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- Health Network Branch representatives: Karina Moore, Jeri Sein and Rachael Biddulph, Marea Gent.
1. Executive Summary

The Injury and Trauma Health Network has identified burns as a major cause of injury in Western Australia (WA); hence, the need to develop an overarching WA Model of Care and, associated guidelines that include prevention, treatment, management and care of Burn Injury.

In general, people who experience Burn Injury in WA are well supported by a range of services that are delivered within a multi-disciplinary team approach. There are a number of constraints that impact upon service delivery including, the size of Western Australia’s geographic area, workforce education and training, and specialist services distribution. Currently, the centralised Burn Injury services make good use of innovations in service delivery such as Ambulatory Care (Burn Early Discharge Programme) and e-health with some link to WoundsWest to overcome the constraints. There are however many more opportunities to progress toward a more cohesive, inclusive and equitable burn care pathway; a pathway that is built around patient needs and brings together the experience of the carer, supported by facilities that meet the patient’s needs. Burn Injury prevention initiatives also require further development.

Although largely preventable, Burns Injuries are common and can be effectively treated with appropriate and timely intervention. Severe Burn Injury is fortunately far less frequent but the devastating outcome can be reduced dramatically when the right care is provided at the right time, in the right place, by the right team. The ‘triangle of care’ (Figure 2) is applied to assist in determining if in fact the time, place and team present are right for the patient at the point of contact.

Further to this an accurate definition of the Burn Injury, access to safe and reliable services supported by well trained staff who rigorously evaluate the care they give, underpins this evidence based, high quality, patient centric model of care. This model is dependant upon access to referral points that are well supported by information and education from injury prevention to first aid and multidisciplinary clinical specialists care.

Current WA epidemiological data indicates decreases in hospital admissions and readmissions in recent times. This decrease can be attributed to primary and secondary prevention interventions delivered synergistically by non-government and government agencies, advances in burns care processes and new technology that promotes consultant led support for collaboration and integration of services.

Burn surgery is a rapidly advancing specialist field. Development of surgical and rehabilitation techniques for tissue salvage and application of tissue engineering technologies in addition to traditional techniques of wound care is continuous. Dressing systems are advancing with new technologies. To implement the new techniques we need to develop tools for assessment, support prospective research and undertake clinical audit.

In addition, Burn Injury is one of the most common injuries to occur during mass casualty events. Therefore, during the planning and response to a disaster, trained burns specialists should be involved.
The purpose of this document is to provide a brief overview of the service delivery models available nationally and the current status of the WA Burns Services locally. It will also clearly articulate the Model of Care for Burn Injury for WA to establish a model of care across the state to improve equitable access to services that will prevent Burn Injury, provide better Burn Injury first aid and on-going care for all WA burn injured patients. This will ultimately have had an impact on hospitalisation rates and care outcomes.
2. **Recommendations**

To implement the Western Australian Model of Care for Burn Injury, it is recommended that there is:

**Recommendation 1:**
Development, maintenance and expansion of existing injury prevention initiatives as follows:

- Expansion of existing child safety programmes in rural and remote areas
- Development of targeted programmes for the 15-24 year old age group
- Ongoing development of culturally secure ATSI resources for the prevention of Burn Injury
- Development of targeted education programmes in the use of child safety resources for rural and remote health professional, Aboriginal health workers, Aboriginal health services and Community groups.
- Implementation of the WA Alcohol Plan strategies including social marketing campaigns to policy targeting risky drinking behaviours.

**Recommendation 2:**
Consult with training organisations to ensure that all first aid training courses, particularly for ‘at risk groups’ carers, work places and general community contain burns first aid content.

**Recommendation 2.1:**
Provide access to basic online first aid training on Burn Injury to target the community.

**Recommendation 3:**
Development of assessment techniques and prospective research as well as prospective clinical audit is required to support implementation of innovative surgical techniques.

**Recommendation 4:**
Establishment of state-wide burns e-health services with associated protocols and guidelines and, supporting consultant led on-call advisory service for non-specialist units in metro, rural and remote areas.

**Recommendation 5:**
Develop guidelines for wound management and rehabilitation, and audit to ensure the WA Burn Injury Service standards are being achieved and maintained in non-specialist units including work sites.

**Recommendation 6:**
Develop clinical protocols and risk assessment tools to assess mental health across the continuum of care to ensure timely psychosocial intervention.
**Recommendation 6.1:**
Education for health professionals should include the roles, responsibilities and requirements by health professionals in the setting where non accidental Burn Injury is suspected in children.

**Recommendation 6.2:**
Burns Services should include a dedicated clinical psychology role to provide specialist mental health services for Burn Injury patients.

**Recommendation 7:**
Develop programmes to assist patient integration back into the community including:
- ‘Medihotel’ type accommodation for step-down from tertiary care should be available in metropolitan, rural and remote areas
- Community Rehabilitation and follow up that includes education for children and access to non- government community resources
- ‘Rehabilitation in the Home’ (RITH) for moderate and severe burn injured patients
- Planning for reconstruction procedures
- Recreational therapy
- Return to work/school planning
- Psychological individual or group counselling
- Linking with chronic injury support groups

**Recommendation 8:**
Develop and provide education packages and training for the appropriate transfers of patients to regional, rural and remote facilities who will have first contact with burn injured patients.

**Recommendation 8.1:**
Increase access to web-based training and e-health modalities to improve training and education programmes for clinical workforce. This will require increased resources to improve state wide e-health services with links to Wounds West.

**Recommendation 8.2:**
Provide disaster preparation education which includes training on treatment of Burn Injury for all pre-hospital and hospital health care providers in emergency and critical care areas.

**Recommendation 9:**
Establish stronger partnerships between the Department of Health WA and Australian Universities through clinical workforce initiatives to establish curriculum for short modules or multi-disciplinary postgraduate programmes that focus specifically on burns injury.
**Recommendation 9.1:**
Provide training and professional development learning opportunities through Telehealth support for nurses and allied health professionals in rural and remote areas.

**Recommendation 10:**
Provide individual training of all staff within Burn Injury Units in disaster preparedness and disaster response training.

**Recommendation 10.1:**
Regular contact by the Burn Injury Units should be made with the State Health Disaster Coordinators through provision of information to the Australian and New Zealand Burn Association National Burns Registry and State Health Disaster Committees.

**Recommendation 11:**
Support the current tertiary centres to develop as a virtually united centre of excellence that makes a major contribution to the international literature for Burn Injury management.

**Recommendation 12:**
Further investment and funding for the ongoing innovation and development of the WA Burns Service Burns Information Management System at the Adult & Paediatric Burns Services is required.
3. Definition of Burn Injury

Burn Injury was traditionally defined by percentage of total body surface area (%TBSA) affected. This definition excluded many other factors that impact on a person’s well-being. The classification is dependant on a range of variables that describe the mechanism of injury, how the patient is affected by the injury, %TBSA affected and depth of Burn Injury. Other clinical variables include: age, site of burn, effect on airway, other injuries, co morbidities, and psychiatric and psychosocial considerations. Assessment of these factors allows the Burn Injury to be defined as minor, moderate and severe. Therefore burn injuries in WA are defined as:

Figure 1. WA Burn Injury definition

Different types of Burn Injury include flame burns, scalds from hot liquids, contact burns from hot surfaces such as stoves, heaters, irons, electrical burns, chemical burns, friction burns and radiation burns. The extent of the injury is dependant on the degree of heat and length of time in contact with the heat. For example, flash burns are generally less severe than scalds.

Assessment of the patient includes: inhalation injury, %TBSA affected, the site and depth of the wound, the patient’s age, the presence of other injuries, any areas of circumferential burns, co morbidities and psychosocial issues.

Treatment and referral pathway is also determined by the level of care required, such as resuscitation verses no resuscitation, surgery versus no surgery/conservative wound care. This definition and application of the ‘triangle of care’ will guide the care pathway for each individual patient. The ‘triangle of care’ (Figure 2) is applied to assist in determining if in fact the time, place and team present are right for the patient at the point of contact.

Figure 2. Triangle of Care

What the patient needs to recover

Resources available to optimise outcome

Outcome of injury

Skills available at the specific time of care
4. **Principles**

The following principles underpin WA Health’s response and approach to prevention, treatment and management of Burn Injury in WA:-

- Care is patient centred and considers the needs of patients, families and carers
- Care is provided through a skilled multidisciplinary team from primary, secondary and tertiary levels
- The patient’s journey occurred through health service delivery which is integrated and comprehensive
- Prevention activity takes a population-wide perspective and includes a combination of universal and targeted initiatives.
- Health care is delivered across the system by establishing and maintaining strong partnerships between sectors and agencies
- Care and service delivery reflect the evidence base and best practice
- Services that are sustainable for all aspects of the model of care
5. **Overview of Burn Injury**

5.1 **International**

It is important to note, global data produced by the World Health Organisation categorises Burn Injury into ‘fire related injury’. This broad categorisation may enhance the risk of underreporting of the extent of burn trauma, as scalds in children are a major cause of injury worldwide.

Mortality rates from Burn Injury vary across regions of the world. Low and middle-income countries suffer higher mortality and morbidity rates from burns. These countries require improved surveillance of Burn Injury via epidemiology studies, which will determine the incidence and prevalence of Burn Injury among sub populations. This data will then allow government and nongovernment organisations to design and implement effective prevention strategies. High-income countries have lower mortality rates due to implementation of a range of preventative initiatives including legislation, social marketing and advocacy, as well as improved burn care services. Advances in Burn Injury care enhancing functional outcomes, in conjunction with increased emotional and practical support have improved quality of life for Burn Injury survivors.

Despite these advances worldwide in year 2000 fire related burns were responsible for 238,000 deaths. Globally, fire related deaths occur predominantly in females, children 0-5yrs account for 15% of all fire related deaths and it is one of the top ten causes of death in 15-29yr age group. Therefore, globally groups at most risk of fire related injuries or death are young children and females in the 5-14 years age group.

5.2 **National**

Injury from fire burns and scalds are the sixth leading cause of injury in Australia and was identified as one of seven National Health Priority Areas in 2002. The National Injury Prevention and Safety Promotion Plan 2004-2014 defines priority areas for action by states and jurisdictions to inform injury prevention programmes within defined high risk population groups; children, young adults, adults, older people, rural and remote populations, Aboriginal and Torres Strait Islander peoples and injuries sustained in conjunction with alcohol use. The principals and priority actions of the framework have particular relevance to children, young adults and older people as they are amongst the most high risk population for burn injuries in Australia.

The external causes of Burn Injury can be categorised either as thermal or non-thermal. The majority of thermal burn injuries are non-intentional events, commonly caused by exposure to hot fluids, fire or hot objects. Other less common causes of thermal burn injuries include interpersonal violence or intentional self harm. Non-thermal cases include burn injuries caused by explosives, electric current, corrosive chemicals, friction, extreme cold and complications of medical and surgical care. Contact with hot fluids are the most frequent cause of hospitalisation but are less likely to result in severe injuries compared to exposure to uncontrolled fire and intentional self-harm, which is a less common form of Burn Injury.

In 1997-2005 the rate of total Burn Injury related deaths for Australia was 0.5 per 100,000 persons. In 2003-04 the age-adjusted hospitalisation rate of fire, burn and scald related injury in Australia was 31.9 cases per 100,000 population per year.
During the period of 2001-02, throughout Australia, burns and scalds were responsible for 6,248 hospitalisations in public hospitals with the average length of stay being 7.1 days incurring an estimated cost of $132 million\textsuperscript{7}.

The development of injury prevention strategies that reduce hospitalisation by 1% saves 1.3 million per day and a new clinical therapy that improves healing and reduces hospitalisation by just one day would save the health care budget approximately $18 million per year on burn treatments alone.\textsuperscript{8} Therefore there is a need for collection of actual data rather than estimation, in order to gain an accurate assessment of the burden of disease and injury. National data suggests young children, males in their late teens and early twenties, and older persons are most at risk of hospitalisation from burns and scalds.\textsuperscript{7}

5.3 Western Australia

WA data on Burn Injury related mortality and morbidity is very similar to national data. In comparison to national hospital admission rates, WA had a slightly higher rate in 2003/04 (Refer to Figure 3). This can be partly explained by the fact WA has a higher ratio of non-metropolitan to metropolitan people compared to other states, where non-metropolitan area rates of burn related injury are higher. Additionally, WA has a large industry sector where burn related injury is common. WA also captures approximately 98% of hospital admissions, compared to other states where data collection is not as accurate.

5.3.1 Trends by gender

Figure 3 below also shows although there has been some variation in hospitalisation rates for Burn Injury between 1988/89 and 2006/07, overall there has been a decrease for both genders.\textsuperscript{9} Similar to national trends, the WA male hospitalisation rate for burns in 2006/07 was double the female rate.\textsuperscript{9,10} A significant difference between male and female rates have been prevalent since 1988/89.\textsuperscript{9}
5.3.2 Trends by age

WA data from 2004/05-2006/07 suggests groups most at risk of burn related injury are young children, males in their late teens and early twenties and older people (Refer to Figure 4). This is consistent with national data. Overall, children aged 0-4 years are most at risk of burn related injury. In comparison to females and other age groups, males in the 15-19 and 20-24 age groups have significantly higher crude rates of burn related injury.

Those aged over 85 years have few hospital separations but the number of deaths caused by burn related injury in the older age group from 1997-2005 was the highest for a particular age group (10 persons). An equal number of deaths were also recorded for the 0-4 year age group. Overall WA data suggests prevention interventions need to target young children, males in their late teens and early twenties, and older people.
**Figure 4.** Hospital separations with a principal diagnosis of injury and a primary cause of fire, burns and scalds, by sex, WA, 2004/05-2006/07

![Bar chart showing hospital separations by age group and sex for injuries related to fire, burns, and scalds in WA, 2004/05-2006/07.](chart.png)

Source: WA Hospital Morbidity Data System

### 5.3.3 Aboriginal population

Overall in WA, Aboriginal people experience higher hospitalisation rates for burn related injury compared to the non-Aboriginal population (Refer to Figure 5). About 15% of all burn injuries in WA hospitals were among the Aboriginal population. Figure 5 shows that separation rates for Aboriginal Western Australians were more than five times higher than the non-Aboriginal rate at 303.1 and 59.2 separations per 100,000 persons respectively. Aboriginal children, like non-Aboriginal children aged 0-4 years are most at risk of burn related injury. Hospitalisation rates were four times higher among Aboriginal children aged 0-4 years than non-Aboriginal children of the same age. This rate of Burn Injury in Aboriginal people supports the implementation of injury prevention programmes to target this injury cause.
Table 1 below shows that among non-Aboriginal people in WA more than one in 20 separations for burns were deliberate self harm compared to 1.6% in Aboriginal people. In contrast, 7.5% of burns separations among WA Aboriginal people were the result of interpersonal violence, compared to 1.2% among their non-Aboriginal counterparts.

Table 1. Proportions of hospitalisations for Burn Injury by cause, non Aboriginal and Aboriginal in Western Australia 2004/2005-2006/2007

<table>
<thead>
<tr>
<th></th>
<th>Non-Aboriginal (%)</th>
<th>Aboriginal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>4.4</td>
<td>2.6</td>
</tr>
<tr>
<td>Poisoning</td>
<td>4.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Falls</td>
<td>1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Fires/Burns/Scalds</td>
<td>53.9</td>
<td>65.8</td>
</tr>
<tr>
<td>Unintentional (Other)</td>
<td>17.3</td>
<td>14.2</td>
</tr>
<tr>
<td>Self-Harm</td>
<td>5.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Interpersonal Violence</td>
<td>1.2</td>
<td>7.5</td>
</tr>
<tr>
<td>Undetermined Intent</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Medical Complications</td>
<td>5.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Unknown</td>
<td>6.5</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Data Source: WA Hospital and Morbidity Data System
5.3.4 Rural and remote population

Figure 6 below shows a comparison of hospital separations between metropolitan, regional and remote regions in Western Australia, significantly higher rates of hospitalisations occur in remote areas. Figure 7 below shows incidence by region in Western Australia. Hospitalisation rates per 100,000 are highest in the Kimberley at 72.3, the Goldfields at 50.7, the Pilbara at 37.4 and at the Wheatbelt 35. A cross-sectional survey conducted in 19 French Burn Injury Units found similar results in rural areas. In addition this study showed Burn Injury in populations from rural areas were more severe, deeper, involved a larger % TBSA with a higher rate of deaths than in urban areas. Prevention strategies should be specifically adapted to the profiles of burn patients.11

Figure 6. Age-standardised hospital separations with a principal diagnosis of injury and a primary cause of fire, burns and scalds, by region, WA, 2004/05-2006/079

<table>
<thead>
<tr>
<th>Region</th>
<th>Rate per 100,000 persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan</td>
<td>20 ± 10</td>
</tr>
<tr>
<td>Regional</td>
<td>40 ± 20</td>
</tr>
<tr>
<td>Remote</td>
<td>80 ± 30</td>
</tr>
</tbody>
</table>

Age-standardised per 100,000 population
Source: WA Hospital Morbidity Data System
Figure 7. Age-standardised hospital separations with a principal diagnosis of injury and a primary cause of fire, burns and scalds, by health region, WA, 2004/05-2006/07

<table>
<thead>
<tr>
<th>Health Region</th>
<th>Rate per 100,000 persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goldfields</td>
<td>70.0</td>
</tr>
<tr>
<td>Great Southern</td>
<td>45.0</td>
</tr>
<tr>
<td>Kimberley</td>
<td>120.0</td>
</tr>
<tr>
<td>Midwest</td>
<td>55.0</td>
</tr>
<tr>
<td>NMAHS</td>
<td>75.0</td>
</tr>
<tr>
<td>Pilbara</td>
<td>85.0</td>
</tr>
<tr>
<td>SMAHS</td>
<td>60.0</td>
</tr>
<tr>
<td>South West</td>
<td>40.0</td>
</tr>
<tr>
<td>Wheatbelt</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Age-standardised per 100,000 population
Source: WA Hospital Morbidity Data System

5.3.5 Types of Burn Injury

The most common mechanisms of burn related injury (WA hospital admission data from 2004/05-2006/07) include contact with hot drinks, food, fats and cooking oils (330 hospital separations); contact with hot fluids (291 hospital separations); and exposure to ignition of highly flammable material (274 hospital separations). Other less common causes of Burn Injury are from electric current, ionizing radiation, and visible and ultraviolet light.

Table 2 below shows that for each of the causes presented, children aged 0-4 years represent a significant proportion of those hospitalised; including:

- Contact with hot household appliances: 57.3 per cent.
- Contact with hot tap-water: 43.2 per cent.
- Contact with hot drinks, food, fats and cooking oils: 41.5 per cent.
- Contact with hot heating appliances, radiators and pipes: 40.9 per cent.
- Contact with other hot fluids: 38.7 per cent.

The data below suggests the majority of burn related injury occurs in the home and is associated with cooking. This is supported by a WA prospective review of minor Burn Injury between 1 January 2004 and 30 November 2004, where 56.57% of cases occurred in the home and 35.96% of burn injuries were associated with cooking. This data has specific implications for prevention interventions.
Table 2. Injury related fire burns and scalds by age and cause WA 2004/05-2006/07

<table>
<thead>
<tr>
<th>Exposure to uncontrolled fire in building or structure</th>
<th>0–4</th>
<th>5–24</th>
<th>25–64</th>
<th>65+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per cent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure to uncontrolled fire, not in building or structure</td>
<td>4.3</td>
<td>4.3</td>
<td>78.3</td>
<td>13.0</td>
<td>23</td>
</tr>
<tr>
<td>Exposure to controlled fire in building or structure</td>
<td>16.7</td>
<td>30.0</td>
<td>46.7</td>
<td>6.7</td>
<td>30</td>
</tr>
<tr>
<td>Exposure to controlled fire, not in building or structure</td>
<td>19.4</td>
<td>32.8</td>
<td>47.0</td>
<td>0.7</td>
<td>134</td>
</tr>
<tr>
<td>Exposure to ignition of highly flammable material</td>
<td>1.4</td>
<td>47.0</td>
<td>47.7</td>
<td>3.9</td>
<td>281</td>
</tr>
<tr>
<td>Exposure to ignition or melting of nightwear</td>
<td>33.3</td>
<td>0.0</td>
<td>16.7</td>
<td>50.0</td>
<td>6</td>
</tr>
<tr>
<td>Exposure to ignition or melting of other clothing and apparel</td>
<td>4.5</td>
<td>38.6</td>
<td>45.5</td>
<td>11.4</td>
<td>44</td>
</tr>
<tr>
<td>Exposure to other specified smoke, fire and flames</td>
<td>16.5</td>
<td>22.8</td>
<td>44.3</td>
<td>16.5</td>
<td>79</td>
</tr>
<tr>
<td>Exposure to unspecified smoke, fire and flames</td>
<td>9.2</td>
<td>18.3</td>
<td>61.8</td>
<td>10.7</td>
<td>131</td>
</tr>
<tr>
<td>Contact with hot drinks, food, fats and cooking oils</td>
<td>41.5</td>
<td>23.9</td>
<td>25.6</td>
<td>8.9</td>
<td>347</td>
</tr>
<tr>
<td>Contact with hot tap-water</td>
<td>43.2</td>
<td>10.8</td>
<td>32.4</td>
<td>13.5</td>
<td>74</td>
</tr>
<tr>
<td>Contact with other hot fluids</td>
<td>38.7</td>
<td>26.5</td>
<td>26.5</td>
<td>8.3</td>
<td>302</td>
</tr>
<tr>
<td>Contact with steam and hot vapours</td>
<td>2.9</td>
<td>30.4</td>
<td>58.0</td>
<td>8.7</td>
<td>69</td>
</tr>
<tr>
<td>Contact with hot air and gases</td>
<td>7.7</td>
<td>30.8</td>
<td>53.8</td>
<td>7.7</td>
<td>13</td>
</tr>
<tr>
<td>Contact with hot household appliances</td>
<td>57.3</td>
<td>13.3</td>
<td>25.3</td>
<td>4.0</td>
<td>75</td>
</tr>
<tr>
<td>Contact with hot heating appliances, radiators and pipes</td>
<td>40.9</td>
<td>18.2</td>
<td>30.7</td>
<td>10.2</td>
<td>88</td>
</tr>
<tr>
<td>Contact with hot engines, machinery and tools</td>
<td>14.3</td>
<td>60.3</td>
<td>23.8</td>
<td>1.6</td>
<td>63</td>
</tr>
<tr>
<td>Contact with other hot metals</td>
<td>18.5</td>
<td>25.9</td>
<td>55.6</td>
<td>0.0</td>
<td>27</td>
</tr>
<tr>
<td>Contact with other and unspecified heat and hot substances</td>
<td>18.4</td>
<td>25.4</td>
<td>36.8</td>
<td>19.3</td>
<td>114</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>24.6</td>
<td>28.2</td>
<td>38.9</td>
<td>8.3</td>
<td>1,957</td>
</tr>
</tbody>
</table>

Per cent
6 Causes of Burn Injury

6.1 Associated risk factors

Burns hazards in the home
A number of hazards in the home increase the risk of Burn Injury. Parental awareness will provide a safer home environment, in particular for their children. Examples of hazards include hot drinks, hot tap water, ovens, stoves, kettles, irons, heaters, open fires, matches, lighters, chemicals and electrical outlets.  

Cigarette, alcohol and drug use
Those who smoke, drink alcohol and use drugs have a significantly higher risk of being injured or dying in a residential fire. Cigarettes are responsible for 28% of all fires causing death. Often fires start from bedding or upholstery igniting. Alcohol was an associated factor for 23.24% of cases recorded in the WA prospective review of minor Burn Injury and 44% of fire related deaths.

Open Fires
Open fires such as campfires, bonfires and barbecues used for cooking, heating and lighting pose an increased risk of burn related injury. Inadequately extinguished campfires leaving hot ashes and coals actually cause more burn related injury compared to open flame fires. Children below the age of five who have poor recognition of environmental hazards are particularly at risk of burns from inadequately extinguished campfires.

Lower socioeconomic status
A recent study has confirmed several socioeconomic status (SES) factors are associated with an increased risk of Burn Injury. These SES factors included ethnicity (non-Caucasian) low income, large families, single parents, illiteracy, low maternal education, unemployment, job loss, poor living conditions, not owning a home, not having a telephone, and over crowding. The generalisability of these finding are limited by varying definitions of SES, as well as the heterogeneity of study populations and outcomes measures. However, this study has provided a list of factors to be considered when developing prevention initiatives for Burn Injury.

Implications for prevention
The majority of these causes of Burn Injury can be directly influenced by prevention interventions; low SES can be addressed but requires multiple interventions at social and individual level. Those causes most influenced by prevention strategies include burn hazards in the home, cigarette, alcohol and drug use as well as open fires. Primary and secondary prevention approaches have the ability to prevent burns related injury from occurring, in addition to increasing the application of correct first aid, which can significantly reduce the “Burden on Disease and Injury” caused by fires, burns and scalds. Similarly, programmes targeting young Australians must address social norms which perpetuate behaviours which contribute to Burn Injury such as the use of alcohol, drugs and violence.
6.2 Target groups

The data presented above clearly demonstrates that the high risk groups in Western Australia are:-

- Aboriginal and Torres Strait Islander people
- Rural and remote populations
- Children 0-4 yrs
- 15-24 year olds, particularly young males
- Elderly people
7. Proposed Model of Care for Burn Injury

7.1 Prevention

7.1.1 Current prevention strategies in WA

7.1.1.1 Fire and Emergency Services Authority (FESA) of WA

The FESA has three strategic intentions one of which is community-centred emergency management, which incorporates aspects of fire and Burn Injury prevention. Prevention is based around increasing community awareness of hazards and community resilience to these risks. A number of the FESA programmes are designed for remote Indigenous communities using Indigenous language and communication methods where appropriate.17

Smoke alarms warn people of a possible fire, which can prevent death or injury and reduce property damage. To ensure smoke alarms are always functioning correctly, the FESA encourages residents to test smoke alarms monthly and change batteries once a year. The FESA promotes April Fools Day (1st April) annually as the day to change smoke alarm batteries with a high-quality long-life battery.17

7.1.1.2 Kidsafe WA

Kidsafe WA has been successful in achieving legislative change to reduce bathroom hot water temperature controlling hot water system delivery temperatures. Kidsafe WA has also conducted a number of scalds prevention education campaigns “Hot Water Burns Like Fire” in 1996, 1999 and 2001/02. Kidsafe WA through its Home Safety Demonstration Home and 1800 toll free number provides ongoing advice to parents on all aspects of child safety including products for the prevention of burns. The Kidsafe website is an ongoing useful source of information for the community to access information on burns prevention (http://www.kidsafewa.com.au/).12

On behalf of the WA Department of Health, Kidsafe WA conducts the following child injury prevention programmes:

- Home Safety Demonstration Home: This centre showcases a safe home environment and child safety products to prevent injury in the home with emphasis on appliances and safe products including protection from burn injuries.

- 1800 Child Safety Information Line and Kidsafe WA Website: The line provides an advice and information line for parents and the community on all aspects of child safety. Development of the website in 2008 includes an interactive safe home site (virtual walk through home) which can be accessed by the community who cannot visit the Home Safety Demonstration Home. This will particularly benefit the rural and remote areas of Western Australia.

- The Injury Surveillance Bulletins: The quarterly reports provide information on surveillance of injury types and causes of injury for children presenting to Princess Margaret Hospital Emergency Department. Each bulletin showcases a particular child injury cause and promotes strategies and activities to prevent such injuries. The Bulletins are provided to the community, schools and injury prevention officers across health services and health professionals and are available on the Kidsafe WA Website.
The Child Seasonal Injury Prevention Programme: This is a multilevel programme targeting at the 4 key child injury areas: falls, burns and scalds, accidental poisoning and holiday safety. The programme focuses each key area in line with the season where the potential for injury cause is highest. The Burn Injury prevention programme “Get Warm Don’t Burn!” is conducted in the winter period June to August when the potential of Burn Injury from hot food and fire incidents is highest. The Child Seasonal Injury Prevention Programme is conducted statewide including rural and remote communities in Western Australia.

Resources for Indigenous populations: Additional funding has been provided to develop child safety injury prevention resources for the Indigenous population. These resources will build on the successful development of such resources by Queensland Health utilising local research and consultation.

7.1.1.3 Western Australian Department of Health

The Government of Western Australia through the Department of Health funds focus injury prevention programmes for high risk populations, which is aligned with the principles and priority action areas under the National Injury Prevention and Safety Promotion Plan 2004-2014. These programmes are conducted by non government sector organisations under service agreements with DoH WA. The programmes focus on population groups where admission to hospitals results from specific injury causes and include, child safety, prevention of drowning and falls in older Australians.

The Western Australian Department of Health injury prevention programmes are aligned with Western Australian Health Promotion Strategic Framework 2007-2011. This policy defined the strategic priority purchasing areas for health promotion and injury prevention to enhance existing and implement new programmes for injury prevention in Western Australia. This policy aligns with the WA Health Strategic Intent 2005-2010 and the key priority area of Healthy Communities.

Child safety is defined as priority area 2 for injury prevention with particular emphasis on the development of injury prevention programmes targeting accidental poisoning, burns and scalds, playground safety and falls. The child safety and injury prevention programmes, as described under the section 7.1.1.2, are conducted by Kidsafe WA under several programmes.

While the Home Safety Demonstration Home has been established for a number of years, the Child Seasonal Injury Prevention Programme and indigenous resources are new programmes established in 2007. These programmes are funded until 2010 and will be evaluated as they are established and developed over the term of the Service Agreement.

7.1.1.4 Drug and Alcohol Office

The role of the Drug and Alcohol Office is to present and reduce alcohol and other drug related harm, including alcohol-related burn, in Western Australia and is the government agency responsible for drug and alcohol strategies and services in Western Australia.

The agency provides or contracts a state-wide network of treatment services, a range of prevention programs, professional education and training and research activities. It coordinates whole-of-government policies and strategies in conjunction with state
and commonwealth agencies. For example, the WACHS Brief Intervention Initiative has introduced alcohol use screening and brief intervention for all people admitted to hospital.

The Western Australian Drug and Alcohol Strategy (WADAS), provides the broad direction for addressing problems relating to alcohol and other drug use in Western Australia. There are a numbers of state and national policy papers and guidelines that underpin the Strategy. These include, but are not limited to, the National Drug Strategy 2004-2009, the WA Alcohol Plan and other strategies that guide practice.

Prevention and reducing alcohol-related harm are WADAS priorities. Activity to prevent and reduce alcohol-related harm focuses on social marketing to decrease the support for risky drinking and provide policy and environmental settings that discourage and make it difficult for people to engage in risky drinking.

The majority of acute harms such as alcohol-related injury, including burns, tend to arise from episodic bouts of intoxication. Drinking to the point of intoxication is widespread in the community, highly prevalent among young males, aged 17 to 30 years-of-age and people in the northern and central regions on non-metropolitan WA. A prevention paradox exists with regard to acute harm and intoxication, whereby those who occasionally drink at risky levels constitute a far larger group than the few community members with ongoing drinking problems. Therefore, contrary to popular opinion, the attributed burden of harm is greater for this group who occasionally drink than those with a drinking problem.

Furthermore, intoxicated adults do not supervise children as well as their non-intoxicated counterparts, leaving children at greater risk of harm. The extent that intoxicated adults directly or indirectly contribute to the burn injury suffered by children is not known.

Therefore, strategies to decrease the prevalence of risky drinking in the WA population reduce alcohol-related harm, including burn injury and are detailed in the WA Alcohol Plan.

For 2004/05, it is estimated that risky alcohol use cost Western Australian society $1.5 billion. These costs include the aggregated costs due to alcohol-related harms, including burns.

7.1.1.5 Area Health Service Initiatives WA Health

The Prevent Alcohol and Risk related Trauma in Youth (P.A.R.T.Y) Programme is conducted by Royal Perth Hospital, South Metropolitan Area Health Service. The PARTY Programme targets 14-18 year olds and is an awareness campaign which demonstrates the consequences of risk behaviours such as the use of alcohol and the serious impact of trauma. The programme influences this group to recognise potential injury situations and change behaviours to minimise risk of injury. This Programme is supported by the Adult Burn Injury Unit which provides education on the potential for Burn Injury in this setting.

The Adult Burn Injury Unit also supports an education programme to ‘fire lighters’ who are not eligible for the Juvenile and Family Fire Awareness Programme (JAFFA) Programme. The programme is conducted in the Burns Injury Unit at RPH where programme participants are given information on the consequences for people with Burn Injury and targets the 10-17 years age group. The programme is also conducted in schools.
7.1.1.6 Legislation

- **Labeling on children’s nightwear**
  National legislation adopted under the Western Australian Fair Trading Act 1987 regulating flammability of sleepwear is effective in reducing burn injuries. In 1978 it became mandatory in Australia for all children’s nightwear to contain a label indicating garment flammability (Australian Standard 1249-1999) Labeling on children’s nightwear is split into three categories, “low fire danger”, “styled to reduce fire danger”, and “warning- high fire danger- keep away from fire”. Parent education as well as style changes (from nightgowns to pyjamas) have contributed to burn prevention.12

- **Safe water temperatures and safety products**
  The most effective documented method of preventing scald burns is legislation requiring all water heaters have a safe pre-set temperature. This legislation has been found to be more effective than parental education in encouraging parents to turn down water heater temperatures.18 Australia wide hot water temperature control has been legislation since 1997. This legislation applies to all new buildings and sanitary fixtures including basins, baths and showers. In domestic houses the maximum temperature of water allowed is 50°C and in early childhood centres, schools, hospitals and aged care facilities it is 45°C.

- **Smoke alarm legislation**
  Hard-wired smoke detectors have been mandatory in all new residential properties and major renovations in WA since the Building Code of Australia was amended in 1996. There is no current legislation in WA for residential properties built prior to 1996; hence new legislation is currently being developed. The FESA and the Department of Housing and Works are working on developing amendments to the Building Regulations which will require hard-wired smoke alarms to be installed in all residential (including rental) properties before they can be sold or re-tenanted. The intent of this legislative amendment is to ensure hard-wired smoke alarms are installed in all residential properties, not just those constructed after 1996. The amended Building Regulations will be prescribed under the Local Government (Miscellaneous Provisions) Amendment (Smoke Alarm) Bill 2007 (the Bill).19
7.1.2 Proposed strategies for injury prevention

7.1.2.1 Injury Prevention Framework

The Injury Prevention Working Group (IPWG), a subgroup of the Injury and Trauma Health Network has evaluated several models including Haddon’s Matrix to inform the development of an injury prevention framework which can be applied in the Western Australian Models of Care for injury and trauma. One such model developed by Professor David Sanders describes a framework model applicable in public health prevention of disease. The IPWG used the public health model to develop a modified Injury Prevention Framework, as outlined in the table on p.30, which can be applied in the Models of Care for injury and trauma.

The primary outcome of the Injury Prevention Framework is to create a safe and supportive environment that reduces the risk of an injury occurring. This Framework allows for preventative measures to be identified across all components and therefore across continuum of care. The key components of the framework are:

- Promotive (target – well population)
- Preventive (identified at risk group/population)
- Curative (acute care of injured individual)
- Rehabilitative (rehabilitation aspect in the treatment of injury)

To ensure sustainable reduction of burn injuries in the community, actions at the national, state and regional level are required. A comprehensive integrated programme consisting of the evidence based initiatives and strategies, outlined in the framework below, needs to be developed.
### Injury Prevention Framework

<table>
<thead>
<tr>
<th>Universal</th>
<th>Selective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promotive strategies</strong>&lt;br&gt;Well population</td>
<td><strong>Preventive strategies</strong>&lt;br&gt;At risk population</td>
</tr>
<tr>
<td>- Education</td>
<td>- Assess and identify ‘at risk’ population according to <em>geographical location</em> <em>age</em> <em>gender</em> <em>environment (SES?)</em> <em>ethnicity</em></td>
</tr>
<tr>
<td>- Policy</td>
<td></td>
</tr>
<tr>
<td>- Legislation</td>
<td>- Identify specific actions within each of the following strategic areas: <em>Education</em> <em>Policy</em> <em>Legislation</em> <em>Workforce development</em></td>
</tr>
<tr>
<td>- Advocacy</td>
<td>- Resources <em>Human resources</em> <em>Physical resources (infrastructure)</em></td>
</tr>
<tr>
<td>- Partnerships (ie linking or collaborating with NGOs, state and local organisations)</td>
<td>- Discharge planning</td>
</tr>
<tr>
<td>- Media</td>
<td>- Workforce development</td>
</tr>
<tr>
<td>- Community Engagement/Support/Action</td>
<td></td>
</tr>
<tr>
<td>- Workforce development</td>
<td></td>
</tr>
<tr>
<td>- Resources <em>Human resources</em> <em>Physical resources (infrastructure)</em></td>
<td></td>
</tr>
</tbody>
</table>

A holistic multidisciplinary approach has been taken in developing the framework which outlines the key priority areas for the prevention and management of injury and trauma. The framework allows for the identification of preventative strategies and the optimisation of opportunities for injury prevention at all stages across the continuum of care.
The key elements which underpin the framework include:

1. The ‘at risk’ population will vary depending on type of injury
2. The selection of the targeted population must be supported by relevant system level statistical data such as prevalence rates, and/or utilisation of health services as a result of injury.
3. Implementation of effective prevention programmes requires a competent workforce with the capacity to deliver evidence-based primary and secondary prevention activity at a level that can make difference.

An effective prevention programme integrates a coordinated national, state-wide and local area, culturally sensitive approach. That is, culturally appropriate for Aboriginal and, Culturally and Linguistically Diverse (CALD) groups. Application of this model with regard to targeted programmes for Burn Injury is supported in current programmes in development or in place for child safety and limited intervention for the indigenous population in Western Australia. However, there is clearly opportunity to develop injury prevention strategies to target 15-24 years age group particularly in young males. Ongoing expansion of programmes targeting Indigenous peoples are also required for all ages groups. Aboriginal peoples in Western Australia are fourteen times more likely to be admitted to hospital as a result of injury than non indigenous people. The implementation of strategies to reduce the prevalence of risky alcohol consumption resulting in intoxication must receive priority for action.

7.1.2.2 Electrical outlet covers and electrical safety switches

The American Academy of Paediatrics recommends the use of plugs or covers on unused electrical sockets to prevent electrical burns. Safety trip switches to prevent electrocution have been regulated under the Building Code of Australia in new buildings or renovations in States and Territories for some time and are regulated through local government bodies. There is an ongoing need to raise community awareness for these devices to be installed in many older buildings and homes constructed before these standards were implemented in 1996. This is particularly relevant in older buildings as the potential for fires through faulty and old wiring and products is higher. Although recent legislation passed in WA in 2007 prescribes the installation of such devices in all residential buildings, community awareness of this requirement and the benefits of such devices are still required.

7.1.2.3 Community education

Ongoing community education is required to increase awareness of burn hazards and safety products. Safety products, such as cups with wide bases or lids and barriers around kitchen stoves, irons and heaters play a role in preventing burns in children. Similarly antenatal education in regard to hot liquid safety when sterilising bottles or preparing bottled water for baby can reduce risk of Burn injury for not only the baby but also the mother and toddler in the family.
Each new generation of parents requires education on safety products and be informed about the relationship between the stages of their child's development and injury risks. Successful injury prevention education campaigns focus on a specific prevention message targeting a narrow target group. Targeted educational programmes for parents of young children and primary school aged children have been successful. Programmes are more successful when a combined approach is used involving a variety of community organisations, schools, the media, health professionals and government.

Community education should also focus on the importance of smoke alarms. Increasing ownership of smoke alarms is important, as studies have found fire skills training does not correlate with correct behavior in real-life fires.

A number of education campaigns focus on prevention of Burn Injury among children in the home, however other risk situations need to be considered, such as campfire burns. This is particularly significant for the Aboriginal 0-4 year age group.

**Recommendation 1:**

Development, maintenance and expansion of existing injury prevention programmes as follows:

- Expansion of existing child safety programmes in rural and remote areas
- Development of targeted programmes for the 15-24 year old age group
- Ongoing development of culturally secure ATSI resources for the prevention of Burn Injury.
- Development of targeted education programmes in the use of child safety resources for rural and remote health professional, Aboriginal health workers, Aboriginal health services and Community groups.
  - Implementation of the WA Alcohol Plan strategies including social marketing campaigns to policy targeting risky drinking behaviours.

Department of Health Service Agreements with non government organisations for child safety programmes includes reporting outputs to provide evidence to monitor outcomes to deliver key outcomes. However, formal evaluation of the effectiveness of specific injury causes requires ongoing monitoring of health service utilisation and academic injury prevention research. Western Australia does not have system level injury surveillance data information system. This limits capacity to formally evaluate the effectiveness injury prevention programmes.
7.2 Burn Injury management

7.2.1 Pre hospital care/immediate care

Ongoing state-wide community education of appropriate first aid measures for burn related injury is required in WA. Currently the Red Cross, St John Ambulance Service (SJAS), and Royal Life Saving Society WA (RLSS) provide a wide range of high-quality, accredited first aid courses and first aid products to the WA community. For example SJAS held a Save a Life Day, on 16 May in 2007, where basic first aid and resuscitation was taught to 3,907 students from metropolitan and country locations. This event achieved a world record for the largest CPR training session. A WA prospective review of minor Burn Injury between January 2004 and November 2004 found 61% of cases recorded received inadequate or inappropriate first aid. Therefore educating children and adults’ basic first aid in a range of settings through initiatives such as the Save a Life Day on an ongoing basis are recommended.

Data indicates an increased incidence of Burn Injury in rural areas compared to metropolitan areas. Children in remote and rural areas have an increased incidence of Burn Injury relative to the metropolitan population. In addition, indigenous children who reside predominantly in rural/remote areas have a high incidence of injury and complications e.g. infection.

Collaborative research is being conducted at the University of WA (UWA) to improve patient assessment in WA. A computer based tool to guide assessment is being researched and there are plans to develop an environmentally and culturally appropriate targeted prevention and first aid programme.

Similarly, the West Australian Country Health Service (WACHS), Alcohol Brief intervention initiative should be delivered state-wide.

These projects will provide tools to support improved pre-hospital and immediate care.

**Recommendation 2:**

Consult with training organisations to ensure that all first aid training courses, particularly for ‘at risk groups’ carers and general community contain burns first aid content.

**Recommendation 2.1:**

Provide access to basic online first aid training on Burn Injury to target the community.
7.2.2 Transport/transfer

Emergency Department (ED) costs decrease and workflow improves with appropriate triage and transfer of burns patients. Western Australia’s geographic characteristics present a significant challenge in the provision of the right care at the right time.

Burns patients can be considered in 3 groups:
- Inner Metro
- Outer Metro
- Rural/Remote

Patients within the inner metro group can access tertiary facilities directly. Those within the outer metro and rural/remote groups require routine links to the tertiary facilities, including protocols driven by the core multidisciplinary team.

A written transfer protocol should exist between Emergency Departments and Burn Injury Units. The transfer protocol should:
- Identify appropriate stabilisation
- Outline which patients need to be transferred
- Determine who organises a suitable mode of transport
- Identify patient needs during transportation
- Outline resources available for clinicians caring for patients in outer metropolitan, rural and remote areas that do not require transfer to PMH or RPH burns unit (e-health services, online protocols)

The facility who has first contact with Burn Injury patient/s should contact the Burn Injury Unit to gain support and advice regarding transfer of patient/s to a Burn Injury Unit in the shortest possible time. The involved transport, ambulance and secondary level care staff may require additional knowledge and skills in burn care, beyond the emergency response stage.

A culture of an agreed and understood framework for access to services is a key component for ensuring smooth transition from pre-hospital to integrated hospital care.
7.2.3 Access to services

The following flowchart (Figure 8) guides the pathway for access to Burn Injury services in WA.

Access to WA Burn Injury services is dependant on the post assessment classification of the Burn Injury as minor, moderate or severe. The definition of minor, moderate and severe Burn Injury will be further developed within a Clinical Practice Guidelines for Burn Injury. The guidelines will define specific assessment criteria and appropriate care pathways for burn injured patients. This classification will direct the patient’s triage to a specific care pathway. It is important to note that Burn Injury wounds are as dynamic and individual as the people who suffer them therefore repeated ongoing assessment is required over time and subsequent assessments may alter the care pathway. Each referral point must be supported by specialist opinion.
BURN INJURY ASSESSMENT
(assessment criteria needed - %TBSA, site & depth of the injury, patient’s age, other injuries, co morbidities, psychosocial issues, mechanism of injury, how the patient presents, care required)

Conservative Wound Care
No Resuscitation

Conservative Wound Care
Resuscitation

Surgical Repair Resuscitation

Regional/Rural/Remote E-health Outreach to non-specialist centres

Conservative path
a) Home
b) Local surgery
c) Day stay unit

Multidisciplinary inpatient care
a) Adult Tertiary Burn Injury Unit (Royal Perth Hospital)
b) Paediatric Tertiary Burn Injury Unit (Princess Margaret Hospital)

Supported by Regional/Rural/Remote e-health Outreach Service

Provide Regional/Rural/Remote e-health Outreach Service

Facilitated early discharge by:
a) Hospital-in-the-Home services
b) Step down to local non-tertiary hospital for transition to rehabilitation.
7.3 Care considerations

7.3.1 Assessment

To deliver safe, high quality health care, accurate assessment and intervention is crucial.

The initial assessment of a Burn Injury informs a plan of care, which is developed, documented and reviewed for each patient on a continual basis. Accurate and early prediction of burn depth is vital to the management of severe burns, which often involves early surgery. Determining burn depth has been based on expert clinical judgement. Laser Doppler technology is being introduced to the WA Burn Service to facilitate more precise assessment of Burn Injury.

Burn Injury assessment is notoriously difficult therefore access to specialist services for guidance to appropriate assessment, definition/classification and treatment is essential. The access to specialist guidance may be on-site or off-site, with e-health supported informed, decision making, about the predicted evolution of the Burn Injury and required care. In addition, care for non severe burn patients is provided by networking with other WA hospitals by the Adult and Paediatric Burn Injury Units.

Most often, initial assessment of burn injured patients, is carried out in Emergency Departments (ED). Emergency Departments often have to treat Burn Injury, with no access to a specialist Burn Injury Unit in the same facility. In this case it is recommended ED staff communicate with the state Burn Injury Unit regarding patient management. The WA Burn Injury Service via this model of care aims to provide a twenty-four hour turn around service where staff from rural and remote areas, outer metropolitan regions and GPs can email images to RPH and PMH for clinical advice.

A recent study has investigated using quantitative image processing of Burn Injury photographs to aid in the assessment of Burn Injury. Research included collecting data on widespread clinical photography techniques. Consultation with clinicians concluded utilising a semi-automated image processing system, one photograph of Burn Injury can possibly be used to estimate %TBSA of a Burn Injury. A database of photographs of Burn Injury is required in order to do additional research in this area.

7.3.2 Minor burn

Patients with minor Burn Injury are often treated outside specialist Burn Injury Units or trauma hospitals. This provides a challenge for medical staff that does not treat Burn Injury on a regular basis, as burn wounds evolve and potentially increase in depth after the initial assessment and up to 72 hours post injury.

Therefore if at any time a minor burn increases in severity beyond that classified as minor the patient should be transferred to a Burn Injury Unit as soon as possible. Appropriately timed transfer and care minimises complications and patient length of stay in hospital.
Communication with the most appropriate Burn Injury Unit is recommended for all minor burn cases, even if those at the initial point of contact are confident about the assessment and associated plan of care. This will ensure access to expert advice, optimum patient treatment and early orientation for the specialised unit if complications occur. This engagement with a Burn Injury Unit will facilitate non-specialist facilities to develop emergency, stabilisation and transfer guidelines.30

7.3.3 Moderate burn

Similarly, moderate Burn Injury may be treated outside of a specialist Burn Injury Unit. Resuscitation is often limited to uncomplicated airway management and fluid replacement. If the initial assessment of 'no surgery required' remains accurate after the first 48 hours then transfer to a specialist unit may still be necessary. Again, early communication with the most appropriate Burn Injury Unit is also recommended for all moderate burn cases along with adoption of the specialist units' recommended emergency, stabilisation and transfer guidelines.30

7.3.4 Severe burn

As per the definition outlined (p.12) a severe burn patient indicates a major burn and all those requiring surgical intervention. Burn Injury Units located at RPH (Fiona Stanley) and Princess Margret Hospital (PMH) provide care for severe burn patients in WA. The role of these Burn Injury Units is to:

- Provide high standard burn care embedded in an infrastructure for ongoing research
- Receive statewide referrals of severe burn patients
- Provide leadership and expertise in burn care
- Promote best practice in research, education and clinical care31
- Support e-health initiatives with virtual/electronic ward rounds that include a review of all burn patients state wide initially, with digital images then progress to increased use of e-health. Daily ward rounds and examinations of patients returning home should include initial assessments and protocol guidance.

Multidisciplinary teams within the Burn Injury Unit should coordinate individual clinical pathways for patients. The multidisciplinary team approach is consistent with best-practice burn care.35 Each clinical discipline in the multidisciplinary team should provide input for a thorough treatment plan based on standardised, valid outcome measurement tools. All care pathways must incorporate rehabilitation throughout all stages of care starting at the time of injury.30

Allied health disciplines involved in the provision of care to severe burns patients may include clinical psychology, nutrition and dietetics, occupational therapy, orthotics, pharmacy, physiotherapy, play therapy, speech pathology and social work. For each allied health discipline there are detailed referenced clinical practice guidelines.
7.3.4.1 Paediatrics

Fortunately large burns are an infrequent occurrence in paediatrics relative to adults. To ensure the optimal outcome is achieved in paediatrics, a level of experience must be maintained among professionals. There is currently not enough paediatric activity in WA to ensure maintenance of severe Burn Injury skills for the existing multidisciplinary team. The paediatric Burn Injury Unit will be supported by the adult Burn Injury Unit. There is the need for paediatric anaesthetics and intensive care unit capability. It is recommended nurses and therapists rotate into the adult environment to maintain their knowledge in treatment of large burns. This rotation of staff allows for exchange of ideas and the potential to improve care. For example, the ‘Bali Bombing’ (2002) disaster response involved PMH staff assisting at RPH with excellent results.

An emerging group is the adolescent with scarring and associated functional and psychological problems. In collaboration the RPH and PMH Burn Units are developing a transition programme to facilitate care beyond 16 years of age through the final growth periods and beyond.

7.3.4.2 Surgical intervention

Perioperative care of patients with severe Burn Injury requires cross-disciplinary planning and organisation of surgical, anaesthetic and intensive care personnel. This is particularly important for those patients who have surgery commenced while being managed in the Intensive Care Unit. A significant aspect of perioperative management of severe Burn Injury includes post-procedural application of dressings. These procedures are often extensive, complex and labor-intensive. The requirement for positioning and splinting frequently requires the expertise of the burn physiotherapist or occupational therapist in the surgical team.

Surgical intervention is predicated on the condition of the patient and the burn wound. There are approximately 150-210 severe Burn Injury Unit admissions per year, of which approximately 45% of patients require surgical intervention. Patients requiring surgical intervention from regions without burn surgery specialists on-site will need stabilisation and transfer to a specialist unit, in a timely manner.

The WA severe Burn Injury service approach to surgical management of the burn-patient is as follows:

- Emergency surgery within 24-hours post-Burn Injury to prevent complications associated with deep burns, often involving muscle or other tissue
- Early excision of the necrotic burn tissue (3-5 days post full thickness, 5-10 days post partial thickness burn-injury)
- Coverage with a skin graft or skin substitute
- Secondary wound coverage
- Scar revision
Burn surgery is a rapidly advancing specialist field. The epithelial autograft programme is a process directed at development of surgical techniques for tissue salvage and application of tissue engineering technologies in addition to traditional wound care techniques. Similarly, dressing systems are advancing rapidly with new technologies. To safely implement the new and innovative techniques we need to develop tools for assessment, develop prospective research and undertake clinical audit. Under the inaugural Stuart Wagstaff Fellowship from Telethon, the Laser Doppler Scanner is in use to evaluate assessment which brings together technology, assessment and clinical audit.

Development of modalities for the rapid assessment of burn wound depth is a priority for many health professionals specialising in burn wound management to guide treatment and care.36

**Recommendation 3:**
Development of assessment techniques and prospective research as well as prospective clinical audit to support implementation of innovative surgical techniques.

7.3.4.3 Respiratory complications

At the time of Burn Injury from flame or smoke or toxic chemicals a person’s airway is vulnerable and may be compromised even in the absence of burns to the face37. Invasive and non-invasive techniques are often utilised to maintain the airway. These interventions coupled with prolonged bed rest or theatre time may exacerbate existing injury or increase the risk of respiratory complications if the airway is not managed well. The development of respiratory complications increases mortality and morbidity (including prolonging the length of stay); hence aggressive prophylactic respiratory physiotherapy is essential.31
7.3.5 Special considerations for all burn patients

7.3.5.1 Rural and remote (including international and inter-state)

Treating and stabilising burns patients in rural and remote areas or in response to a call for assistance from international or inter-state health services is a significant challenge.30

The predominant issue for patients living in rural and remote areas is access to expert burn advice and care. E-health technologies can alleviate distance, transport, accommodation and cost issues for families having to travel to Perth from rural and remote areas for expert burn care. The transfer of information via e-health provides support to all staff involved in burn care regarding diagnosis, education and treatment. Burn management is suited to e-health as it encompasses a high level of visual assessment. E-health is also used as a teaching tool to build on current knowledge in rural and remote areas. The main concerns with e-health are cost effectiveness, confidentiality and security of information/patient records, patient consent, and professional indemnity as well as litigation.38 Additional barriers are access to appropriate and adequate analgesia and the multidisciplinary team.

Evidence of evaluation in the literature of telehealth programmes in burns care is limited, particularly in relation to direct cost benefits and/or cost savings and in the Australian context.

E-health can influence community based care, tertiary referral and hospital admission rates. Virtual e-health clinics can review patient burn wounds, scars and movement, which saves time and transport costs for the patient, family and health care system. An e-health system encompassing visual communication would enable Burn Injury to be reviewed on a regular basis by experts in burn care. To be effective and safe the process must achieve high accuracy and reliability.38 Studies have found the quality of digital imagery does enable accurate wound assessment and decision making.39,40 Experience in other state jurisdictions has demonstrated benefits.

A virtual outpatient burn care service for post-acute care of children in rural and remote areas of Queensland has been trialled and documented. This service provided 293 patient consultations over three years and reduced the need for patients to travel to the state Burn Injury Unit in Brisbane.

It was successful in delivering post-acute burn care using videoconferencing, email and the telephone. Services included routine specialist clinics via videoconference, patient consultations during acute presentations and clinical advice for collaborative burn management as required.

Satisfaction surveys from families of patients revealed a high level of satisfaction, particularly in regard to saving time, money and stress, although the response rate for the survey was low at 19%. Overall, the service improved access to specialist services for rural and remote areas in Queensland41 and this type of communication system would build clinical expertise into rural and remote areas of WA.
Given the size of rural and remote Western Australia, this service would provide treatment closer to home, reduce financial costs of travel to metropolitan areas for follow-up care, and reduce disruption and separation from family and support systems, particularly for Aboriginal patients who suffer significant psychological stress on separation from their community and people. It would assist WA Health to provide equal access to health care, in particular closer to the patient’s residence and meet the increasing expectations of the community. Currently, Clinical Nurse Consultant or Burns Fellow at WA State Burns Service provides remote consultation to rural and regional hospital providers who are unable to access e-health services. Appropriate assessment and referrals are advised based on the digital images of the burn injured patients sent through to the Burns Consultants at WA State Burns Service.

Where e-health treatment options have failed or are inappropriate access to retrieval services with strong links to Burn Injury Units and management protocols should be utilised.

**Recommendation 4:**
Establishment and maintenance of statewide burn e-health services with associated protocols and guidelines and, supporting consultant led on-call advisory service for non-specialist units in metro, rural and remote areas.

### 7.3.5.2 Wound management

Minor and moderate burn injuries should be healing adequately after 10-12 days. However, delayed healing will result in increased risk of hypertrophic scar, functional and psychological problems. The use of conservative wound care protocols will assist to reduce the risk of infection, oedema, secondary functional disability and cost of dressings. In most cases, the superficial burn can be managed well in the primary care setting. The transfer of such a patient to a tertiary centre will only be necessary if the burn area is such that IV fluid resuscitation is required or non-accidental injury is suspected.

Alternatively, severe burn wound care is complex, time-consuming and painful. While comprehensive nursing care is provided in the Burn Injury Unit, critically ill patients managed in the Intensive Care Unit require coordination of wound care by the nursing staff in the Burn Injury Unit, who are experienced in the management of Burn Injury.

**Recommendation 5:**
Develop guidelines for wound management and positioning, and audit to ensure the WA Burn Injury Service standards are being achieved and maintained in non-specialist units.
Inadequate oedema and scar management can lead to an increase in contracture formation, as well as poor functional and cosmetic outcome. Oedema management in the acute phase of burn treatment is essential. Oedema can delay wound healing, promote formation of thick scar tissue and loss of movement. A variety of techniques are used to manage oedema during this phase. Oedema management is the responsibility of the occupational therapist/physiotherapist and nursing team. This responsibility continues into the rehabilitation phase of care where the combined effort of the multidisciplinary team is aimed at managing oedema, scarring and contracture formation.

Moderate and severe burn injured patients are in the high risk category for pressure area development according to the Braden scoring protocol; as they have reduced levels of mobility and skin integrity is compromised. Pressure area prevention and treatment is another major feature of burn wound management.

7.3.5.3 Infection control
A major clinical focus in the management of severe burns is infection control. Patients with burn injuries are at a high risk of infection. Necrotic burnt tissue provides an environment for the proliferation of microorganisms exposing the patient to the risk of infection, delayed healing and complications. As such, meticulous attention is integral to the management of the burn wound. The Burn Injury team maintains close liaison with microbiology and infection control personnel, particularly in relation to the maintenance of patient-related and environmental and architectural infection control programmes. The use of directed and conservative infection control protocols will reduce the risk of infection and assist to reduce the associated cost of increased length of stay, due to delayed healing and increased functional and psychological problems.

7.3.5.4 Medication and pharmaceuticals
The provision of medications and pharmaceutical products for the patient with a Burn Injury may include:

- Analgesics for acute, chronic and neuropathic pain
- Antibiotics for the treatment of infection
- Electrolyte and vitamin supplements
- Medications to reduce pruritis and assist in wound healing
- Antidepressants and nicotine replacement and medications to manage drug withdrawal

The Burn Injury Team works closely with the pharmacist in the management of patient care.
7.3.5.5 Pain management

Burn Injury causes both physiological and psychological pain. The nature of burn care frequently involves protracted surgical and non-surgical procedures, which cause episodes of increased pain. In addition, the individual’s experience of pain, both qualitative and quantitative, varies widely over the course of burn recovery, and the need for different types and quantity of analgesics varies accordingly. Commonly patients experience longstanding pain or ongoing paraesthetic /pruritic (itching) sensations in their scars for many years following injury.

Patients admitted to the WA Burn Injury Services are provided with a comprehensive pain management service incorporating a range of pain management modalities. Effective pain management is an important goal in the provision of care for the burn patient. Nursing staff work closely with other disciplines regarding assessment, delivery and evaluation of patient requirements for pain management. The importance of acute pain management cannot be underestimated, as pain experienced during hospitalisation has been shown to be significantly correlated with psychological adjustment years after injury. In addition to acute pain management, the service provides treatment for chronic pain and neuropathic pain.

A range of therapeutic approaches to the management of acute pain include:

- Patient Controlled Intravenous Analgesia (PCA) with or without sedation
- Continuous narcotic infusions
- Slow-release opiates and pain-relieving medications
- Inhalational agents such as nitrous oxide
- A variety of non-opiate analgesics
- Appropriate addition of anxiolytics or sedatives
- Anti-emetics and aperients for gastric consequences

Complementary therapies, patient and carer education and non-pharmacological pain relief also play an important role in pain management. Non pharmacological interventions incorporate the critical aspect of the patient’s ability to psychologically cope with pain associated with Burn Injury. The association between self-efficacy for coping with pain and development of chronic pain syndromes is now well documented. Therefore, patients’ experience of pain and perceived ability to cope should form part of routine psychological assessment, with interventions being provided, if indicated. While further research is needed to establish the efficacy of specific psychological interventions in both inpatient and outpatient settings, there is evidence to suggest hypnotherapy, sensory focusing, active distraction and cognitive techniques all have the potential to decrease pain and/or the patient’s perceived ability to cope. The psychological treatment approach will depend on the individual patient’s presentation and the stage of burn recovery.

The management of symptoms of pruritus associated with wound and skin graft healing is a particular challenge following Burn Injury. WA Burn Injury service employs treatment options such as antihistamines, topical applications, vibration and bioptron.
The pain management approach provided for burn injured patients is one of multi-modal, high baseline, adjunctive and regular analgesics. It is provided prophylactically in this manner, rather than on request, to maximally relieve pain while supporting the patient to maintain their active functional and purposeful movement.

7.3.5.6 Nutrition

Nutritional support is a vital component in the care of the severe Burn Injury patients as optimal nutrition reduces length of stay, mortality, rate of wound infections/sepsis, severe weight loss, muscle wasting as well as improves wound healing. A dietitian should be involved in the nutritional management of patients with severe burns, as soon as possible eg immediately on admission. The dietitian will assess the patient, determine his/her nutritional requirements and instigate appropriate nutritional support based on evidenced and peer supported nutritional guidelines.

The hypermetabolism associated with major burns results in an increased resting metabolic rate in adults. The standard practice for burn inpatients who are able to take an oral intake is to be on high protein/high energy diets. However, those with severe Burn Injury require an increase in nutritional intake via Enteral Feeding.

Enteral Nutrition is recommended over Parenteral Nutrition due to decreased risk of infectious complication, mortality and cost. Parenteral Nutrition should only be used if Enteral Nutrition is contraindicated. Enteral Nutrition for patients with severe burns should be commenced as early as possible post fluid resuscitation, preferably within 24 hours of injury based on International Guidelines. Where possible weight and height measurements should be obtained (or estimated), as these are necessary to calculate energy and protein requirements. Weight should be monitored weekly (or as practical).

For those patients on Enteral Nutrition, blood sugar levels should be monitored and hyperglycaemia treated, as it is associated with poorer outcomes in adults with burns. These outcomes include increased mortality, poor wound healing, reduced skin graft take, increased rate of muscle protein catabolism and impaired immune function. Early and ongoing nutritional support is a vital component in the care of the severe Burn Injury patient.

7.3.5.7 Pathology services

Fresh whole blood, and regular blood serum analysis form a major part of the severe Burn Injury care both perioperatively and during resuscitation. Good access to pathology services is therefore essential.
7.3.6 Psychosocial and mental health care

7.3.6.1 Associated psychosocial issues

Burn injuries are frequently life threatening traumas which involve extreme pain, discomfort, hospitalisation, operations, itching, pressure garments, and physical limitations. A host of these issues have significant implications for the affected individual and their families. Furthermore, burn care treatment can be lengthy and painful requiring a variety of psychological and social resources for optimal recovery.

The psychosocial difficulties encountered by patients after a Burn Injury may include:

- Problems managing pain, itching and discomfort
- Problems with post-traumatic stress including anxiety, nightmares, flashbacks, avoidance, emotional numbing
- Mental health difficulties such as delirium, depression, anxiety
- Grief and loss issues
- Functional problems of mobility, and dexterity which inhibit/delay return to work or school
- Problems about medical choices and decisions
- Difficulties coping with social reintegration
- Social support problems eg family, partner, peer isolation etc
- Body image and sexuality issues

Furthermore, patients presenting with burns injuries have higher rates of pre-morbid psychosocial difficulties compared to the general population including substance abuse, self harm, psychosis, relationship difficulties, impulsive risk taking and depression.57 These factors will impact upon the patient’s ability to effectively cope with, and adjust to, a Burn Injury.

In addition, a study by Van Loey and Van Son in 2003 demonstrated that Depression and Post Traumatic Distress Syndrome are common in patients with full thickness burns injuries and can contribute to long term chronic mental illness.58

7.3.6.2 Intentional Burn Injury

In 2004 WA Health reported on the cost of Intentional Injury. Findings included, 1.2% of hospitalisations for injuries inflicted by another was a Burn Injury. However, 12.8% of the total cost of hospitalisations for injuries inflicted by another was attributed to Burn Injury care. Additionally, 0.8% of hospitalisations for all self inflicted injury were a Burn Injury. However, 4.5% of the total cost of hospitalisations for self inflicted injury was attributed to Burn Injury care.59
In 2004 nurses and other burn care team members at the RPH Telstra Burn Injury Unit identified an increase in self-inflicted Burn Injury and related re-admissions. A retrospective audit and clinical review over a six-year period from January 1998 to December 2003 was conducted. Of the 1239 patients admitted during this period 44 (3.5%) were admitted for self-inflicted Burn Injury. The findings of the audit were:

- There were an equal number of male and female cases; however there was a greater proportion of females in this patient group when compared to admissions for burns as a result of non intentional injury.
- The average %TBSA for self-inflicted Burn Injury was significantly higher at 31.9% compared to 7.8% in general admissions.  
- The most common causal agent was flammable liquid and flame (47.7%), flame (22.7%) and caustic soda (15.9%).
- Socio-economic factors identified: Fifty percent of these cases occurred at home, with 50% unemployed and 75% had a previous diagnosis of psychiatric illness.
- 62% had previously been admitted to the Burn Injury service for self-harm where burning was the self harm mechanism.
- The outcomes were as follows, 20.5% (n=9) died, 20.5% (n=9) transferred to mental health facility and over 50% discharged home.

Evidence in the reported literature has identified a lack of psychiatric care and support after hospital discharge for deliberate self harm burns patients. Although patient numbers were small in this case review, the high proportion of patients with a previous diagnosis of psychiatric illness and/or a previous admission for self harm burns injury would appear to support this view.

### 7.3.6.3 Strategies to manage psychosocial issues

Effective psychosocial assessment and management should be aimed at maximising psychosocial adjustment to a Burn Injury and minimising ongoing psychological or mental health difficulties. Assessment and management of emotional distress, pain coping strategies, grief and bereavement, livelihood, survival and mental health issues, and dealing with changes in body image and sexuality, are necessary in the care of the patient with a severe Burn Injury, in order to ensure optimal compliance with treatment and rehabilitation goals.

Burn Injury is one of the most common manifestations of non-accidental injury in children. Increased awareness of child abuse and increasing expertise of burn clinicians has enabled early identification of potential non-accidental Burn Injury. Management of patients with suspected non-accidental Burn Injury includes hospital admission. Hospital admission provides the opportunity for appropriate investigations, psychiatric assessment and provision of care. Long term access to psychological support and access to psychosocial and/or psychiatric intervention is required to support burns patients particularly in the setting of deliberate self harm where burning is the mechanism of self harm.
Nursing assessment should be provided throughout inpatient care and supported by social workers, clinical psychology services and psychological services throughout inpatient admission, and following discharge. These services provide ongoing support to burns injury patients to assist them to manage post-traumatic and other mental health symptoms, adjust to change in body image and lifestyle, relationship difficulties and return to work/school programmes. 31

Mental health personnel are integral members of the burn team. They provide mental health care to severe burn patients during all phases of the continuum of care. Components of mental health care will include:

- Psychiatric assessment
- Risk assessment for self-harm or violence
- Risk assessment for substance abuse
- Prescription of psychotropic medication
- Implementation of the *Mental Health Act 1990* where applicable
- Use of a range of therapeutic psychological techniques for patients and families
- Long term access to psychosocial/psychiatric support

**Recommendation 6:**
Develop clinical protocols and risk assessment tools to assess mental health across the continuum of care to ensure timely psychosocial intervention; with specific focus on non accidental Burn Injury.

**Recommendation 6.1:**
Education for health professionals should include the roles, responsibilities and requirements by health professionals in the setting where non accidental Burn Injury is suspected in children.

**Recommendation 6.2:**
Burns Services should include a dedicated clinical psychology role to provide specialist mental health services for Burn Injury patients.
7.3.7 Ambulatory Care Strategies

The multi-disciplinary Burn Injury care team is responsible for arranging the ambulatory care of Burn Injury patients after discharge from in-patient services. The increase in survival of patients with severe Burn Injury and the growing trend of management of non-severe Burn Injury without hospitalisation has resulted in the development of dedicated ambulatory burn care clinics, providing the link between inpatient care and rehabilitation. It is envisaged that the volume of burn activity managed on an ambulatory basis will continue to increase. An ambulatory burn clinic may provide:

- Assessment and dressing of minor and non-severe burns
- Rehabilitation interventions
- Follow-up burn dressing and skin graft management for patients after discharge
- Coordination of rehabilitation in the home (RITH) and, or ‘local’ therapist input
- Long-term scar management and symptom control after discharge
- Patient and family teaching and support
- Advisory service to other hospitals, health care professionals and community
- Patients with a burn who require surgery, with interim burn care until the day of surgery\(^3\)
- Ongoing complication risk management and treatment

In metropolitan WA, Burn Injury patients have access to outpatient wound care and ‘hospital-in-the-home’ services that provide all Burn Injury care post inpatient discharge.

7.3.7.1 Rehabilitation

Rehabilitation commences as soon as the patient is injured. Specialised rehabilitation input is required upon admission to the Burn Injury Unit or the Intensive Care Unit. Rehabilitation aims to assist the patient through recovery from injury, and to optimise their level of functional ability and social reintegration. Nurses provide holistic care and are integral to patient care from point of admission through to rehabilitation and ambulatory care.

Step-down facilities that are linked to acute services achieve a seamless continuum of care by allowing patients with Burn Injury to participate in self-care activities, prepare for discharge and enable their significant others and carers to participate in their programme of care. Availability of such facilities reduces length of stay in acute care facilities and builds patient confidence and independence in a supported care environment prior to discharge from hospital. Provision of an environment that encourages autonomy and independence for burn patients is an important part of facilitating return to function by avoiding the prolonged dependency that extended hospitalisation can foster.

Rehabilitation medicine provides assessment, consultation and follow-up management of the significant disability suffered by patients with a severe Burn Injury. The rehabilitation process is carried out in conjunction with allied health services.

When patients return to the community, normal activities and work Burn Injury Units should work closely with community outreach programmes. Utilising e-health
technology is an efficient and cost effective method of supporting community outreach programmes throughout WA.

It is vital to give the patients equitable care by the multidisciplinary team. Developing a network across healthcare services in the state will combine best practice and increase early discharge back into the community.62

**Recommendation 7:**
Develop programmes to assist patient integration back into the community including:

- ‘Medihotel’ type accommodation for step-down from tertiary care should be available in metropolitan and rural and remote areas
- Community Rehabilitation and follow up that includes education for children and access to non-government community resources
- ‘Rehabilitation in the Home’ (RITH) for moderate and severe burn injured patients
- Planning for reconstruction procedures
- Recreational therapy
- Return to work/school planning
- Psychological individual or group counselling
- Linking with chronic injury support groups

7.4 **Workforce education and training**
Education is required across the continuum of care from prevention through to rehabilitation. Programmes should be tailored to meet all needs from community to specialists training at tertiary level for the workforce of the WA State Burn Services.
### 7.4.1 Pre tertiary hospital care

Education and training of clinicians outside of specialist burn units is required to ensure a collaborative approach with specialist advice for the treatment and management of burn injured patients. This will require the development and implementation of clinical protocols which reflect best evidence. This will ensure patients receive optimal care closer to home through a collaborative team under the guidance of specialist consultation.

Further development of web-based education programmes would improve accessibility and enhance knowledge for all personnel with interests in prevention and management of Burn Injury. Disaster preparedness and response training should be provided for all pre-hospital personnel, and emergency and critical care areas in hospitals. This training should include immediate treatment and management of burn patients in multi-casualty events.

A study conducted at the Paediatric Burns Services from 2005 to 2008 on infants less than 6 months of age found no infants had received adequate first aid from parents or carers. Education in the community, child health centres, schools and playgroups may target parents and carers regarding appropriate first aid.

It is estimated that of the approximate 200 patients in adult or paediatric admitted to a tertiary WA State Burn Services facility each year, about 70 paediatrics and 100 adults would require surgical intervention and resuscitation, while the remaining 130 paediatrics and 150 adults would require resuscitation and/or conservative wound management only. Therefore, 130 paediatrics and 150 adults could be treated remotely with protocols, education, and e-health programmes.

Royal Perth Hospital coordinates a Burn Management Programme to staff in rural and regional hospitals. This is provided by a visiting multidisciplinary team over a one day course. Similarly, a one day targeted course for rural General Practitioners is available upon request. WA State Burn Services should also provide train-the-trainer education on emergency burn care and inpatient treatment, to pre-hospital staff. In addition, Wounds West Module E-learning programme should be accessible by all health professions across WA to ensure consistent assessment and care of burn injured patients.
Recommendation 8:
Develop and provide education packages and training for the appropriate transfers of patients to regional, rural and remote facilities who will have first contact with burn injured patients.

Recommendation 8.1:
Increase access to web-based training and e-health modalities to improve training and education programmes for clinical workforce. This will require increased resources to improve state wide e-health services with links to Wounds West.

Recommendation 8.2:
Provide disaster preparation education which includes training on treatment of Burn Injury for all pre-hospital and hospital health care providers in emergency and critical care areas.

7.4.2 Specialist tertiary services education and training
Burn nursing is recognised as a nursing specialty. Nursing staff constitute the largest component of the multidisciplinary Burn Injury team and are responsible for patient safety and well-being 24-hours a day. Therefore, coordination of the multidisciplinary burn team is usually a nursing responsibility. Since 2004 RPH has held a three day course in Advanced Burn Nursing. The Australian New Zealand Burns Association Emergency Management of Severe Burns course is an integral part of emergency burn education. Registered nurses, senior burn therapists and senior medical officers should be supported to complete this course within 12 months of their appointment to a Burn Injury Unit.

On-going professional development is required for nursing and allied health staff including where appropriate, the acquisition of tertiary qualifications. Appropriate training and professional development learning opportunities should be made available through Telehealth support for the clinical workforce in rural and remote areas. In addition, collaboration with Australian Universities is needed for tertiary level qualification.

The University of Adelaide currently provides a Post Graduate Diploma in Nursing Science (Burns Nursing) course which can be completed externally. However burns specific clinical or course work postgraduate programmes are extremely limited in Australian Universities. Furthermore, due to the limited positions available for specialised burn therapists in Australia, postgraduate courses in this area are not offered in Australia for nurses.

With respect to the medical workforce, there are current discussions with UWA for establishment of a postgraduate burn therapy module, in 2009, through the faculty of the Centre for Musculoskeletal Studies, Department of Surgery. The lack of programmes for higher education for burn specialists is due to the small number of available clinical positions in a highly specialised workforce. This contributes to a high turn over of specialised burn therapists creating a significant issue for retention of specialist burns clinicians. In addition, individuals with higher degrees for dieticians, social workers and psychologists lack specific postgraduate training in
burns care.\textsuperscript{30} Currently psychiatrists and psychologists have limited access to training opportunities. Mental health staff shortages are being experienced globally and current literature recommends advances in higher education to address the issue.\textsuperscript{64}

**Recommendation 9:**
Establish stronger partnerships between the Department of Health WA and Australian Universities through clinical workforce initiatives to establish curriculum for short modules or multi-disciplinary postgraduate programmes that focus specifically on burns injury.

**Recommendation 9.1:**
Provide training and professional development learning opportunities through Telehealth support for nurses and allied health professionals in rural and remote areas.

### 7.4.3 Mass casualty care and stabilisation

Burn Injury is one of the most common injuries to occur during mass casualty events.\textsuperscript{65} Therefore, during the planning and response to a disaster, trained burns specialists should be involved. To facilitate this process, involved burn specialists must have disaster management training, and understand their responsibilities in an emergency situation.\textsuperscript{30} This training should be inclusive of general disease preparedness for mass casualty and specific Burn Injury. ‘Major Incident Medical Management Support (MIMMS)’ training is the internationally accredited course offered to both government and non-government agencies in Western Australia.

A disaster plan is required for the triage and treatment of burns patients in an event of a mass casualty incident. Department of Health (WA) representatives and the Head of Department for the Burn Injury Units should revise and modify the disaster plan to ensure consistency with state and national plans.

Registration of burns care specialists on the AUSMAT register should be encouraged to ensure that appropriate personnel will be sourced to support local workforce in all states in the event of a mass casualty event with multiple burn injuries, where a national response is required. These personnel should receive appropriate disaster training.
Recommendation 10:
Provide individual training of all staff within Burn Injury Units in disaster preparedness and disaster response training.

Recommendation 10.1:
Regular contact by the Burn Injury Units should be made with the State Health Coordinator (Disaster) through provision of information to the Australian and New Zealand Burn Association National Burns Registry and State Health Disaster Committees.

7.5 Outcomes

7.5.1 Clinical Review
Research and training are pivotal to the provision of excellent services. All new methods and new technologies require implementation within a framework of ethics, clinical protocol, review and audit. Changes need to be made so that tertiary centres are research driven to provide an evidence-based service of excellence. This requires the recognition that workforce must be skilled in areas of service, research and training. Other staff members from complementary disciplines must also support staff to counter the developing workforce shortages. Currently the Burns Clinical Outcome Research Project (BCORP) coordinated by RPH is working to evaluate advances in treatments by establishing a new set of standards to measure treatment success in burns. Other research is focussing on physiotherapy, nutrition, artificial skin substitutes and surgical intervention of serious burn patients.

7.5.2 Quality Improvement and Research
With the appropriate infrastructure for communication, state wide protocols should be developed to guide management of non-surgical cases. These protocols will ensure non-surgical patients are treated as close to home as possible. The protocols will only be cost effective if management is truly collaborative. A major issue is the lack of experience in both assessment and appropriate Burn Injury management state wide. This lack of experience leads to late referral, increased infection, prolonged healing and poor scar outcomes. However with the implementation of appropriate protocols, outcomes based education, and communication the benefits will improve service delivery and immediate care and reduce patient transfer errors.

To ensure improved quality of patient care within Burn Injury Units, internal and external audits should be carried out regularly. Similarly, maintaining hospital accreditation and suitable verification is particularly important. 30

Tertiary level centres are the source of evidence-based best practice and excellence in care. Research regarding clinical outcome with feedback loops into initial care protocols is essential to continually develop the evidence base, and monitor outcomes and treatment modalities within a research framework to provide sound rigor. This offers the most effective method of the dissemination of results through translational research.

A retrospective, observational study between 1992-02 was conducted by WA Health to compare treatment and outcomes between Aboriginal and non-Aboriginal children and adults in WA. Although a greater proportion of Aboriginal people sustained major
burn injuries, similar levels of service and outcomes were found compared to non-Aboriginal people. Without this research and given the trends seen for chronic disease the assumption would be that outcomes for Aboriginal people are poorer. More research is warranted in burn care, ranging from culturally and environmentally appropriate prevention through to assessment of outcomes. Researchers should therefore be considered an essential member of the multidisciplinary team.

7.5.3 Information and Care Management System

An information management system is required to improve coordinated care. A Burns Information Management System has been demonstrated to be effective in proof of concept testing. It has been piloted with government funding at RPH and with the view to links with PMH. Further investment and funding to finalise the production module to support ongoing state-wide (web-based) development and implementation of this management system is required.

**Recommendation 11:**
Support the current tertiary centres to develop as a virtually united centre of excellence that makes a major contribution to the international literature for Burn Injury management.

**Recommendation 12:**
Further investment and funding for the ongoing innovation and development of the WA Burns Service Burns Information Management System at the Adult & Paediatric Burns Services is required.
Glossary

≈ Approximate
ANZBA Australian and New Zealand Burn Association
BCORP Burns Clinical Outcome Research Project
ED Emergency Department
FESA Fire and Emergency Services Authority
MIMMS Major Incident Medical Management Support
PCA Patient Controlled Intravenous Analgesia
%TBSA Percentage of total body surface area
RPH Royal Perth Hospital
PMH Princess Margaret Hospital
SES Socioeconomic status
AFPA The Australian Fire Protection Association
JAFFA The Juvenile and Family Fire Awareness Programme
UWA The University of WA
WA Western Australia
Appendices

Appendix A: Aboriginal health impact statement

Model of Care for Burn Injury

1. Will this policy, programme or strategy significantly affect the health of Aboriginal people?
   If so, how:

2. Is this policy, programme or strategy likely to lead to a change in the nature or level of resources of health services available for Aboriginal Health?
   If so, specify:

3. Have all items of the checklist been reviewed and answered?

Statement

The health needs and interests of Aboriginal people have been considered, and where relevant, incorporated and appropriately addressed in the development of this health policy, programme or strategy.

Head of Unit name: Dr Simon Towler

Unit name: Health Policy and Clinical Reform Division
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