assessment was the burns registrar in 36 per cent of cases, followed by the burns consultant (29 per cent), burn care nurse coordinator or nurse practitioner (eight per cent), and burns fellow (six 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.

**Theatre for burn wound excision**

Seventy-six 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 11 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.

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, 72 percent of paediatric cases and 83 per cent of adult cases underwent debridement and grafting. The paediatric figure is a decrease compared to the previous reporting period. The proportion of paediatric and adult patients with full thickness burns that underwent debridement and skin grafting was 79 and 83 percent in 2016-2017.

The median (IQR) time to grafting from injury was 12 (9-16) days for paediatric cases, which is a slight increase on the previous reporting period. For adult cases, the median time to grafting from injury was seven (4-11) days, which is also a slight increase on the previous reporting period.

**Table 11: Percentage of burn wound management procedures**

| | Paediatric cases | | Adult cases | |
|---|---|---|---|---|
| **Procedure** | **N** | **%** | **N** | **%** |
| ***Procedures related to debridement*** | | | | |
| Debridement and skin grafting | 336 | 46 | 1,322 | 59 |
| Debridement and temporary skin closure product e.g. Biobrane™ | 93 | 13 | 319 | 14 |
| Debridement only | 224 | 31 | 371 | 17 |
| Debridement and skin cell product (e.g., CEA) | 73 | 10 | 200 | 9 |
| Debridement and dermal reconstructive product e.g. Integra™ | 2 | 0 | 12 | 1 |
| Debridement and temporary skin closure with cadaver skin | 5 | 1 | 43 | 2 |
| ***Other procedures not outlined above*** | | | | |
| Dressing change in theatre only | 139 | 88 | 48 | 29 |
| Escharotomy/Fasciotomy/Amputation or combination | 0 | 0 | 23 | 14 |
| Other | 19 | 12 | 97 | 58 |

### 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). 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 a stay in hospital for more than 48 hours (n=477), 56 per cent had documentation of a physical functioning assessment by a physiotherapist or occupational therapist within 48 hours of admission. This is consistent with respect to the previous reporting year (57 percent). For adult patients with a stay in hospital of more than 48 hours (n=1,699), 93 per cent had documentation of a physical functioning assessment within 48 hours of admission, which is an increase on 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 (9-12), and in reducing the risk of gastrointestinal dysfunction. Of the paediatric cases with a burn greater than 15 per cent TBSA (n=27), supplementary feeding (either enteral or parenteral) was documented as commencing within 24 hours of admission for 82 per cent of patients. This is consistent compared to the previous reporting year (84 per cent). For adult cases with a burn greater than 20 per cent TBSA (n=138), supplementary feeding was documented as commencing within 24 hours for 74 per cent of patients. This is a slight increase compared to the previous reporting year (69 per cent).

## In-hospital Outcome of Burn Injury

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

### ICU admissions


Critical care management and mechanical ventilation may be required after burn injury (13, 14). An ICU admission was reported for three percent of paediatric cases and 11 per cent of adult cases, which is consistent with previous reporting years. Of the paediatric cases with a burn greater than 15 per cent TBSA, an ICU admission occurred for 48 per cent of cases. For adult cases with a burn size greater than 20 per cent TBSA, an ICU admission occurred for 77 per cent of cases, which is an increase on the previous reporting period (71 per cent). The median (IQR) length of stay in ICU was 52 (38-299) hours for paediatric cases compared to 84 (24-274) hours in 2016-2017. For adult cases, the median (IQR) length of stay in ICU was 67 (30-213) hours compared to 60 (29-232) hours in 2016-2017.

The majority of patients (78 per cent) with a documented inhalation injury were admitted to ICU. The median ICU length of stay for paediatric (37 hours, IQR 11-37) and adult cases (89 hours, IQR 39-264) where an inhalation injury was documented.

The median (IQR) hours of ventilation for cases admitted to ICU was 94 (17-232) for paediatric case and 43 (19-160) for adult cases. These numbers are higher than the previous reporting periods for paediatric cases (69 hours) and lower than the previous reporting period for adult cases (52 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 (15-18). Calculating RIFLE criteria (19) from serum creatinine and estimated glomerular filtration rate (eGFR) is a quantifiable and valid measure of renal function, and an indication of prognosis. A negative change in excess of 25 per cent of eGFR relative to a baseline measurement is considered indicative of a risk of kidney injury as per the RIFLE criteria. Three paediatric cases (three per cent) were deemed to be at risk of kidney injury as defined by the RIFLE criteria. Twenty-six adult cases (three per cent) were deemed to be at risk of kidney injury as defined by the RIFLE criteria. While acute renal impairment may be an indicator of suboptimal resuscitation, there are significant difficulties with establishing baseline renal function in burns patients. Further examination of this indicator is required.

### 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 24 per cent of adult cases (n=587) and 11 per cent of paediatric cases (n=109). This rate of blood culture collection is lower than the previous reporting period for adult cases (28 per cent) but is consistent with the previous reporting period for paediatric cases (12 per cent). A blood culture was taken in 62 per cent of adult cases with a burn greater than 20 per cent TBSA, and in 40 per cent of paediatric cases with a burn greater than 10 per cent TBSA.

For paediatric cases, three per cent of all cases had at least one positive blood culture (n=3). This figure is higher than the previous reporting period (less than one per cent). A positive blood culture was reported in eight per cent of adult cases who had blood cultures taken (n=49), which is an increase compared to the previous reporting period (four per cent). A positive blood culture was recorded in 23 per cent (n=35) of adult cases with a burn greater than 20 per cent TBSA.

### Multidrug resistant organisms

Positive swabs for multidrug resistant organisms can be an indicator of hand hygiene practices and the overuse of antibiotics. The BRANZ collect data on four organisms: Methicillin-resistant Staphylococcus Aureus (MRSA), Vancomycin-resistant Enterococcus (VRE), Carbapenem-resistant Pseudomonas (CRP), and Carbapenem-resistant Enterobacter (CRE). A positive swab for MRSA was recorded for three percent (n=28) of paediatric admissions and two percent (n=54) of adult admissions. A positive swab for VRE was recorded for less than one percent of both paediatric (n=1) and adult (n=10) admissions. A positive swab for CRP was recorded for less than one percent of both paediatric (n=1) and adult (n=13) admissions. A positive swab for CRE was recorded for less than one percent of both paediatric (n=1) and adult (n=7) admissions. As this is the first year this quality indicator has been included in the Annual Report, it is not possible to compare this data to the previous reporting period.

### Pain assessment

Pain is often the most frequent complaint following burn injury. The assessment of pain is vital in determining the most effective management. Early intervention minimises the risk of long-term sequelae such as chronic pain. As a sign of good quality care, it is reasonable to expect that a patient who has been admitted for a burn injury should have an assessment of their pain within 24 hours of admission. The pain assessment should be completed using one of the following validated tools: the short-form McGill questionnaire (20), the short- or long-form of the Brief Pain Inventory (21, 22), the Pain Disability Index (23), a numeric rating scale, a verbal descriptor scale, a pain thermometer, a visual analogue scale, or a pictorial pain scale such as the FACES pain scale.

Ninety-five per cent (n=242) of paediatric patients and 92 per cent (n=2,245) of adult patients received a validated pain assessment within 24 hours of admission. As this is the first year this quality indicator has been included in the Annual Report, it is not possible to compare this data to the previous reporting period; however, this indicates a high level of awareness amongst burns clinicians of the importance of adequate pain control for burns patients.

### Use of accepted diagram to accurately calculate burn size

Specialised burn care includes an accurate estimation of the percentage TBSA of the burn. The percentage TBSA of the burn is used to determine the severity of the burn and accurately calculate the fluid resuscitation requirements. The Lund Browder chart (24) and the Wallace rule of nines diagram (25) are accepted tools used in the estimation of TBSA percentage.

Sixty-two per cent (n=607) of paediatric patients and 73 per cent (n=1,688) of adult patients had the percentage TBSA of their burn accurately calculated by burn clinicians using an accepted

diagram. As this is the first year this quality indicator has been included in the Annual Report, it is not possible to compare this data to the previous reporting period.

**Malnutrition risk screening**

A significant proportion of patients admitted to hospital are at risk of malnutrition. Early identification of patients who are nutritionally depleted (or likely to become so) is vital to provide quality care to these patients and use resources effectively.

Of the paediatric cases with a length of stay exceeding 24 hours, 36 per cent (n=214) had their nutritional status screened within 24 hours if admission. Of the adult cases with a length of stay exceeding 24 hours, 79 per cent (n=1,549) had their nutritional status screened within 24 hours if admission. As this is the first year this quality indicator has been included in the Annual Report, it is not possible to compare this data to the previous reporting period.

**Use of accepted formula to estimate fluid resuscitation requirements**

Specialised burn care includes an accurate estimation of fluid resuscitation requirements in severe burns. Adequate fluid resuscitation remains a cornerstone of quality early burn care, as it restores circulating blood volume, preserves vital organs, and maintains tissue perfusion. The modified Parkland formula and the modified Brooke formula (26) are the two most widely used resuscitation formulas.

Of the paediatric cases with a burn greater than 15 per cent TBSA, 79 per cent (n=56) had documented evidence that an accepted formula was used to guide initial fluid resuscitation requirements. Of the adult cases with a burn greater than 20 per cent TBSA, 89 per cent (n=124) had documented evidence that an accepted formula was used to guide initial fluid resuscitation requirements. As this is the first year this quality indicator has been included in the Annual Report, it is not possible to compare this data to the previous reporting period.

**Venous thromboembolism prophylaxis**

Venous thromboembolic events (e.g., deep venous thrombosis, pulmonary emboli) are a significant risk for all hospitalised patients, but patients with burn injuries are at a higher risk of having such an event (27). Venous thromboembolic prophylaxis is used in adult burn patients to prevent venous thrombosis and pulmonary embolism. Commonly prescribed medications for anticoagulation prophylaxis include clexane, heparin, and warfarin.

Sixty-three per cent (n=1,423) of patients over the age of 16 received venous thromboembolic prophylaxis. As this is the first year this quality indicator has been included in the Annual Report, it is not possible to compare this data to the previous reporting period.

### 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 (9, 10, 28).

Of the paediatric patients, with a length of stay greater than two weeks (n=62), 87 per cent had their weight measured and documented within three to five days of admission. Fifty-one per cent had a weekly weight documented during their hospital stay. Nine paediatric patients lost weight.

For adult cases, with a length of stay greater than two weeks (n=333), 65 per cent had their weight measured and documented within three to five days of admission. A weekly weight was documented for 50 per cent of these patients. Weight loss was recorded in 81 adult patients.

The documented weight loss during the episode of admitted patient care ranged from 0.1 to 14 kg for paediatric cases, and from 0.1 to 26.8 kg for adult cases. The documented median (IQR) weight loss was 2 (1-5) kg for paediatric cases, and 4 (2-6.5) 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

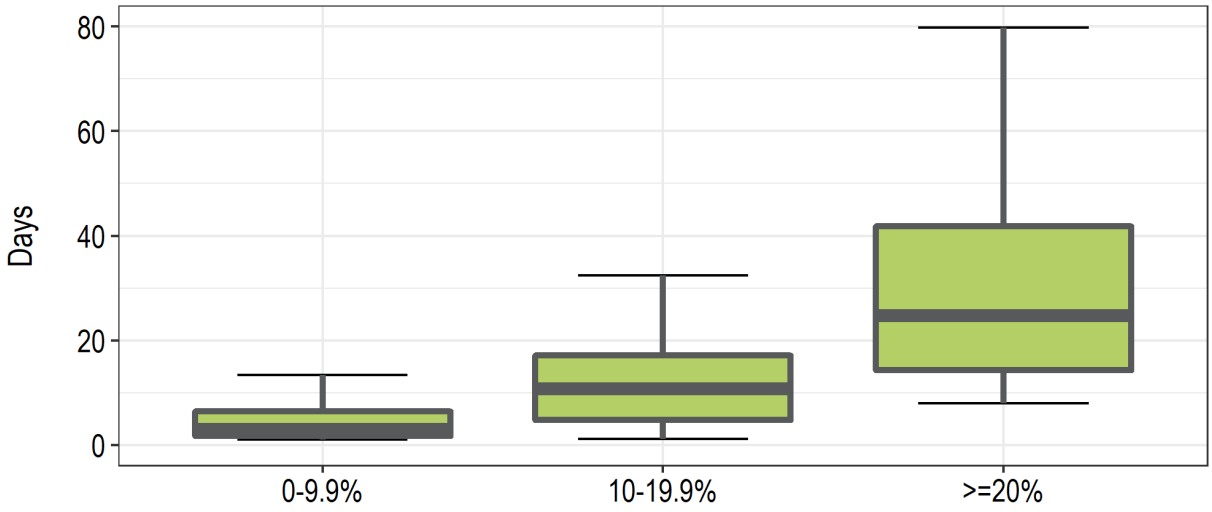
The length of admission is associated with increased case complexity, and is impacted by treatment protocols (29). Cases that did not survive to discharge, or where the length of stay was less than 24 hours, were excluded from the analysis of length of stay.

The median (IQR) length of stay for paediatric patients was four (2-8) days, a slight increase compared to the previous reporting period. 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 (3-12) days, consistent with the previous reporting period. Figure 7b shows the distribution of hospital length of stay by percentage TBSA for adults.

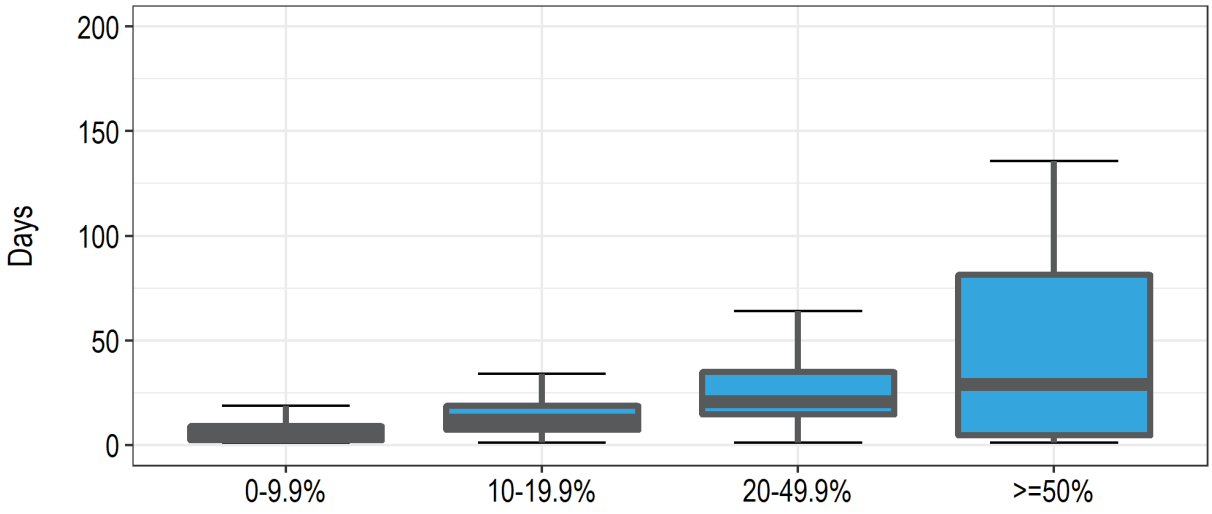
Larger burns were associated with a greater hospital length of stay for both paediatric and adult cases. The average length of stay across BRANZ population was eight days. This figure is comparable to the average length of stay of eight days reported by the American NBR (1).

**Figure 6a: Distribution of LOS by %TBSA - Paediatric cases**




*Excludes outside values and deaths.*

**Figure 6b: Distribution of LOS by %TBSA - Adult cases**




*Excludes outside values and deaths.*

The accepted length of stay by percentage TBSA for burns between ten and 50 per cent is one day per per cent of TBSA burned. Figure 7a shows the relationship between the size of the burn and the mean length of stay, increasing in one per cent units of burn size, in adults over the past five years. The error bars represent the standard deviation of the length of stay, while the red line represents the expected length of stay based on the one day per percentage of TBSA burned theory.

Figure 7b shows the relationship between the size of the burn and the mean length of stay, increasing in five per cent units of burn size, in adults over the past year. The error bars represent the standard deviation of the length of stay, while the red rectangles represent the expected length of stay based on the one day per percentage of TBSA burned theory.

**Figure 7a: LOS by % TBSA - Adult cases (Last five years)**

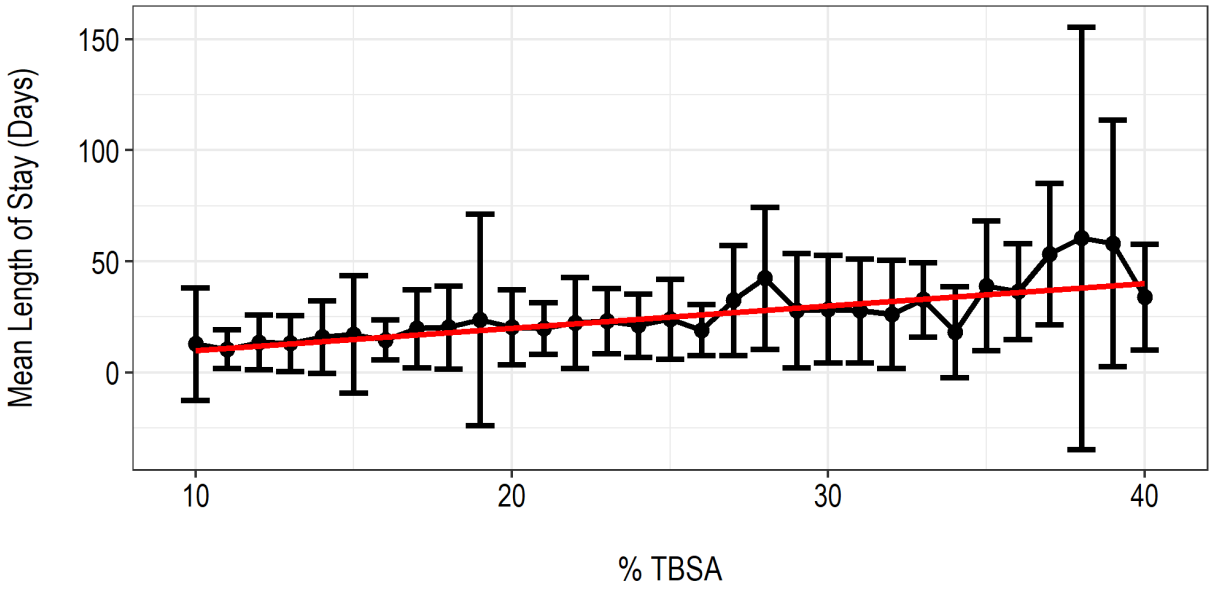
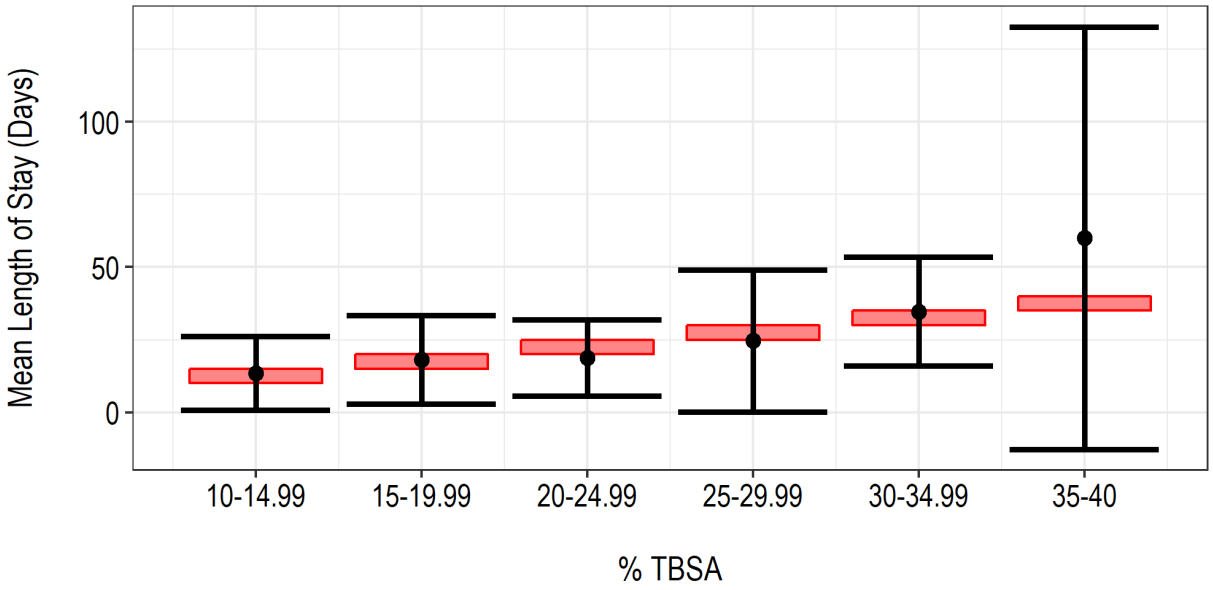



**Figure 7b: LOS by % TBSA - Adult cases**



### Deaths

Overall, 37 (one per cent) patients died before hospital discharge. Of these patients, 36 were adults. This in-hospital death rate is lower than the reported American NBR death rate of three per cent (1), most likely reflecting the differences in the distribution of burn size noted earlier between the registries.

The proportion of patients who died generally increased with burn size. Of the 43 patients who had a TBSA greater than 50 per cent, 24 (56 per cent) died. This figure is higher than the previous reporting period (41 per cent). Of the patients who died, 65 per cent (n=24) had a documented inhalation injury.

A reason for death was recorded for all of the patients who died before hospital discharge, with multi-system organ failure (n=18) and burns shock (n=6) the most common reasons for death.

Of the 37 patients who died during their hospital stay, active treatment was not commenced for 19 of the cases. Active treatment was commenced but later ceased for 13 of the patients who died during their hospital stay. Ten of the 37 patients died within 24 hours of admission and the cause of death was recorded as burns shock, multi-system organ failure, or pulmonary causes (pulmonary embolus, pneumonia, etc). The median (IQR) length of stay for patients who died during their hospital stay was three (1-16) days.

### Discharge status

Most patients (87 per cent) were discharged to their usual residence, while four per cent were discharged to Hospital in the Home (Table 12). Common other destinations on departure from hospital included other acute hospitals.

**Table 12: Discharge Disposition**

| Discharge Disposition | N | % |
|---|---|---|
| Usual residence/home | 3,007 | 87 |
| Hospital in the Home | 137 | 4 |
| Other destination | 80 | 2 |
| Other acute hospital | 71 | 2 |
| Inpatient rehabilitation hospital | 60 | 2 |
| Died | 37 | 1 |
| Left against medical advice | 21 | < 1 |
| Psychiatric hospital/unit | 15 | < 1 |
| Other healthcare accommodation | 13 | < 1 |
| Statistical discharge | 8 | < 1 |
| Another BRANZ hospital | 7 | < 1 |

**Readmissions**

A total of 132 paediatric cases (14 per cent) were readmitted within 28 days of discharge with the majority of cases (90 per cent) reported as being a planned readmission. This figure 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 lower for adults. Only five per cent of adult cases (n=127) experienced a readmission within 28 days of discharge. In contrast to the paediatric patients, 56 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 arose from an unexpected complication. We hope that poor outcomes in terms of readmission may be able to be linked to processes of care, which can be improved in the future.

## 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. The response rate for this reporting period was greater than that of the previous reporting period (53 per cent response rate).

| STRUCTURAL QUALITY INDICATORS | Number of centres that responded | Yes (n) | Yes (%) |
|---|---|---|---|
| 1. Is a Burns Surgeon available on call 24 hours? | 11 | 10 | 91 |
| 2. Is a Burns theatre available on a 24-hour basis? | 11 | 10 | 91 |
| 3. (a) Is Multidisciplinary care provided within the Burns unit? | 11 | 11 | 100 |
| (b) Are weekly multidisciplinary team meetings Conducted in the burns unit? | 11 | 11 | 100 |
| 4. Does your unit routinely complete infection Surveillance swabs on admission? | 11 | 6 | 55 |

# Project Achievements

### 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 ninth year of reporting, there were 14 requests for BRANZ data for purposes such as research, injury prevention, education and public awareness campaigns. Of these requests, 13 had data provided.

### Presentations

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

1. Australian and New Zealand Burns Association Annual Scientific Meeting, Adelaide, October 2017: Acute kidney injury <72 hours in adult burn cases: Findings from BRANZ. Yvonne Singer.

2. Australian and New Zealand Burns Association Annual Scientific Meeting, Adelaide, October 2017: The Burns Registry of Australia and New Zealand: Progressing the evidence base for burn care. Heather Cleland.

3. Australian and New Zealand Burns Association Annual Scientific Meeting, Adelaide, October 2017: A review of heterotopic ossification in burns: Implications for treatment and research. Dale Edgar.

4. Australian and New Zealand Burns Association Annual Scientific Meeting, Adelaide, October 2017: Pathways of ambulation after lower limb burn injury: Does timing of ambulation influence functional outcome? Dale Edgar.

5. American Burn Association Annual Meeting, Chicago (USA), April 2018: Does Admission eGFR Affect Burn Centre Length of Stay? Findings from the Burns Registry of Australia and New Zealand. Yvonne Singer.

## Conclusion

Data are presented for 3,459 burn cases admitted to the 17 specialist burn units across both Australia and New Zealand for the 12-month period from 1st July 2017 to June 30th 2018. 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. Data validity was slightly poorer, ranging between 90 and 95 per cent for most data items.

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.

A minimum of 20 minutes of cool running water was applied within three hours of injury for 76 per cent of cases that received some kind of first aid treatment after sustaining their burn injury. Where an injury requiring admission to a burns unit occurred, the vast majority of burns were less than 10 per cent TBSA. However, 76 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 (30). |
| Burn Injury classifications (30) | • Chemical – direct contact with chemicals<br>• Contact - direct contact with hot objects<br>• Electrical – direct contact with an electrical current<br>• Flame – direct contact with open flame or fire<br>• Flash – exposure to the energy produced by explosive material<br>• Friction – rapid movement of a surface against the skin, e.g. treadmill, road surface<br>• Radiation – exposure to solar energy, radiotherapy, laser<br>• Radiant heat – heat radiating from heaters , open fire places<br>• Scald - hot liquids such as hot water and steam, hot fats, oils and foods |
| Country of Birth: | Country in which the person was born (31). |
| Definitive burn wound assessment: | The burn assessment documented by the most senior burns clinician assessment within 72 hours of admission.<br><br>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 (9). |

| | |
|---|---|
| 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.'* (19)<br><br>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 (32). |
| Full thickness burns: | The most severe classification of burn depth where all skin layers are destroyed, leaving no cells to heal the wound. Full thickness burns are likely to require surgical excision and skin grafting (30). |
| Inhalation injuries: | Burns to the oropharynx and upper airway result in swelling and possible airway obstruction within the first few hours after injury. Inhalation 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 (33). |
| 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 (30). |

# Appendix 1: 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 the 2010-2011 reporting period.
- 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.

# Appendix 2: How does the 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.

# Appendix 3: Data Completeness

Complete data is an aim for all clinical quality registries as missing data can result in bias and limit the analyses that can be performed to answer research questions. The table presented here show the *completeness* (i.e., whether there was a response entered) of key BRANZ data items. The aim for any registry is to achieve more than 95 per cent completeness. The number of responses is shown first, followed by the percentage of cases completed. The percentage reported is for cases *where the case was eligible for* collection.

The percentages have been colour coded to assist with identifying fields that have suboptimal completeness. The legend is as follows:

100% complete  90-99% complete  80-89% complete  < 80% complete

| | Complete response | |
|---|---|---|
| | n | % |
| Date of Birth | 3463/3463 | 100 |
| Date of Injury | 3463/3463 | 100 |
| Date of Admission | 3463/3463 | 100 |
| Patient Gender | 3463/3463 | 100 |
| Primary Burn Cause | 3463/3463 | 100 |
| TBSA | 3416/3462 | 99 |
| Date of Discharge | 3463/3463 | 100 |

# Appendix 4: Data Validity

While complete data is an aim for all clinical quality registries, having valid and analysable data is also an important aim. Valid and analysable data excludes responses such as 'Not stated/inadequately described', 'Not applicable', and incomplete responses. Valid and analysable data also excludes dummy date responses (i.e., 09/09/9999). The tables presented here show the validity of responses for key data items. Again, for each table the number of responses is shown first, followed by the percentage of cases where a valid response was provided.

The percentages have been colour coded to assist with identifying fields that have suboptimal completeness. The legend is as follows:

100% valid | 90-99% valid | 80-89% valid | < 80% valid

| | Complete response | |
|---|---|---|
| | n | % |
| Date of Birth | 3463/3463 | 100 |
| Date of Injury | 3460/3463 | 99 |
| Date of Admission | 3463/3463 | 100 |
| Patient Gender | 3463/3463 | 100 |
| Primary Burn Cause | 3448/3463 | 99 |
| TBSA | 3410/3462 | 99 |
| Date of Discharge | 3463/3463 | 100 |

## Appendix 5: Management Membership Committee

| | | |
|---|---|---|
| Belinda Gabbe | Monash University, DEPM | Head, Pre-Hospital Emergency and Trauma |
| Lincoln Tracy | Monash University, DEPM | BRANZ Research Fellow |
| Mimi Morgan | Monash University, DEPM | Senior Program Manager |

## Appendix 6: Steering Committee Membership

| NAME | SITE | TITLE |
|---|---|---|
| Peter Cameron | Monash | Chief Investigator (Project Lead) |
| Belinda Gabbe | Monash | Chief Investigator (Project Supervisor) |
| Lincoln Tracy | Monash | Research Fellow |
| Judith McInnes | Monash | Research Fellow |
| Heather Cleland | VIC, Alfred | Head of Burns Unit/ Chair of Steering Committee |
| Yvonne Singer | VIC, Alfred | Victorian State Burns Education Program Coordinator |
| Kathy Bicknell | VIC, RCH | Burns Co-ordinator |
| Roy Kimble | QLD, QCH | Head of Burns Unit |
| Bronwyn Griffin | QLD, QCH | Clinical Research Manager |
| Jason Miller | QLD, RBW | Surgeon |
| John Harvey | NSW, CH Westmead | Head of Burns Unit |
| Anne Darton | NSW, SBIS | Burn Injury Service Manager |
| Andrew Castley | TAS, Royal Hobart | Head of Burns Unit |
| Rebecca Schrale | TAS, Royal Hobart | Clinical Nurse Consultant, Burns |
| Sheila Kavanagh | SA, RAH | Clinical Nurse Consultant |
| Kathryn Heath | SA, RAH | Allied Health Project Manager, Burns SA/ Senior Dietitian, Surgical Specialties |
| Rochelle Kurmis | SA, RAH | Allied Health Project Manager, Adult Burns Service |
| Linda Quinn | SA, WCH | Burns - Advanced Clinical Practice Consultant |
| Fiona Wood | WA, FSH | Head of Burns Unit (Past ANZBA President) |
| Dale Edgar | WA, FSH | Senior Physiotherapist / Fiona Wood Foundation Director of Clinical Research (Past ANZBA President) |
| 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 |

# Appendix 7: 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. All 17 specialist burns units have ethics approval to submit data to BRANZ and the remaining site. For this reporting period, 17 sites contributed data (Table 14). Of these sites, five sites treat paediatric patients only, six 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 |
| Perth Children's | 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 |
| Royal Brisbane and Women's | Queensland | Adults |
| Queensland 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 8: Australian 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 |
| Perth Children's Hospital | WA | https://pch.health.wa.gov.au/Our-services/Burns |
| Royal North Shore Hospital | NSW | http://www.nslhd.health.nsw.gov.au/Hospitals/RNSH |
| Concord General Repatriation Hospital | NSW | https://www.slhd.nsw.gov.au/concord/Burns_about.html |
| 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/ |
| Queensland Children's Hospital | QLD | https://www.childrens.health.qld.gov.au/referapatient/list-specialities/burns/ |
| 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 9: 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