Australian Government
Department of Health and Ageing

House of Representatives Standing Committee on Health and Ageing

Public Roundtable on Burn Injury Prevention

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Submission on behalf of the Department of Health and Ageing

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Introduction

The terms of reference for this roundtable forum (as quoted from the Committee's website) are as follows:

> "The Committee will be investigating the impact of burn injuries on the individual, the family and the health system. The Committee will also examine ways to prevent or minimise burn injury and the associated health system costs."[1]

This submission comprises three sections:

1. A brief description of the clinical assessment and management of burn injuries
2. A summary of data available on the incidence of burn injuries and their impact on the health system (in particular, public and private hospitals)
3. A description of the role of the Department of Health and Ageing (DoHA) in the management and prevention of burn injuries.

Burn Injuries – Clinical Assessment and Management

Burns involve a thermal (heat) or chemical injury to the skin and underlying structures, but also potentially to internal body surfaces as well, such as the gastrointestinal and respiratory tracts.

Agents causing burn injuries include hot fluids (including food stuffs, oils, water), highly flammable materials, fires (buildings, motor vehicles, outdoors), clothing on fire, contact with hot objects/machinery, electric current, explosions and chemicals (caustic acids, alkalis and hydrocarbons).

Burns to the skin are characterised in two ways – by the depth of burn and by the percentage of total body surface area (TBSA) covered by a burn.

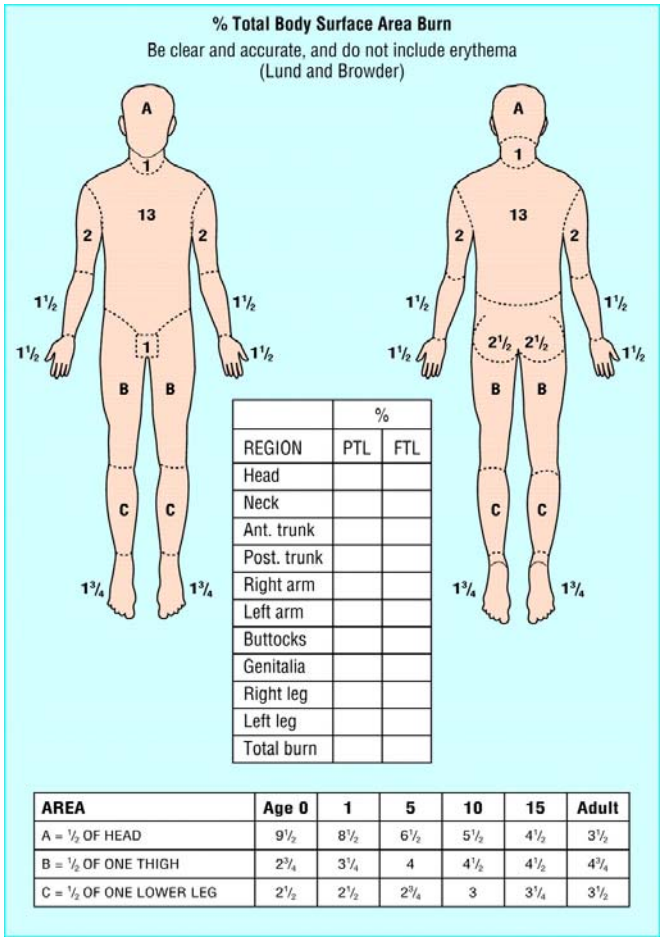
The depth of burn determines the seriousness of the injury as well as whether the burnt area is capable of healing itself. The table below demonstrates this:

Depth	Pathology	Colour	Circulation	Sensation	Blisters	Healing
Erythema (1st degree)	Epidermis only	Red, warm	Normal or increased	Present	None, or appearing days later	Within a few days
Superficial partial thickness (2nd degree)	Epidermis and upper dermis, with most adnexal structures intact	Pink	Increased (hyperaemic)	Painful and hypersensitive	Within hours	Within 2-3 weeks within wound, with minimal scarring
Deep partial thickness (2nd degree)	Epidermis dermis, with only deeper adnexal structures intact	Pale pink / blotchy red	Sluggish	Decreased sensation	Appear early, usually large and rupture within hours	Longer than 2-3 weeks, with high risk of hypertrophic scarring
Full thickness (3rd degree)	Epidermis, dermis and adnexal structures destroyed	White / charred	Nil	Nil	None (epidermis destroyed)	No healing – granulation and wound contraction may cause chronic ulceration

Note: 'Adnexal' structures are epithelial structures from which healing occurs, such as hair follicles and sweat glands.

Source: Adapted from - Victorian Adult Burns Service Referral Criteria Information – The Alfred Hospital

The body surface area of a burn is usually calculated and drawn on a chart, such as the Lund and Browder chart reproduced below:



	%	
REGION	PTL	FTL
Head		
Neck		
Ant. trunk		
Post. trunk		
Right arm		
Left arm		
Buttocks		
Genitalia		
Right leg		
Left leg		
Total burn		

AREA	Age 0	1	5	10	15	Adult
A = ½ OF HEAD	9½	8½	6½	5½	4½	3½
B = ½ OF ONE THIGH	2¾	3¼	4	4½	4½	4¾
C = ½ OF ONE LOWER LEG	2½	2½	2¾	3	3¼	3½

Source: British Medical Journal website.

These charts allow for the variation in the surface area of certain body structures by age.

Relatively minor burns (erythema, partial thickness burns of less than 10% TBSA, full thickness burns of less than 5% TBSA) can usually be managed in a local health facility. This will involve cooling the burnt area (usually with cold water), minor debridement (removing blisters and cleaning the burnt area), analgesia (pain relief) and the application of protective dressings. Admission to hospital, as well as serial reapplication of dressings (as an inpatient or outpatient) may be required as the burn heals.

Major burns require referral to a specialist major burns unit. The burns unit referral criteria of the Australian and New Zealand Burn Association (ANZBA) are reproduced below:

- Burns greater than 10% TBSA
- Burns of special areas – face, hands, feet, genitalia, perineum and major joints
- Full thickness burns greater than 5% TBSA
- Electrical burns
- Chemical burns
- Burns with an associated inhalation injury

- Circumferential burns of the limbs or chest
- Burns at the extremes of age – children and the elderly
- Burn injury in patients with pre-existing medical disorders which could complicate management, prolong recovery or affect mortality
- Any burn patient with associated trauma

These criteria (with some minor variations) are used by all major burns services in Australia and New Zealand.

Specialised Major Burns Units are located in the following hospitals:

NSW – Royal North Shore Hospital, Concord Hospital, The Children's Hospital at Westmead
VIC – The Alfred Hospital, Royal Children's Hospital
QLD – Royal Brisbane and Women's Hospital, Royal Children's Hospital
SA – Royal Adelaide Hospital, Women's and Children's Hospital
WA – Royal Perth Hospital, Princess Margaret Hospital
TAS – Royal Hobart Hospital

There are no major burns units in NT or ACT, though Royal Darwin Hospital has a capability of managing burns up to 20% TBSA.

The distribution of specialised burns beds, as well as "surge" bed capacity to deal with a multiple burns casualty event has been assessed as part of the National Health Disaster Management Capability Audit 2008, conducted under the auspices of the Australian Health Protection Committee. This report is currently being finalised.

Clinical management of a patient with major burns can be divided into four phases[2 3]:

1. Initial evaluation and resuscitation, including prehospital treatment and transport, initial assessment to determine depth and extent of burn and the need for immediate resuscitation such as airway control, fluid resuscitation and initial burn care such as protective dressings, escharotomy (dividing a circumferential deep burn which threatens circulation to a limb or breathing), pain management and referral and transfer to a specialised burns unit if required.
2. Initial wound excision and biological closure. This includes emergency surgery in the first 24 hours (such as escharotomy), as well as early excision of necrotic burn tissue in the first three days or so and coverage with a skin graft or skin substitute. There are also issues with ongoing blood loss and fluid management, pain management and infection control.
3. Definitive wound closure. For extensive and deep burns, there may need to be a series of surgical procedures to remove all dead tissue and achieve total skin coverage.
4. Rehabilitation and reconstruction. Extensive and deep burns can cause contracture of skin and soft tissue, limiting the movement of joints as well as oedema (swelling) and scarring. There are also nutritional and psychosocial issues that need to be dealt with in these patients. Treatment and support from allied health professionals (such as physiotherapists, occupational therapists and dieticians) as well as the involvement of rehabilitation physicians and psychiatrists are required.

Burn injury statistics – incidence, management and outcomes

An excellent and comprehensive review of burns and scalds cases in the five-year period 1999-00 to 2003-04 has been published by the AIHW National Injury Surveillance Unit (NISU), based at the Research Centre for Injury Studies at Flinders University - "Burns and scalds"[4]:

The key findings from this briefing are as follows:

- Approximately 46,611 people were hospitalised as a result of burn or scald-related injury during the 5-year period 1999–00 to 2003–04.
- Injuries resulting from burn and scald injuries were especially high for young children aged 4 years and under, with 12,159 children hospitalised during the period 1999–00 to 2003–04.
- For infants aged 1 year or less, 84% of the burns and scalds injuries occurred between the ages 7–12 months.
- A distinctive age and gender profile can be seen for injuries resulting from exposure to *highly flammable liquid* (e.g. petrol), with males accounting for 88% of these hospitalisations, and a sharp increase in this type of injury at ages 10–14 through to 25–29 years, then declining at older ages.
- For males aged 15 through to 39 years old, more than 1 in 5 (22%) burn and scald injuries were sustained whilst *working for income*.
- Scald injuries are common in older people with the rates of hospitalised scalds, those involving hot tap water and other fluids, rising with age after around 70 years. This type of injury represents 24% of burn hospitalisations for those aged 70 to 74, and increases to 40% in those aged 85 and over.
- Burn injuries resulting from *intentional self harm* (ISH) are uncommon, yet serious when they do occur. 30% of the burns associated with ISH were full thickness burns. The length of time required in hospital as a result of these injuries is more than triple that of *scalds with hot water* and close to four times the hospitalisation period for burns resulting from *controlled fires*.
- Admitted burns and scalds are numerous. Fortunately, most are not very severe. Less than a quarter (24%) of the hospital admissions are for full thickness burns, with 96% of those affecting a body surface area of less than 10%. Most (69%) of burns and scalds result in a hospital stay of from 1 to 3 days, more than half (57%) involving a stay of 1 day or less.

Data from the AIHW National Hospital Morbidity Database[5] for the 10 year period 1998-99 to 2007-08 reveals the following:

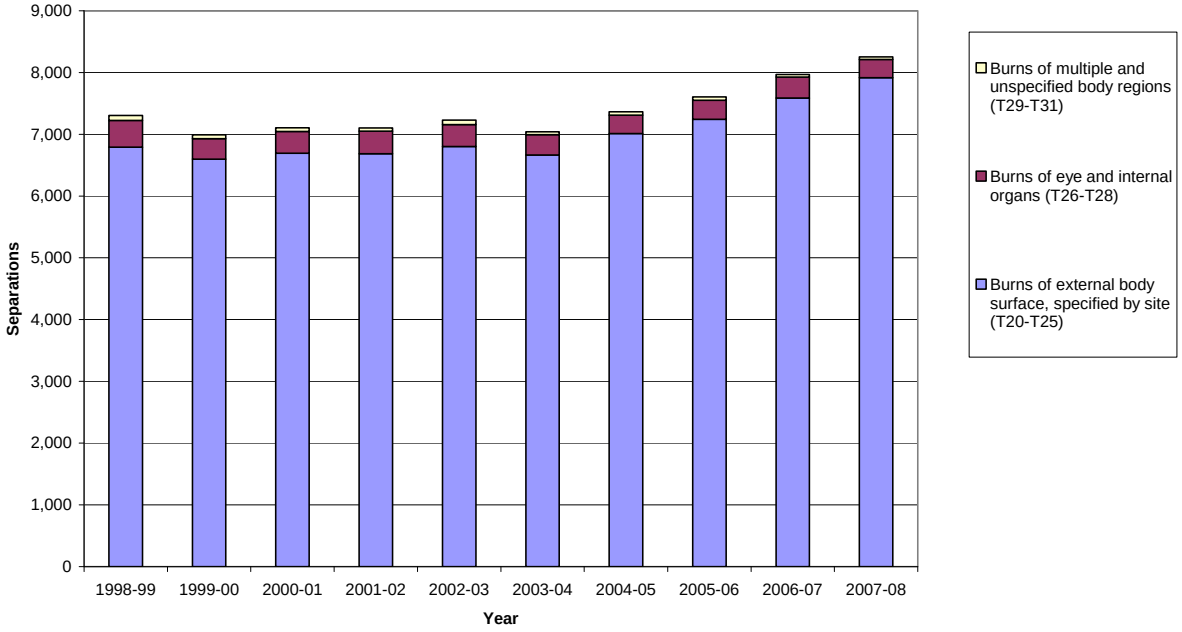
Hospital separations

Where a burn or burns is the principal diagnosis (ICD-10-AM categories T20-T31), there have been 73,973 hospital separations over the 10 year period. Whilst there has been a gradual rise in separations (both as total separations and per 100,000 population) over the last five years in particular, hospital separations due to burns as a proportion of all hospital separations due to an injury or poisoning (around 5-7% of all hospital separations) has remained fairly steady (1.63% over the 10 years), following a gradual decrease in the first five years of this period. Comparing surface burns only by depth, the proportion of separations by

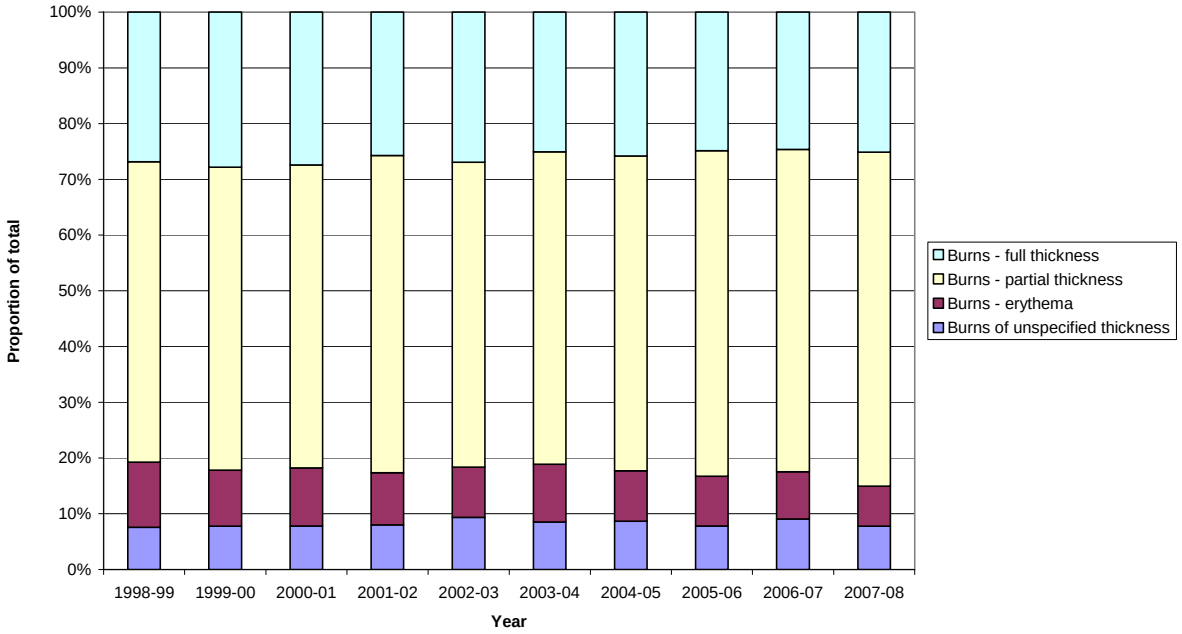
year has remained relatively constant, with 8.2% involving burns of unspecified depth, 9.4% erythema, 56.4% partial thickness and 26.0% full thickness burns.

It should be noted that, as this data only involves inpatient separations (but including sameday), it is an underestimate (particularly for erythema and partial thickness burns), as it does not include burns treated only in an emergency department or outpatient clinic.

Burns separation statistics by principal diagnosis in ICD-10-AM, Australia, 1998-99 to 2007-08



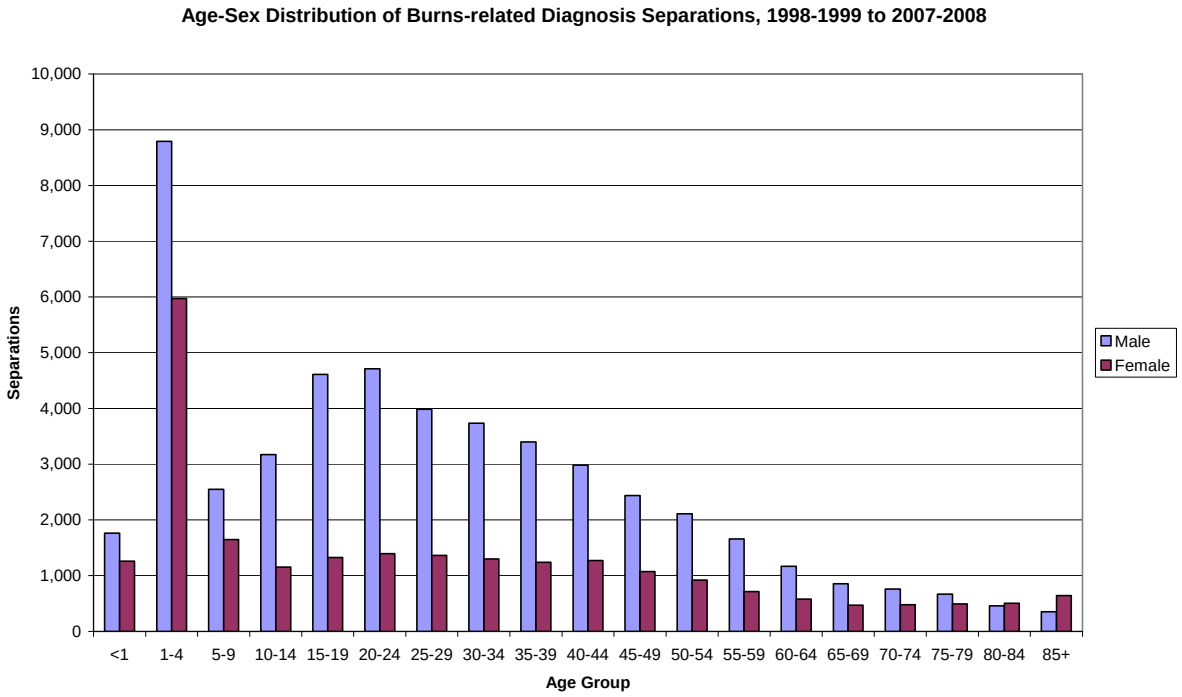
Surface burns - relative proportions by depth of burn, Australia, 1998-09 to 2007-08



For more detailed statistics, refer to Tables 1-4 and Charts 14-17 in the Appendix.

Age and gender distribution

The gender distribution shows a marked predominance amongst males (2:1 on average), which is more marked in the teenage and young adult age groups. The age distribution shows predominance in the younger age groups (especially infants), though when adjusted for population, there is also predominance in the elderly age groups as well.



For more detailed statistics, refer to Table 7 and Chart 18 in the Appendix and Figures 1 and 2 in Harrison and Steele (Ref 4).

Total patient days, average length of stay (ALOS)

A total of 411,037 patient bed days were occupied by burns patients over the 10 year period. After an initial decrease over the first five years, there has been a gradual increase over the second five years. Average length of stay is highly variable, but shows a general trend of increasing with age, with an average of 2.8 in infants up to 14 days in those over 80 years old. Burns involving the respiratory tract, trunk or hip and lower limb tend to have a longer ALOS. In general, there has been a decline in ALOS over the last 10 years, decreasing by approximately a day on average over the last 10 years.

For more detailed statistics, refer to Tables 5, 6, 8 and 9, and Chart 18 in the Appendix.

External cause

The NISU briefing “Burns and scalds” (Ref. 4) has an extensive summary of recorded external causes for burns and scalds, with the most common external cause being hot fluids, unspecified exposure to smoke/fire/flame, highly flammable material, hot appliances/machinery and hot tap water. Available grouped data from the AIHW National Hospital Morbidity Database for 2007-08 shows that by far the majority of hospital burns separations are due to smoke, fire and flames, or hot substances (ICD-10-AM external cause codes X00-X19), and that burns comprise the majority of injuries due to this external cause (refer to Table 10 in the Appendix).

Mortality

Information from the Australian Bureau of Statistics (ABS) on causes of death by external cause in 2007[6] lists 58 deaths (42 male, 16 female) due to exposure to smoke, fire and flames (X00-X09). This compares with 7,893 deaths primarily attributed to an external cause in 2007 (5.7% of all deaths).

The ABS report "4102.0 - Australian Social Trends, 2005" contains a section on "Mortality and Morbidity: Children's Accidents and Injuries"[7]. For the years 1999-2003, it reports 50 deaths in the 0-14 years age group due to smoke, fire and flames (3.4% of all injury deaths in this age group for the period). In this group, 58% were male (refer to Table 13 in the Appendix).

Hospital costs

There is no single data collection which is allows the full costs of burn injuries to be estimated. Average estimated costs for public and private hospital burn-related separations for the year 2007-08 are summarised as follows:

Sector	Number of separations	Patient days	Total Estimated Cost ($)
Public	7,645	38,160	63,918,712
Private	267	1,319	1,108,394
Total	**7,912**	**39,479**	**65,027,106**

For a more detailed version of this table, refer to Table 12 in the Appendix (see also Table 11 in the Appendix for selected separations by procedure for 2007-08).

These costs relate to inpatient care in hospitals. Non-admitted costs, including emergency department care, outpatient clinics and pre- and interhospital transport are not included.

We are currently awaiting data on services paid under the Medicare Benefits Schedule. We will present this data when it becomes available.

Chronic effects of burns

The NSIU briefing "Injury as a chronic health issue in Australia"[8] comments on the impact of severe burns as a chronic health problem. Based on the same period as the briefing "Burns and scalds" (1999-00 to 2003-04), the following points in particular are made:

- While most serious full thickness burn injury hospitalisations during the period were caused by accidental exposure to smoke, fire and flames (31%), hot fluids (11%), household appliances (8%) and electrocution (5%), they were also the result of intentional self harm (particularly due to smoke, fire and flames – 2%), and these cases tended to be particularly severe.
- Severe burns have long-term physical and psychosocial consequences, due both to the injury event and subsequent treatment. Depression and post-traumatic stress disorder are common.

Involvement of DoHA in burns management

The direct funding of burn injury services, including services in emergency departments, specialised burns units and outpatient departments is primarily the responsibility of states and territories, as these services are usually provided in a public hospital. Services provided in private hospitals are funded from a combination of Medicare, Private Health Insurance and through WorkCover and Motor Vehicle Third Party compensation systems.

The Australian Health Protection Committee (AHPC), a principal committee of the Australian Health Ministers' Advisory Council formed in 2006, is responsible for advising on and managing the Australian health sector response to disasters and major incidents where more than one jurisdiction or an overseas location is involved. The AHPC is chaired by a DoHA Deputy Secretary, and comprises the Commonwealth Chief Medical Officer, state and territory Chief Health Officers, as well as representatives from Emergency Management Australia, Joint Health Command (Australian Defence Force), the New Zealand Ministry of Health and clinical experts, including Dr Fiona Wood, who advises on burn injuries. The AHPC is supported by the National Incident Room in the Office of Health Protection in DoHA. AHPC and its antecedents have been responsible for coordinating the medical management of patients in major incidents involving burn injuries, such as the first and second Bali bombings (2002 and 2005) and the explosion on a vessel near Ashmore Reef in April 2009.

The National Response Plan for Mass Burn Casualty Incidents (AUSBURNPLAN) "aims to detail the response and recovery arrangements for an incident resulting in mass casualties with burns. The objective is to minimise the impact of a major burns incident on the health system and the individuals effected. By coordinating the distribution of burns victims and the response to an incident, casualties will be provided better specialist burns care. AUSBURNPLAN is implemented when national coordination of a major burns incident is required within Australia. AUSBURNPLAN is also implemented when national coordination is required for response to a major burns incident impacting on Australians overseas."[9] The plan consists of two phases:

> Phase 1 (SURGE), involving the jurisdiction where the incident has occurred (if within Australia and New Zealand), and
>
> Phase 2 (REDISTRIBUTION) where the resources of a single jurisdiction are overwhelmed and burns patients need to be distributed throughout the national burn network (of major burns units).

AUSBURNPLAN is currently under review.

Involvement of DoHA in burns prevention

There is no direct or specific funding of burns prevention programs by DoHA.

[1] Parliament of Australia, 2009. House Standing Committee on Health and Ageing – Roundtable forum on Burns Prevention – Terms of Reference, viewed 6 January 2010. http://www.aph.gov.au/house/committee/haa/burnsprevention/tor.htm

[2] NSW Department of Health, 2004. NSW Severe Burn Injury Service – Model of Care. NSW Health, North Sydney.

[3] Sheridan RL, 2002. Burns. Crit Care Med 2002; 30[Suppl.]:S500-S514

[4] Harrison JE & Steele D, 2006. Burns and scalds. Cat. No. INJCAT 92. Adelaide: AIHW

[5] Australian Institute of Health and Welfare, 2010. Principal Diagnosis Data Cubes – Separation statistics by principal diagnosis in ICD-10-AM, Australia, 1998-99 to 2007-08, viewed 6-19 January 2010. AIHW, Canberra. http://d01.aihw.gov.au/cognos/cgi-bin/ppdscgi.exe?DC=Q&E=/AHS/pdx0708

[6] Australian Bureau of Statistics 2009. 2007 Causes of Death, Australia. Cat. no. 3303.0, ABS, Canberra (Table 3.18, p 37)

[7] Australian Bureau of Statistics, 2005, Australian social trends, Cat. no. 4102.0, viewed 19 January 2010, http://www.abs.gov.au/AUSSTATS/abs@.nsf/2f762f95845417aeca25706c00834efa/1d72f5e5299decc5ca25703b0080ccbf!OpenDocument

[8] Cripps RA & Harrison JE 2008. Injury as a chronic health issue in Australia. Cat No. INJCAT 118. Adelaide: AIHW

[9] Emergency Management Australia, 2004. AUSBURNPLAN, Version 1. EMA, Canberra.