

**SELECTED SPECIALTY  
AND STATEWIDE  
SERVICE PLANS**

**Number Four**

**Severe Burn  
Service**

**May 2003**

## **NSW HEALTH DEPARTMENT**

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This Selected Specialty and Statewide Service Plan was developed by the Statewide services Development Branch between 1998 and 2000 with considerable contribution by the specialist clinicians in the field. The Selected Specialty Services Steering Committee provided significant direction to this process.

The Greater Metropolitan Services Implementation Group, under the auspices of the Government Action Plan for Health, then reviewed and ratified this Plan.

The considerable effort of all involved is acknowledged.

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## EXECUTIVE SUMMARY

In recognition of the need to plan a number of the more highly specialised health services on a statewide level, NSW Health has undertaken a series of service planning reviews. The services considered in this series are characterised by one, or a combination of factors, which include:

- A demonstration of a relationship between volume and quality
- The treatment of conditions that are not common
- The need for specialised skills of individual clinicians or team
- The need for highly specialised equipment and/or support services
- The early stage of development of the specialty
- Shortages in supply or distribution of the workforce
- High cost infrastructure

Severe burns is regarded as one of these Selected Specialty and Statewide Services in NSW and is the fourth in a series to be released by NSW Health.

A burn is generally defined as a thermal or chemical injury to the skin. A burn injury is largely an unpredictable, potentially catastrophic event and a single incident may produce many burn victims. Burn related injuries manifest themselves in a wide variety of injury profiles from minor to extensive.

A severe burn injury is generally defined as being 20% or greater of total body surface area adults and 10% or greater for children and of partial or full thickness skin depth. Severe burn injuries are complex and require timely admission to a tertiary referral hospital with specialist burn management expertise.

Over the past 25 years survival rates for patients with a severe burn injury have improved dramatically. Early surgical intervention, advances in intensive care, nutrition and development of skin substitutes can contribute to improved outcomes of patients with more than 85% of body surface area burned.

In 1992 NSW Department of Health released the *Selected Specialty Burn Services Plan* which recommended that, based on population trends, the bed requirement for NSW in 2001 would be 33 at an occupancy of 80%. It was also recommended that Burn Units should be retained at Concord Hospital, Royal North Shore Hospital, Westmead Hospital, Tamworth Based Hospital and Children's Hospital at Westmead.

In 1997 five hospitals in NSW had designated Burn Units – Concord Hospital (9 beds), Royal North Shore Hospital (6 beds), Westmead Hospital (2 beds), Tamworth Base Hospital (2 beds) and Children's Hospital at Westmead (8 beds). Although the NSW Health (1996) *Transfer Guidelines for People with a Burn Injury* provides hospitals and health care professionals with the indications for admission to a Burn Unit, there was no statewide approach, which integrates all services involved in responding to burn related events and the ongoing management of burn victims.

This Plan results from consideration of the issues related to the future of services for severe burns, in the context of a statewide specialty. Based on current and projected activity for burn services, the Plan includes recommendations in relation to the number of burn beds; the location of these beds and the networking of hospitals for the management of non-severe burns. A model of service delivery for severe burns for NSW is also recommended.

In order to determine the number of beds required in NSW an analysis of inpatient burn activity was undertaken for the six-year period 1995/96 to 2001/02. The NSW Health Inpatient Statistics Collection was used as the data source. It was identified that in 2001/02 patients with a burn diagnosis were admitted to 145 public hospitals in NSW.

The analysis found that **total burn separations** was relatively stable over the period, with 2,517 reported in 1996/97 to 2,508 in 2000/01. Day-only admissions constituted a considerable proportion of these admissions. Approximately 44% of all admissions annually did not involve an overnight hospital stay. Bed days utilised ranged from 14,044 in 1996/97 to 11,885 in 2001/02. Overnight burn activity has equated to 47.2 beds in 1996/97 and 39.3 beds in 2001/02 at 75% occupancy.

To determine the extent of **severe burn activity** those separations were identified where ICU hours, intubation, death and/or extensive partial or full thickness burns was reported. Over the six-year period a total of 2,034 separations met one or more of these criteria. Severe burn activity accounted for 14% of separations and 60% of bed days in 1996/97 and 14% of separations and 61% of bed days in 2001/02. Average length of stay ranged from 28.5 days in 1996/97 to 22.1 days in 2001/02. The ICU hours (adults and paediatric) reported amounted to the equivalent of 3.2 ICU beds annually for the six-year period (high 3.9 beds in 1997/98 and low 2.8 beds in 2.8 beds in 1998/99).

Estimation of future bed requirements for severe burns was undertaken using acute inpatient activity projected based on historical trends in age standardised separation rates (SSR) and length of stay (LOS) applied to the projected population. An occupancy rate of 70% was used to calculate bed requirement. It was estimated that in 2005/06 the total bed requirement would be 33 in 2005/06 (comprising 25 adult and 8 paediatric) and 37 in 2010/11 (comprising 27 adult and 10 paediatric).

Although bed requirements have been projected to 2010/11, in view of the current progress in the acute management of severe burn injury, particularly in relation to tissue culture, a review of requirements will be included as part of the evaluation of this Plan.

A key element of this Plan is the proposed model of service delivery for the management of severe burns in NSW. In determining an appropriate model of burn service delivery for NSW, consideration has been given to taking advantage of the existing hospital and service infrastructure as much as possible.

It is proposed that the future model for the delivery of burn services in NSW comprises a combination of centralised and decentralised services appropriate for the management of severe and non-severe burns.

In terms of provision of severe burn services in NSW reconfiguration is indicated. The reconfiguration is intended to more appropriately align Burn Units geographically to areas of greatest service need. It is also intended to redistribute burn beds to maintain clinical sustainability in the longer term and to provide a locus of medical, nursing and allied health expertise to provide clinical leadership in burn care in NSW.

The proposed reconfiguration will result in the establishment of a single, statewide severe burn service comprising three hospital campuses with a bed complement of 33 beds in 2005/06 allocated as Concord Hospital (17 beds), Royal North Shore Hospital (8 beds) and Children's Hospital at Westmead (8 beds).

In terms of care provision for patients with a non-severe burn it is considered that, as much as possible, this should be provided within the Area Health Service of residence, and in accordance with the role delineation of the individual hospital. It is proposed that a network

of hospitals around the state be established to enable the provision of an appropriate level of care for the non-severe burn patient by hospitals within the AHS of residence.

The Selected Specialty and Statewide Service Plans will be reviewed on a regular basis. It is expected that the Severe Burn Services Plan will be reviewed in 2006. However, changes in clinical practice and technological change will be monitored in order to determine whether a shorter timeframe for review is required.

Good progress has already been made in relation to the recommendation of this Plan, as the clinicians who have been actively involved in its preparation continue to have a significant role in its implementation.

#### **RECOMMENDATIONS**

1. That a total of 33 beds (inclusive of the intensive care unit component) are allocated to the management of severe adult and paediatric burns in NSW in 2005/06.
2. That a total of 8 beds (inclusive of the intensive care component) are allocated to the management of severe paediatric burns in NSW in 2005/06.
3. That a total of 25 beds (inclusive of the intensive care component) are allocated to the management of severe adult burns in NSW in 2005/06.
4. That a Statewide organisational model for paediatric and adult burn services in NSW be established to provide an integrated framework of care.
5. That a single Statewide Paediatric Unit for the management of severe burns in NSW is appropriate in terms of efficiency and expertise and that the service should be retained at Children's Hospital at Westmead.
6. That a Statewide Adult Unit for the management of severe burns in NSW is retained on two hospital campuses – Concord and Royal North Shore.
7. That 17 beds are allocated for the management of severe burns at Concord Hospital and 8 beds at Royal North Shore Hospital
8. That a hospital network for the management of non-severe burns is included in the NSW model of burn service delivery.
9. That a NSW Burn Services Advisory Group is established.
10. That a funding model be developed for the adult and paediatric severe Burn Units which reflects this statewide role. Funding for the management of non-severe burns continues through global budget allocation to the Area Health Service (AHS).

## 1. INTRODUCTION

In considering the number and location of highly specialised services, many factors are taken into account. NSW Health considers access, quality of care and service efficiency in these decisions. There are a number of considerations that favour the decision to restrict health care provision to a limited number of sites, or to promote an integrated service network of sites and/or provider groups. These include:

- When there is reasonable evidence that, up to a certain level, patient outcomes improve as caseloads increase and that care needs to be concentrated to reach this level. This most often occurs with interventions that involve:
  - Skills that require substantial training, practice and experience to develop and maintain;
  - Large teams, in which the different specialised skills provided by separate team members (including doctors, nurses, technicians and allied health staff) are important, as is the way the team works together;
  - Extensive infrastructure requirements, for example diagnostic services with highly specialised equipment and staff skills; and
  - Treatment of conditions that are uncommon.
- When there are large infrastructure costs, with unnecessary duplication of services leading to inefficient use of resources. This is especially relevant when attempting to ensure value for money for the public and may occur with interventions that involve:
  - Expensive equipment and/or buildings; and
  - Substantial investment in staff training and/or recruitment.
- When the medical technologies involved require further research, development and evaluation, and there is an associated need to enhance the diffusion of knowledge in the area. This may include:
  - New or rapidly evolving medical technologies;
  - The need for substantial research infrastructure;
  - The need for research activity to reach "critical mass";
  - Widespread enrolment of patients into clinical trials and the associated use of clinical protocols; and
  - A tendency for a lag between scientific knowledge and clinical practice.

As a result, a series of service planning reviews have been undertaken where a number of these criteria have been met.

The development of the severe burns service plan was initially undertaken as part of the Selected Specialty Services Planning Project. The Selected Specialty Services Steering Committee oversaw the development process. The initial Plan was completed in October 1999.

In March 2000, the NSW Minister for Health launched the respective findings and recommendations contained in the Reports of the NSW Health Council and the Ministerial Advisory Committee on Health Services in Small Towns.

The Government's response to these reports is being carried out through the Government Action Plan for Health. The implementation framework provided the mechanism for actions to occur. The process included the establishment of the Greater Metropolitan Services

Implementation Group (GMSIG), which reviewed and made recommendations on a number of clinical services. GMSIG made recommendations on the provision of severe burn services and endorsed the NSW Severe Burn Services Plan (1999).

This Plan incorporates an updated analysis of burn activity using more recent year's data for the six-year period 1996/97 to 2001/02.

This Plan considers issues related to the future of services for severe burns in the context of a statewide specialty services model. Key reference documents include:

- *Strategic Directions for Health 1998 – 2003*;
- *Management Guidelines for People with Burn Injury* (July 1996);
- *Transfer Guidelines for People with Burn Injury* (July 1996); and,
- *Selected Specialty Services Plan* (1992).

*Strategic Directions for Health* articulates four goals to ensure that health care planning and delivery is focused on achieving Better Health, Good Health Care for the people of NSW. These goals are

- Healthier people
- Fairer access
- Quality health care
- Better value

This Plan reflects the goals and strategies contained in *Strategic Directions for Health*, in particular ensuring that:

- Services are well coordinated, readily accessible and responsive to needs of patients and carers;
- Service and planning frameworks reflect the need for flexibility in service provision and acceptance of emerging models of care; and,
- Planning and decision-making are based on evidence of best practice, benchmarking, trend analysis and local community needs.

## 2. BURN INJURY

### 2.1 Description and Aetiology

A burn injury is largely an unpredictable, potentially catastrophic event and a single incident may produce many burn victims. Burn related injuries manifest themselves in a wide variety of injury profiles from non-extensive to extensive. A severe burn injury can result in death or, for the majority of cases, results in physical and psychological sequelae requiring long term and intensive treatment and follow-up.

A burn is generally defined as a thermal or chemical injury to the skin or other body tissue. The skin, the largest organ of the body, provides structure and form to the body, provides protection to internal organs and assumes a primary regulatory function associated with temperature regulation and response to infection.

A burn injury may result from the following causes (Streeton and Nolan 1997 p 109):

- Scald – hot liquids such as hot water and steam, hot fats, oils and food.
- Flame – direct contact with open flame or fire.
- Chemical – direct contact with chemicals.
- Contact - direct contact with a hot object.
- Radiation – exposure to solar energy, infrared radiation or electromagnetic ionising radiation.
- Electrical – direct contact with an electrical contact. May occur as a result of an electrical malfunction or short circuit. Burns caused by contact with an electrical heating element for example a bar radiator, are not classified as “electrical” burns but as “contact burns”.
- Flash – exposure to the energy produced by explosive material.
- Friction – rapid movement of a surface against the skin.

### 2.2 Classification of burn injury

The classification of burn injury is a fundamental aspect in the management of any burn injury. It is important in terms of triage of burn victims, to identify the severity of burn injury, provide an indication of the requirements of care and patient outcome. Burn injury is described in terms of:

#### Burn size

Burn size is traditionally expressed as a percentage of total body surface area (TBSA) burned. “Rule of Nines” (based on anatomical regions of the body) is commonly used as a rapid means of determining the percentage burned. Alternatively, a burn diagram using a body chart is used to more accurately identify the extent of burn, particularly in the case of children (See Glossary).

#### Depth of skin involvement and damage to underlying structures

Traditionally, burn depth has been described in terms of first degree, second degree and third degree. With first degree denoting a superficial burn that would be expected to heal completely without surgery to third degree denoting a deep burn through all skin tissue requiring skin grafting.

Contemporary clinical practice, however, has adopted an alternative classification of burn depth that more precisely describes burn depth in terms of skin tissue involvement. Burn depth is described in terms of superficial, partial thickness, deep dermal partial thickness and full thickness.

This method for describing burn depth has become the preferred option for clinicians in burn management. The delineation of partial thickness and deep dermal partial thickness is important in terms of assessment of the severity of burn injury and as a major determinant of the course of management particularly the need for skin grafting.

Unlike assessment of the extent of burn injury in terms of total body surface area (TBSA), determination of depth of burn is more complex. In the majority of cases, particularly with extensive burns, burn depth is not homogeneous. The ability to accurately identify the varying burn depths requires specialist burn skill. As Monafó (1996 p1584) observes, *there is no clinically useful objective method of measuring burn depth; classification depends on clinical judgement.*

Table 1 provides a useful matrix representation of the depth of burn, presentation and anticipated outcome. Of note is the attempt to reconcile the two depth classification systems by splitting second degree burns to superficial and deep

**Table 1** Depth characteristics of burn wounds

	<b>Superficial (First degree)</b>	<b>Partial Thickness (Superficial second degree)</b>	<b>Deep Dermal Partial Thickness (Deep second degree)</b>	<b>Full Thickness (Third degree)</b>
Morphologic localisation of injury	Minimal epithelial damage	Epidermis, minimal damage to dermis	Entire dermis and more dermal involvement than superficial partial thickness; intact hair follicles and sweat glands	Epidermis, dermis, epidermal appendages; portion of subcutaneous fat, possible involvement of connective tissue, muscle or bone
Physical characteristics	Red or light red, dry or small blisters; slight erythema; exquisitely painful	Moist, bright pink or red colour; blister formation; intact blanching; tactile and pain sensation	Pale waxy appearance; absent blanching; mostly dry; decreased pinprick sensation but pressure sensation intact	Dry, leather, insensate, avascular, pale yellow to brown in colour, possibly charred; thrombosed vessels
Healing time	Approximately 5 days	Within 21 days	Prolonged healing period > 21 days; contracture formation; possible conversion to full thickness injury; hypertrophic scarring	Incapable of self – regeneration; requires grafting

Source: Extract from Greenfield & Jordan (1996 p 206)

### Site of burn injury on the body

The site of burn injury on the body has implications for patient management in terms of risk of complications and the need for admission to a Burn Unit. Burn injury involving the face, hands, feet, perineum, inner joint surface and upper airway are generally regarded as requiring consultation with a burn care specialist (*NSW Health Burn Management Guidelines 1996*). In addition to site of injury, circumferential burn injuries pose additional complication risks and therefore are consideration in terms of severity assessment.

## Age

Age is an important consideration in the management and outcome of burn injury. Studies have shown that burn injury rates are high in children and the elderly (Sarhadi et al 1995) and there is a relationship between age and survival (Saffle 1998).

### **2.3 Severe Burn Injury - Defined**

There is a spectrum of burn injuries. The severity of which is dependent on the extent of the burn, in terms of percentage of the TBSA and depth of burn. Age, body part involved and the presence of other medical conditions also contribute to the severity of the burn injury. The individual with a severe burn injury requires admission to a Burn Unit for acute management.

The American Burn Association and the American College of Surgeons has recommended that individuals who meet any of the following criteria require admission to a Burn Unit and therefore have sustained a severe burn injury.

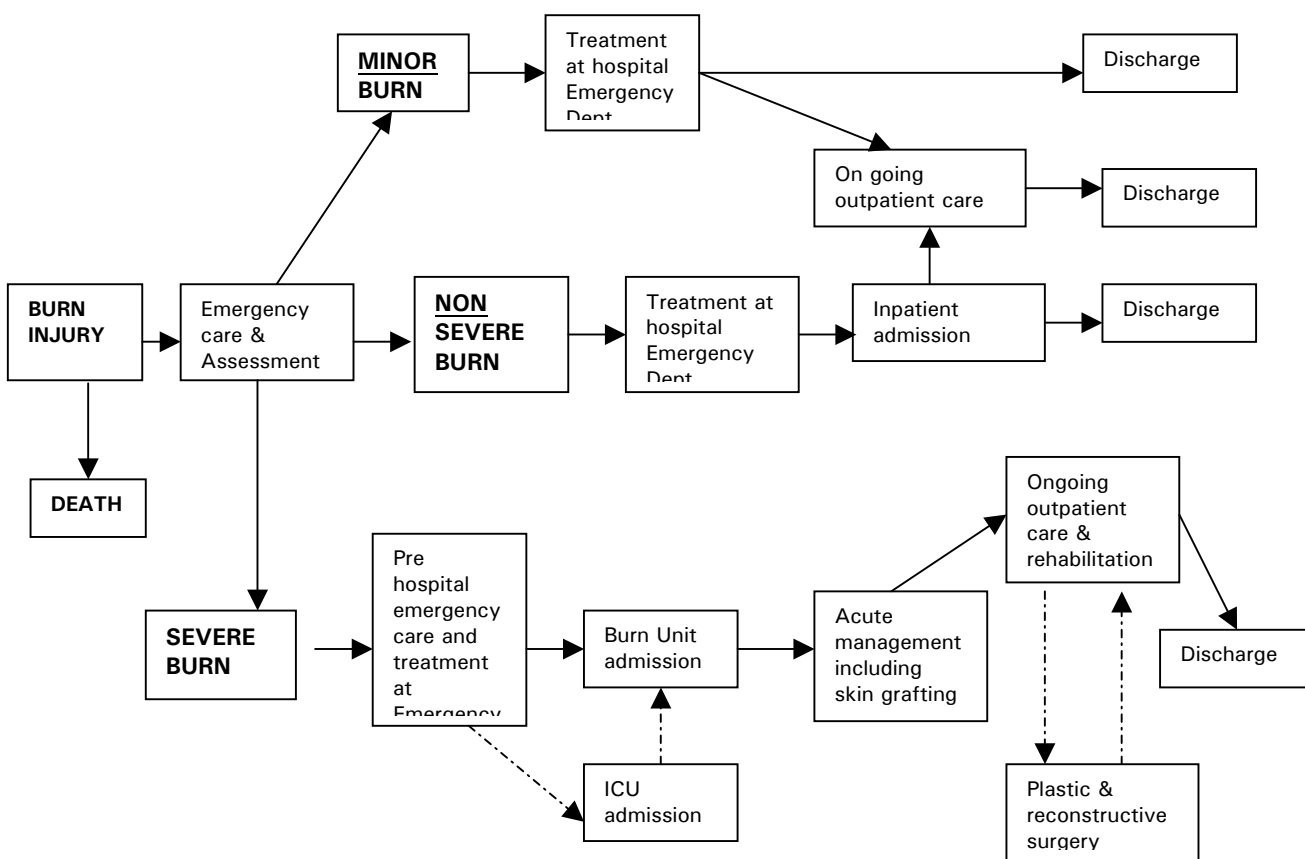
1. Partial thickness burns  $\geq$  20% TBSA in patients aged 10 – 50 years old.
2. Partial thickness burns  $\geq$  10% TBSA in children aged 10 or adults aged 50 years old.
3. Full thickness burns  $\geq$  5% TBSA in patients of any age.
4. Patients with partial or full-thickness burns of the hands, feet, face, eyes, ears, perineum, and/or major joints.
5. Patients with high-voltage electrical injuries, including lightning injuries.

The complete list of criteria is included in Appendix 1.

### 3. MANAGEMENT OF THE BURN PATIENT

For the purposes of this Plan a flowchart was developed to illustrate the management pathway for minor, non-severe and severe burns (Figure 1). Whilst minor (superficial) burn injuries are generally managed on an outpatient basis following initial hospital treatment - other burn injuries require hospitalisation. Of patients requiring hospitalisation, those with severe burns require direct admission, or transfer to a Burn Unit. Burn injuries associated with burn or trauma to the respiratory system may require intensive care management and ventilatory support.

Figure 1 Management Pathway for Minor, Non-Severe and Severe Burns



#### 3.1 Elements of Burn Management

Although the care plan for the burn injury patient is based on individual needs, the management of the burn patient is generally based on a set of guiding principles, namely that:

- Appropriate emergency and pre hospital care is provided to prevent and/or minimise immediate complications resulting from the trauma.
- Other injuries such as chest trauma, fractures, cardiac arrhythmia, resulting from the burn or in addition to the principal burn trauma are managed.
- Appropriate mechanisms to prevent/minimise the physical consequences (such as loss of mobility, scar formation, etc) are instituted.
- Complications, particularly infection, are prevented/minimised.

- Skin coverage is attained as quickly as possible.
- Appropriate management of the acute psychological consequences of the injury is instituted. This may include posttraumatic stress management and ongoing management of the emotional and physical problems that may arise as the individual returns to the community.

The treatment regime for the management of severe burns generally comprises the application of anti microbial topical dressings, on a daily or less frequent basis, pain management, nutritional support, physical therapy and psychological support.

Surgical intervention is a principal and integral component of the management of burn injury. Early surgical excision of burn tissue was established in the late 1970s and continues to be a principal strategy in the management of severe burns. The patient with severe burns may require a series of surgical procedures to attain skin coverage. Reconstructive surgery may be necessary to restore physical function such as use of hands and digits, provide coverage to underlying structures where simple grafting techniques are inappropriate and the rebuilding of body features, such as craniofacial reconstruction. The availability of suitable skin material impacts significantly on the timetable for surgical intervention and the duration of post injury hospitalisation.

### **3.2 Burn Management - An Integrated Model of Care**

The development of a multi disciplinary team approach and an integrated model of care for the management of patients with severe burn injury are hallmarks of current, best practice burn management. The team approach enables the numerous health care professional groups responsible for the various components of burns care to provide that care in an effective and coordinated manner (Demling 1995).

The burn team may comprise a surgeon, nurse, physiotherapist, occupational therapist, nutritionist, pain management personnel, social worker, and psychiatrist/psychologist. In the paediatric arena the team may also include a teacher and play/diversional therapist. Other personnel that may have input into the team are intensivists, pharmacists and microbiologists. It has been the practice for a surgeon (who may also be the Director) to head the team.

### **3.3 Burn Care and Functional Interdisciplinary Relationships**

The management of the severe burn victim requires the availability of services providing critical care, general and reconstructive surgery, laboratory and transfusion, nutrition, physical and psychosocial therapies.

Therefore, the development and maintenance of functional relationships between the health care professionals integrally involved in the management of the burn patient care and other hospital departments and personnel are essential to ensure effective and efficient burn care.

The availability of intensive care services, operating room and physical therapy services have significant impact on the effectiveness of service delivery, particularly for the severe burn patient. Burn Units may find that they are unable to accept severe burn admissions due to the inability to accommodate patients requiring ventilation in the ICU. These instances frequently result in hospitals, without the necessary expertise in severe burn management, being required to manage the severely ill burn patient for the initial acute phase.

Inaccessibility to operating room facilities resulting from conflicting operating schedule priorities further impacts on the service provision for the burn patient and results in a protracted length of stay. The immediate initiation of a burn management regime for the individual burn patient that includes planned surgical intervention represents an important goal for effective patient care. To ensure effective surgical management of the burn patient the availability of operating room facilities and personnel with appropriate expertise to manage the surgical and associated components of burn care are equally important considerations.

World's best practice burn facility design for the management of severe burns incorporates an operating room and accommodation relationships that enable isolation of patients and artificial ventilation capabilities as required (American Burn Association and American College of Surgeons 1995).

### **3.4 Burn Service Interface with Community Service Providers**

Whilst the provision of acute and ongoing burn management occurs in a hospital setting it is important to acknowledge that burn service provision occurs in a broader context of community, emergency and trauma services. The provision of an effective burn service is very dependent on the development and maintenance of functional interfaces with community medical, paramedical and non-medical service providers.

Fire fighting personnel are generally the principal respondents to incidents involving burn victims. Ambulance and retrieval services are integrally involved in the initial emergency treatment and evacuation of burn victims to hospitals and Burn Units. Major fires, explosions, bushfires and similar events have the potential to escalate into situations requiring the initiation of disaster responses by a number of emergency organisations and personnel.

The relationship between fire-fighter and burn victim, particularly when the fire-fighter becomes the victim, has resulted in fire fighting personnel becoming involved with many Burn Units, particularly in terms of involvement in community education, researching fire and burn management.

### **3.5 Developments in the Management of Burn Injury**

Improvements in surgical techniques and intensive care management now enable the survival of severely burned patients with involvement of 85% or more of total body surface area (Saffle 1998 p387). Developments in the management of pain and improvements in supporting the nutritional requirements of the patient have also contributed to the decrease in mortality and morbidity associated with major burns.

The introduction of early excision for extensive burn injuries in the 1970's has also made a significant contribution to burn care. However, whilst this practice has resulted in the reduction of mortality and morbidity associated with infection, it also results in the removal of remnants of viable skin tissue and requires the availability of a suitable biological or other skin substitute to provide wound coverage.

In response to this demand for skin or substitutes, the establishment of skin or tissue banks and research into the development of a suitable skin substitute on a commercial basis, have been principal goals for improvements in burn care.

Skin, or tissue banks, have been established as a means of providing Burn Units with fresh or frozen human cadaver skin. A number of these facilities are now engaged in meeting demand for tissue products to other national or regional Units in addition to local demand.

In terms of the future direction in skin replacement in the management of burns Hooper et al (1997 p116) state "only those Units with access to well established skin banks with up-to-date research interests will be able to provide the benefit of these advances to their patients".

Although a number of synthetic and biological products are available, the development of a skin substitute that is a satisfactory replacement for skin has yet to be achieved (Hopper et al 1997). Biological skin coverings such as pig skin, amnion membrane cultured epidermal autograft and aloderm graft are available in Australia. Although hospitals such as Concord Hospital are using these materials, their use is generally restricted to those patients where harvesting of the patients own skin is problematic. The current high cost of these skin substitutes and the current stage of their development would indicate that more common use of these products in the foreseeable future is unlikely.

The recent development of laser topography may present a significant technological advancement for the future management of burn injury. Currently conventional excision techniques often involve the loss of viable skin tissue along with burn tissue. Laser topography enables the precise and real time mapping of burn depth (Senior 1999). It therefore facilitates the differentiation of viable and non-viable burn tissue and has the potential to reduce the extent of the excision and therefore improve wound healing, and decrease the cosmetic effect of the burn for the patient.

### **3.6 Rehabilitation**

An important component of burn management is the prevention or minimisation of the physical, metabolic and psychological sequelae associated with burn injury. To this end hospitals provide acute and post discharge rehabilitation as part of the treatment regime.

Rehabilitation programs are designed to assist individuals to overcome functional impairment and psychological complications of burn injury, to regain independence and to reintegrate into the community.

DeSanti et al (1998) have reported that through the establishment of a Burn Rehabilitation Unit within an acute rehabilitation facility length of stay for patients treated at the Brigham and Women's Hospital Centre, Boston declined and resulted in positive functional outcomes for these patients.

The demand for Burn Rehabilitation services in the USA, Canada and the UK has resulted in the establishment of purpose built Burn Rehabilitation centres, either collocated with other rehabilitation services or as an extension to the acute burn facility. In addition to the provision of burn rehabilitation, these services engage in research to develop and evaluate scar minimisation interventions and products, develop and maintain outreach training for home health care providers in rural and remote areas and evaluate outcomes for individuals with burn injuries.

Effective burn rehabilitation programs rely on the expertise of a number of specialities to manage the complex and interrelated aspects of patient care. The multidisciplinary team approach, comprising medical, nursing and paramedical personnel with burn expertise, is the model used for the organisation of burn rehabilitation services.

The Baltimore Regional Burn Centre and the Centre for Burn Reconstruction (John Hopkins Bayview Medical Centre, Baltimore) provides a comprehensive burn rehabilitation program. Under the auspices of the USA National Institute for Disability and Rehabilitation Research, John Hopkins is a participating institution in the Burn Injury Rehabilitation Model System. By providing a full range of care through investigation and evaluation of improved outcomes for people with severe burns, the Model System aims to reduce the functional impairment associated with burn injury. In the absence of a statewide coordinated approach to the management of burn related rehabilitation in NSW it may be of value to explore this Model and its potential application to the Australian context.

### 3.7 The Concept of the Burn Centre

In view of the various components required for the provision of burn services particularly in relation to severe burns, the concept of the Burn Centre as a model of service delivery for burns is one that is widely developed in the USA and Canada.

The Burn Centres are located in hospitals that are tertiary referral hospitals for a state, province or region. Severe and complex burn cases are admitted to these Centres and criteria used to identify those patients appropriate for transfer to such a facility (Appendix 1). Dependent on the needs of the population and the location of these Centres they may accept all ages or specifically paediatric or adult. Demling (1995 p570) stated the important aspects of a Burn Centre are:

1. *The presence of a critical mass of burn expertise that practices and also defines the most up-to-date care;*
2. *The presence of an optimum physical and infection-control environment conducive to the patient with burns, and;*
3. *The burn team concept in which a multidisciplinary approach to a complex disease is used to more effectively coordinate care into multiple and separate pieces.*

The Burn Centres offer a full acute treatment service with follow up clinics for scar management and reconstructive surgery. In addition they have responsibilities for maintaining tissue banks, education, burn prevention and research.

Patients are managed in purpose built facilities in the main with single room accommodation, filtered and controlled air, treatment area and provision for the management of ventilated patients, particularly those with smoke inhalation or airway burns.

Examples of such Centres are Miller-Dwan Regional Burn Centre (Wisconsin USA), Calgary Fire-fighters Burn Treatment Centre (Foothills Hospital Canada), Pindersfield Burn Centre (Yorkshire, UK) and St James Hospital National Burn Unit (Dublin Ireland).

The American Burn Association (ABA) and the American College of Surgeons (ACS) have developed Guidelines for the operations of Burn Centres (1995). These guidelines outline the service requirement, staffing, expertise, and admission criteria for the Burn Centre.

The ABA and ACS Burn Centre Verification Program is used as the quality credentialing process to ensure that burn care and management practices are appropriate and effective. The process is similar to the Australian Council for the Health Care Standards hospital accreditation program and the USA Trauma Centre verification program established through the American College of Surgeons in 1987. Adequacy, quality, efficiency and the team approach to providing multiple ancillary services involved in the care and treatment of the patient with burns are the focus of the Program (Supple et al 1997).

## 4. PROVISION OF BURN SERVICES IN NSW

### 4.1 Organisation of hospital-based burn care

In 1992 the NSW Health *Selected Specialty Burn Services Plan* recommended the following for the provision of burn services in NSW:

- Based on population trends the specialist burn bed requirement for NSW in 2001 would be 33 at an occupancy of 80%;
- Of the 33 beds, 12 (40%) should be paediatric and 21 (60%) should be adult);
- The adult Burn Units (Concord, Royal North Shore and Westmead Hospitals) should be retained, and;
- The unit at Children's Hospital at Westmead be retained as the statewide unit for paediatric burns.

The Plan stated that an estimated decrease of 10% in bed requirement (based on 33 beds) resulting from decreased in length of stay would occur by 2001.

In 1992, five public hospitals in NSW were designated as having a Burn Unit. Each hospital was assigned a geographical catchment in NSW.

**Table 2 Burn Units in NSW**

Unit and Location	Services Provided	Catchment AHSs
Concord Hospital	9 bed dedicated unit	Central Sydney, South Eastern Sydney, Illawarra, Southern, Greater Murray
Royal North Shore Hospital	6 beds located in a surgical ward	Northern Sydney, Central Coast Hunter, Mid North Coast Northern Rivers
Westmead Hospital	2 beds located in a surgical ward	Western Sydney, South Western Sydney, Wentworth, Mid Western, Macquarie, Far West
Tamworth Base Hospital	2 beds in dedicated area adjacent to High Dependency & Intensive Care	New England
Royal Alexandra Hospital for Children	8 beds located in the Plastic Surgery Ward	All AHSs

All public hospitals in NSW are engaged in some form of burn care. The NSW Health (1992) *Guidelines to Role Delineation of Health Services* describes the level of service which may be provided by individual public hospitals for a specific clinical speciality. .

To assist hospitals in the care of the burn patient, NSW Health developed *Management Guidelines for People with Burn Injury* (July 1996). The document provides hospitals and health care professionals with simple and comprehensive information on the identification of the variety of burn injuries and management of the patient not requiring transfer to a specialist facility.

Dependent on the role delineation of the hospital and the availability of burn management expertise and supporting services, hospitals may appropriately manage more extensive burns including surgical intervention and rehabilitation. For smaller hospitals, such as community non-acute and multi-purpose services, service provision is generally restricted to the emergency management of minor and non-severe burns and their ongoing outpatient management. In addition, these hospitals may, from time to time, be required to provide

emergency care for severe burn victims prior to their evacuation to an appropriate level hospital

NSW Health's *Transfer Guidelines for People with Burn Injury* (1996) provides information to assist hospitals identify those burn victims who may require admission to a Burn Unit.

Although the Transfer Guidelines outline the indications/criteria for transfer of burn injury patients to a Burn Unit there is no mechanism in place to ensure that these Guidelines are appropriately utilised or that burn victims are expeditiously admitted to a Burn Unit.

The configuration of the burn beds within the metropolitan hospitals impacts on external and internal functional relationships. Burn Units are located a considerable distance (in some instances a number of floors) away from essential services such as Intensive Care Units, Operating Rooms and Emergency Services. Unlike the majority of Burn Centres in the USA and UK, Burn Units in NSW do not have provision for managing ventilated and critically ill burn patients or have incorporated operating room facilities within the Unit. The location of these facilities within the Units results in the need for the management of severe burns to be located on a "hot floor" in proximity to intensive care units and operating rooms.

In terms of internal functional relationships, the ability to provide appropriate patient isolation with single room accommodation, ability to isolate and regulate heating and cooling and cater for bathing, treatment and physical therapy needs of patients, are important considerations in the design of Burn facilities.

## 4.2 Ambulatory and Non-Inpatient Services

In addition to the provision of acute inpatient burn care, ambulatory burn services are provided in the majority of acute care hospitals. This non-inpatient caseload represents a considerable contribution to burn management in NSW.

In the past these ambulatory services have been confined to catering for two distinct patient populations:

- Those with a burn injury not requiring hospitalisation but requiring ongoing wound management; and,
- Those patients requiring follow up wound dressings, surgical intervention and/or scar management following hospitalisation.

A third category of ambulatory burn management has been established over the past decade. Innovations in short acting anaesthesia, intravenous sedation and pain management have enabled the development of same day surgery. These innovations and the development of synthetic wound dressings have made it possible to treat more complex burns on an ambulatory basis.

The change to same day burn care is most evident in the management of paediatric patients. In 2000/01 Children's Hospital at Westmead reported 71% of its burn separations as being day-only.

A similar change in burn care has not been identified in the management of adult burns. Traditionally adult burn patients have been treated as outpatients and reported as outpatient attendances. The advance in dressing materials has been utilised in the management of adult non-severe burns with care appropriately provided on an outpatient attendance rather than a same day admission. This is similarly the situation with adult patients requiring ongoing wound care post discharge.

The difference in management practices between the ambulatory paediatric and adult patient generally reflects the additional needs of the paediatric patient compared with the adult. Additional personnel, diversionary therapy, pain management regimes, psychological support and time are required for the care of the ambulatory paediatric burn patient.

### **4.3 Rehabilitation**

Increasing survival rates of patients with severe burn injury requires a particular focus on the provision of effective rehabilitation services. The majority of patients with severe burn injury require rehabilitation for a number of years post discharge and there is a need for rehabilitation services which are comprehensive, readily accessible and coordinated by personnel with burn expertise.

The burn team in each of the NSW Burn Units generally includes the services of a physiotherapist and/or occupational therapist, nutritionist and social worker on a full or part time basis. Burn Units ensure that functional rehabilitation commences shortly after admission and continues throughout the hospital stay. Intensive mobility and ambulation programs are undertaken concurrently as wound and graft stability occurs.

Outpatient/ambulatory care clinics provide for the ongoing management of patients post discharge. These clinics are conducted by the burn team to ensure continuity of care and offer a range of services including physical therapy, scar management including the provision of pressure garments, nutritional management and assistance in activity of daily living.

To further ensure that ongoing and appropriate care is provided post discharge Burn Unit staffs are engaged in activities such as training of outreach personnel and training of families and carers to manage dressing at home.

In terms of identifying future requirements for burn rehabilitation, Burn Unit personnel have identified a need to establish step-down low dependency units and on campus accommodation to assist the severely burned patient and family make the transition to independent home living. The development of these facilities would progress the quality of service provision for burns in NSW to international standards.

## 5. REVIEW OF INPATIENT BURN ACTIVITY IN NSW

### 5.1 Methodology

To obtain an indication of the level of burn-related burn service provision in NSW public hospitals, an analysis of inpatient activity was undertaken using the NSW Health Inpatient Statistic Collection as the data source.

For the five-year period 1996/97 to 2001/02 hospital separations, which had been assigned a burn-related ICD 10 diagnosis code, were identified. It should be noted that, at the time the 2001/02 activity was extracted the NSW inpatient dataset was incomplete. However, there is confidence that the majority of the data is complete.

Whilst this process enabled the development of a comprehensive dataset that included relevant demographic and clinical information, there were a number of factors, which complicated the analysis of the data:

- For some separations the burn-injury was not the principal reason for the admission, but rather secondary to a more serious injury eg severe head injury. Isolating the burn-component of the episode of care was problematic for this patient population
- A significant number of inter hospital transfers resulted in the number of separations to appear inflated. Tuner et al (1996) identified double counting of separations as an issue in their study into DRG coding and the Burn Diagram. Bed days, however, is not affected.
- The omission of procedure codes for a significant number of individual separations created difficulty in determining the complexity of care and patient acuity in many instances.
- The assignment of separations to some individual AR-DRGs seemed inappropriate. This was particularly evident in relation to day-only patients (who were neither transfers nor deaths) assigned to tertiary DRGs.
- The replacement of the AN-DRG and ICD 9 coding classification with AR-DRG V4 and ICD 10 coding system during the five-year period created difficulty in mapping activity between the two systems.

The analysis of activity in the Plan is descriptive and, given the large number of variables and a relatively small number of separations, the analysis has been restricted to the most frequently identified characteristics of burn activity.

The AR-DRG V4 classification system contains a number of DRG specifically related to burns and these are:

- Y01Z – Severe Full Thickness Burns
- Y02A – Other Burns W Skin Graft Age>64 or W Cat/Sev CC or W Complicg Diagnosis
- Y02B – Other Burns W Skin Graft Age<65 W/O Cat or Sev CC W/O Complicg Diagnosis
- Y03Z – Other O.R Procedures for Other burns
- Y60Z – Burns, Transferred to Another Acute Care Facility < 5 days
- Y61Z – Severe burns
- Y62A Other Burns age>64 or W Catastr or Severe CC or W Complicating Diagnosis/
- Y62B – Other Burns age<65 W/O Catastr or Severe CC W/O Complicating Diagnosis

Using the ICD 10 burn-related diagnosis codes, rather than the broader AR-DRGs, it was possible to identify a significant amount of inpatient burn activity assigned to “non-burn related DRGs”. The complete list of DRG activity for the 6-year period is contained in Appendix 2.

The summary of inpatient activity by DRG (Table 3) shows that in 1996/97 46% of separations and 47% of bed days were assigned to non – burn DRGs and 23% of separations and 10% of bed days in 2001/02.

**Table 3 Summary of inpatient activity by AR-DRG, 1996/97 to 2000/01**

AR-DRG	Activity	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02*
DRG Y01Z to Y62B	Separations	1,371	1,461	1,932	1,871	2,079	1,939
	Bed days	7,473	7,982	11,652	11,163	10,811	10,743
	Ave.length of stay	5.5 days	5.5 days	6.0 days	5.9 days	5.2 days	5.5 days
Other DRGs	Separations	1,146	970	797	721	638	569
	Bed days	6,560	5,947	1,527	1,117	1,177	1,142
	Ave. length of stay	5.7 days	6.1 days	1.9 days	1.5 days	1.8 days	2.0 days
<b>All DRGs</b>	<b>Separations</b>	<b>2,517</b>	<b>2,431</b>	<b>2,729</b>	<b>2,592</b>	<b>2,717</b>	<b>2,508</b>
	<b>Bed days</b>	<b>14,044</b>	<b>13,929</b>	<b>13,179</b>	<b>12,280</b>	<b>11,988</b>	<b>11,885</b>
	<b>Ave.length of stay</b>	<b>5.6 days</b>	<b>5.7 days</b>	<b>4.8 days</b>	<b>4.7 days</b>	<b>4.4 days</b>	<b>4.7 days</b>

\* 2001/02 data is incomplete

Of significance is that over the five-year period:

- An average of 650 separations annually were assigned to DRG Z62Z – Follow Up after Treatment – Endoscopy. This represents Children’s Hospital at Westmead same-day admissions for ambulatory care burn-treatment.
- Activity assigned to 901Z Extensive O.R. procedure Unrelated to Primary Diagnosis declined dramatically between 1997/98 and 1998/99 as a consequence of a “shift” of activity to DRG Y02B - Other Burns W Skin Graft Age<65 W/O Cat or Sev CC W/O Complicg Diagnosis.

## 5.2 Total inpatient activity

In 2001/02 145 hospitals admitted patients with a burn injury. A summary table of hospital activity is provided in Appendix 5.

**Table 4 Summary of burn inpatient activity 1996/97 – 2001/02**

Activity	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02*
Total separations	2,517	2,431	2,729	2,592	2,717	2,508
Total bed days	14,044	13,929	13,179	12,280	11,988	11,885
Day-only separations	1,100	1,014	1,644	1,150	1,204	1,102
Overnight separations	1,417	1,417	1,085	1,442	1,513	1,406
% Day-only separations	44%	42%	60%	44%	44%	44%
Ave.length of stay (overnight)	9.1 days	9.1 days	10.6 days	7.7 days	7.4 days	7.7 days
Overnight beds equivalent @ 75% occupancy	47.2 beds	47.2 beds	42.1 beds	40.6 beds	40.6 beds	39.3 beds

Over the six year period 1996/97 to 2001/02:

- The annual number of separations reported has ranged between 2,508 and 2,729
- With the exception of 1998/99 the day-only rate has been relatively constant at 44% of total separations

- The overall bed days utilised has declined by 15%, whilst, with the exception of 1998/99, approximately 1,400 bed days annually are utilised by patients with a length of stay of 1 day or longer
- Overnight burn activity has equated to 47.2 beds in 1996/97 and 39.3 beds in 2001/02

**Inpatient activity by length of stay** shows that of the 2,717 patients admitted with a burn injury in 2000/01:

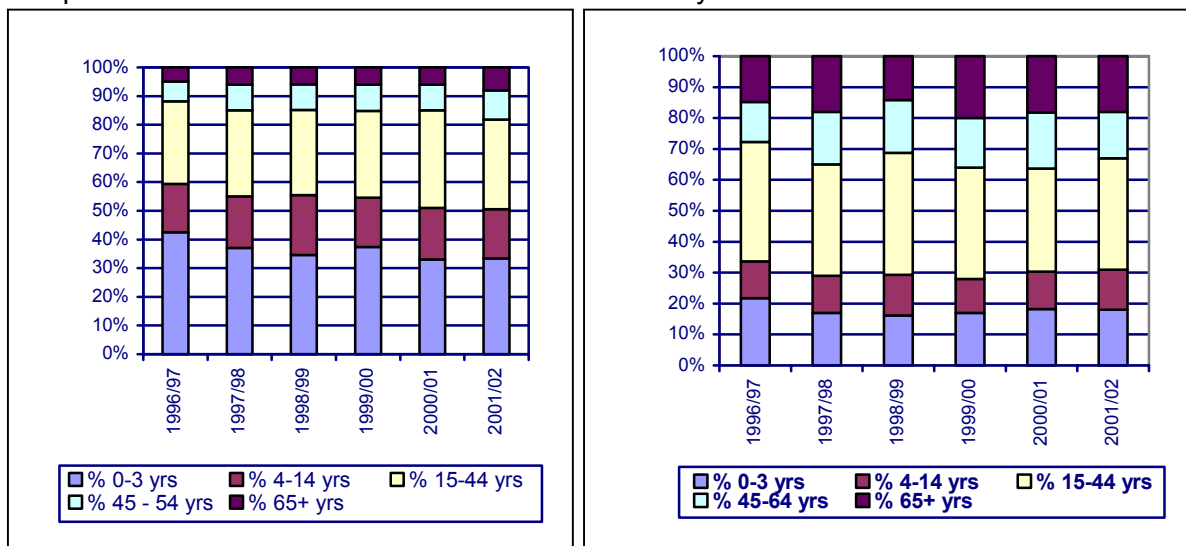
- 45% (1,204 separations) were same-day admissions
- 20% (576 separations) had a length of stay of 1 day
- 21% (561 separations) had a length of stay of between 2 and 7 days
- 6% (174 separations) had a length of stay of between 8 – 14 days
- 7% (201 separations) had a length of stay of 15 days or more.

**Inpatient activity by age grouping** shows that, with the exception of the 0 to 3 year old and 15-44 year old age groups, the number of separations and bed-days utilised was relatively consistent from year to year (Figure 3).

**Figure 2 Inpatient activity by age group, 1996/97 to 2001/02**

a. Separations

b. Bed days



Over the 6-year period children in the 1 to 3 year old age group and in the 4 to 14 year old age group combined for approximately 70% of the annual admissions related to a burn injury. The majority of these were day-only admissions.

Adults in the 15 – 44 year old age group represent the highest number of bed days utilised accounting for some 40% of bed days occupied. Some 20% of bed days utilised was reported for over 65-year-old age group.

**Inpatient activity by Area Health Service of treating hospital** (Appendix 3) shows that over the six-year period:

- Activity for both Central Sydney and Northern Sydney Area Health Services has increased in terms of separations and bed days reflecting the location of the Burn Units at Concord and Royal North Shore Hospitals in the respective Area Health Services.

- The significant decline in inpatient activity in Western Sydney since 1998 is attributed to the re-alignment of speciality services at Westmead Hospital and the consequent cessation of specialist burn services.
- Separations at Children's Hospital at Westmead activity have declined by 18% and bed days 23%
- Hunter and New England Area Health Services accounted for the highest level of burn inpatient activity outside metropolitan Sydney

The largest proportion of burn inpatient activity is undertaken by the principal referral hospitals and paediatric specialist hospitals (Table 5) accounting for 60% of separations and 74% of bed days in 2001/02.

**Table 5 Burn separations by hospital peer groups, 1996/97 to 2001/02**

HOSPITAL PEER GROUPS		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
<b>A1 Principal referral</b>	Separations	611	660	703	677	733	746
	Bed days	6,659	6,946	6,717	5,922	5,909	6,204
<b>A2 Paediatric specialist</b>	Separations	1,020	764	926	922	855	750
	Bed days	3,269	2,530	2,340	2,399	2,630	2,563
<b>B1 Major metropolitan</b>	Separations	248	355	371	294	389	318
	Bed days	906	1,096	835	667	753	540
<b>B2 Major non metropolitan</b>	Separations	193	185	230	198	198	221
	Bed days	1,134	1,247	1,364	1,229	810	850
<b>C1 District group 1</b>	Separations	105	118	156	144	163	140
	Bed days	458	483	589	652	436	357
<b>C2 District group 2</b>	Separations	177	174	147	151	171	160
	Bed days	702	628	423	574	649	782
<b>D1a Community acute</b>	Separations	96	98	107	108	79	71
	Bed days	383	334	107	405	289	195
<b>Other</b>	Separations	67	77	89	98	209	102
	Bed days	522	665	804	432	512	394
<b>Total</b>	<b>Separations</b>	<b>2,517</b>	<b>2,431</b>	<b>2,729</b>	<b>2,592</b>	<b>2,717</b>	<b>2,508</b>
	<b>Bed days</b>	<b>14,033</b>	<b>13,929</b>	<b>13,179</b>	<b>12,280</b>	<b>11,988</b>	<b>11,885</b>

\* 2001/02 data is incomplete

**Inpatient activity by Area Health Service of residence** was identified by number of separations and bed days utilised. A summary table of resident activity is shown in Appendix 4. The data indicated that over the six-year period:

- Residents of South Western Sydney (SWSAHS) and Western Sydney (WSAHS) and Northern Sydney (NSAHS) reported separation rates considerably higher than for residents of other Health Services.
- Bed days utilised, a better indicator of demand, confirms that residents of SWSAHS have highest demand for inpatient burn services with residents of South Eastern Sydney (SESAHS) and WSAHS also reporting high bed day utilisation.

- Bed days utilised by residents has declined for almost all Area Health Services. Bed days utilised by residents of Illawarra have declined by 53% and Western Sydney by 52%. Conversely, bed days utilised by residents of Hunter have increased by 71%.

It should be noted that a component of total separations reported for some Area Health Services of residence is the result of the double counting effect of transfers. This is particularly the case for SWSAHS, which has the highest number of both paediatric and adult transfers to Burn Units.

It should also be noted that bed days utilised refers to activity undertaken in NSW public hospitals only and does not include outflow activity to other states. Whilst this may not be an issue for the majority of Area Health Services, Northern Rivers and Far West Area Health Service demand will be impacted as residents of these Areas with a severe burn injury are usually admitted to Burn Units in Brisbane and Adelaide respectively.

To obtain an alternative indication of burn inpatient activity by Area Health Service of residence, bed days utilised per 10,000 population for patients from 0 – 15 yrs and 15 yrs plus. Paediatric and adult activity has been addressed under the relevant sections of this document.

It is acknowledged that bed days/population is a crude indicator of activity, however, in terms of accounting for the wide variation in activity between Area Health Services, it is considered to be an appropriate proxy indicator.

### 5.3 Adult inpatient activity

In 2001/02 adult inpatient activity represented approximately 50% of total burn separations, 70% of bed days utilised and approximately 74% of the total overnight beds.

**Table 6 Summary of adult inpatient activity 1996/97 to 2001/02**

Activity	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02*
Total separations	1,035	1,084	1,207	1,176	1,341	1,244
Total bed days	9,393	9,858	9,345	8,784	8,353	8,275
Day-only separations	189	212	519	277	382	361
Overnight separations	836	872	688	899	959	883
% Day-only separations	18%	20%	43%	24%	28%	29%
Ave.length of stay (overnight)	11.0 days	11.0 days	12.8 days	9.5 days	8.3 days	8.9 days
Overnight beds equivalent @ 75% occupancy	33.6 beds	35.2 beds	32.2 beds	31.0 beds	29.1 beds	28.9 beds

Over the six-year period 1996/97 to 2001/02:

- The number of separations has shown minimal fluctuation from year to year.
- Bed days utilised has declined by 16% from a high of 9,858 in 1997/98 to 8,275 in 2001/02.
- Overnight burn activity equated to a utilisation of 35.2 beds in 1997/98 to 28.9 beds in 2001/02.

**Inpatient activity by length of stay** shows that in 2000/01 of the 1,341 adult separations:

- 28% were same-day admissions
- 25% had a length of stay of 1 day
- 26% had a length of stay of 2 – 7 days
- 9% had a length of stay of 8 – 14 days
- 11% had a length of stay of 15 days and over.

**Area Health Service of treating hospital** (Appendix 3a) data showed, over the six-year period separations and bed days utilised for Central Sydney and Northern Sydney have increased significantly. Bed day utilisation for Central Sydney has increase by 30% and Northern Sydney by 60%.

**Adult inpatient activity by Area Health Service of Residence** over the six-year period 1996/97 and 2001/02 showed significant fluctuations between years and Area Health Services. Appendix 4a provides as summary of residential Area Health Service demand by separations and bed days. The average annual number of bed days utilised was highest for residents of South Western Sydney, South Eastern Sydney and Central Sydney. Residents of Far West and Greater Murray reported the lowest annual utilisation. It is expected that interstate flows was a factor in this low utilisation.

**Bed days utilised/10,000 population aged 15 years and over** is shown in Table 7. Statewide 17 bed days/10,000 adult population were utilised with a range of 10 bed days for Northern Sydney Area Health Service residents and 48 bed days for residents of Far West Area Health Service.

## 5.4 Paediatric Inpatient activity

In 2001/02-paediatric inpatient activity represented approximately 50% of total burn separations, 30% of total bed days utilised and approximately 26% of the total overnight beds.

**Table 7 Summary of paediatric activity 1996/97 to 2001/02**

Activity	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02*
Total separations	1,492	1,347	1,522	1,416	1,376	1,264
Total bed days	4,641	4,070	3,834	3,496	3,635	3,610
Day-only separations	911	802	1,125	873	822	741
Overnight separations	581	545	397	543	554	523
% Day-only separations	61%	60%	74%	62%	60%	59%
Ave. length of stay (overnight)	6.4 days	5.9 days	6.8 days	4.8 days	5.1 days	5.5 days
Overnight beds equivalent @ 75% occupancy	13.6 beds	11.9 beds	9.9 beds	9.6 beds	10.2 beds	10.4 beds

Over the six-year period 1996/97 to 2001/02 (Table 7):

- The number of separations has declined from 1,492 to 1,264
- Bed days utilised have declined by 28% from 4,641 to 3,610
- Overnight burn activity equated to a utilisation of 13.6 beds to 10.4 beds in 2001/02.

**Inpatient activity by length of stay** shows that in 2000/01 of the 1,376-paediatric separations:

- 60% (822 separations) were same day admissions
- 18% (247 separations) had a length of stay of 1 day
- 16% (216 separations) had a length of stay of between 2 – 7 days
- 3% (47 separations) had a length of stay of between 8 – 14 days
- 3% (44 separations) had a length of stay of 15 days or more.

**Area Health Service of treating hospital** (Appendix 3 b) data showed, that in 1996/97 Children's Hospital at Westmead accounted for 66% of total paediatric separations and 68% of bed days. In 2001/02, the proportion of separations declined to 56% however, the proportion of bed days utilised was unchanged.

**Paediatric inpatient activity by Area Health Service of Residence** fluctuated over the six-year period between years and Area Health Services. Appendix 4b provides as summary of residential Area Health Service demand by separations and bed days. The average annual number of bed days utilised was highest for residents of South Western Sydney, Western Sydney and South Eastern Sydney. Residents of Southern, Far West and Northern Rivers reported the lowest annual utilisation. It is expected that interstate flows was a factor in this low utilisation.

**Bed days utilised/10,000 population aged 15 years and under** is shown in Appendix 12. Statewide 29-bed days/10,000 paediatric population were utilised with a range of 57 bed days for Far West residents and 12 bed days for residents of Southern Area Health Service.

## 6. BURN UNIT INPATIENT ACTIVITY

For the period 1996/97 to 2001/02 inpatient activity for the Burn Units (Concord, Royal North Shore, Westmead and Tamworth Base Hospitals and Children's Hospital at Westmead) has fluctuated overall and shown significant differences between Units (Table 8).

**Table 8 Summary of inpatient activity by Burn Unit, 1996/97 to 2001/02**

		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Concord	Separations	114	115	136	157	215	187
	Bed days	2,486	2,661	3,469	2,537	2,798	3,244
Royal North Shore	Separations	82	88	74	80	99	109
	Bed days	781	1,145	774	1,110	1,254	1,352
Children's Hospital at Westmead	Separations	1,000	734	895	893	816	714
	Bed days	3,188	2,382	2,255	2,353	2,415	2,459
Tamworth	Separations	43	55	54	47	45	43
	Bed days	352	534	426	324	265	249
Westmead	Separations	95	65	68	49	43	30
	Bed days	1,632	1,234	497	305	144	118
<b>Total Burn Units</b>	<b>Separations</b>	<b>1,334</b>	<b>1,057</b>	<b>1,227</b>	<b>1,226</b>	<b>1,221</b>	<b>1,083</b>
	<b>Bed days</b>	<b>8,439</b>	<b>7,956</b>	<b>7,421</b>	<b>6,629</b>	<b>6,969</b>	<b>7,422</b>
Other Hospitals	Separations	1,183	1,374	1,502	1,366	1,496	1,425
	Bed days	5,594	5,973	5,758	5,651	5,019	4,463
<b>TOTAL</b>	<b>Separations</b>	<b>2,517</b>	<b>2,431</b>	<b>2,729</b>	<b>2,592</b>	<b>2,717</b>	<b>2,508</b>
	<b>Bed days</b>	<b>14,033</b>	<b>13,929</b>	<b>13,179</b>	<b>12,280</b>	<b>11,988</b>	<b>11,885</b>

Activity undertaken by the combined Burn Units represented 53% of total burn separations and 60% of total bed days in 1996/97 and 43% of separations and 62% of bed days in 2001/02.

A summary of activity by the individual Burn Units is as follows:

### 6.1 Concord Hospital

Over the five-year period 1996/97 to 2001/02 inpatient burn activity at Concord Hospital (Appendix 6) has reported:

- An increase of 64% in separations from 114 to 187.
- An increase in bed days utilised of 30% from 2,486 to 3,244.
- An increase in same-day separations from 4% to 19%
- An average length of stay (ALOS) for overnight stays of 22.8 in 1996/97 and 21.2 in 2001/02. It should be noted that in 1998/99 ALOS was 31.3 days.
- Activity in terms of beds utilised for overnight patients at 75% occupancy increased from the equivalent of 9.0 beds to 11.7 beds.
- Bed days were utilised by almost residents of almost all Area Health Services in NSW and elsewhere.

## 6.2 Royal North Shore Hospital

Over the five-year period 1996/97 to 2001/02 inpatient burn activity at Royal North Shore Hospital (Appendix 7) has reported:

- An increase of 33% in separations from 82 to 109.
- An increase in bed days utilised of 73% from 781 to 1,352
- An increase in same-day rate of 11% to 15%.
- An increase in average length of stay (ALOS) for overnight stays from 10.6 days to 14.3 days.
- Activity in terms of beds utilised for overnight patients at 75% occupancy increased from the equivalent of 2.8 beds to 4.9 beds.
- The majority of bed days were utilised by residents of Northern Sydney (40%), Hunter (17%) and Central Coast (13%).

## 6.3 Children's Hospital at Westmead

Over the five-year period 1996/97 to 2001/02 inpatient burn activity at Children's Hospital at Westmead (Appendix 8) has reported:

- A decrease in separations by 28% from 1,000 to 714.
- A decrease in bed days utilised by 23% from 3,188 to 2,459.
- A same-day rate of separations from 80% in 1998/99 to 69% in 2001/02.
- A decrease in average length of stay (ALOS) for overnight stays from 10.2 days to 8.9 days. It should be noted that in 1997/98 ALOS was 11.6 days.
- Activity in terms of beds utilised for overnight patients at 75% occupancy declined from the equivalent of 8.8 beds to 8.9 beds.
- Bed days were utilised by almost residents of almost all Area Health Services in NSW and elsewhere.

## 6.4 Tamworth Hospital

Over the five-year period 1996/97 to 2001/02 inpatient burn activity at Tamworth Hospital (Appendix 9) has reported:

- Relatively stable number of separations ranging from 55 in 1997/98 to 43 in 2001/02.
- A decrease in bed days utilised by 30% from 352 to 249.
- A same-day rate of separations from 19% in 1998/99 to 5% in 1996/97.
- A decrease in average length of stay (ALOS) for overnight stays from 8.6 days to 6.2 days. It should be noted that in 1997/98 ALOS was 10.2 days.
- Activity in terms of beds utilised for overnight patients at 75% occupancy declined from the equivalent of 1.3 beds to 0.9 beds.
- Residents of New England accounted for over 90% of bed days utilised. Residents of Far West and Hunter Area Health Service were also admitted for burn injury management.

## 6.5 Westmead Hospital

Over the five-year period 1996/97 to 2001/02 inpatient burn activity at Westmead Hospital (Appendix 10) has reported a significant decline in burn inpatient activity:

- Separations declined by 68% from 95 to 32.
- Bed days declined by 92% from 1,632 to 118.
- The rate of same-day activity increased from 12% in 1996/97 to 49% in 2001/02.

- Average length of stay (ALOS) for overnight stays declined from 19.0 days to 5.3 days. It should be noted that in 1997/98 ALOS was 23.0 days.
- Activity in terms of beds utilised for overnight patients at 75% occupancy declined from the equivalent of 6.0 beds to 0.4 beds.
- Residents of Western Sydney were generally the primary users of inpatient bed days for burn injury.

## 7. SEVERE BURN ACTIVITY

For the purposes of service planning for the management of severe burns in NSW an attempt was made to identify all separations which would have appropriately required admission to a Burn Unit using the following transfer criteria set out in the Burn Transfer Guidelines (p 2):

- *Any intubated patient*
- *Facial or airway burns*
- *Any child with burns > 10%*
- *Burns >20% in adults*

Although separations requiring intubation and ventilation and those with facial and airways burns were identified in the available data the lack of detail in the coding of separations in terms of percentage of total body surface burned made identification of severe burns difficult. Therefore in the absence of any other appropriate suitable criteria the following proxy identifiers were used:

- Intensive care unit hours reported;
- Coded as tracheostomy required;
- Coded as having ventilatory support;
- Death;
- Assigned to high cost complex case (HCCC) DRGs; and,
- Length of stay of greater than 14 days (adults) or with a length of stay of greater than 10 days (children).

The length of stay was chosen to approximate the anticipated timeframe for the re epithelialisation of a partial thickness burn or donor site.

A total of 2,034 separations for the 6-year period met these criteria. Verification of burn severity was undertaken using principal procedure code. All separations had partial thickness or full thickness burns.

**Table 9 Severe burn activity compared with total burn activity, 1996/97 to 2001/02**

	TOTAL BURN ACTIVITY			SEVERE BURN ACTIVITY		
	Separations	Bed days	ALOS (overnight)	Separations	Bed days	ALOS (overnight)
1996/97	2,517	14,044	9.1 days	357	8,491	28.5 days
1997/98	2,431	13,929	9.1 days	311	7,956	28.6 days
1998/99	2,729	13,179	10.6 days	311	7,086	26.7 days
1999/00	2,592	12,280	7.7 days	328	5,918	24.1 days
2000/01	2,717	11,988	7.4 days	382	6,565	22.1 days
2001/02	2,508	11,885	7.7 days	345	7,238	27.3 days
<b>TOTAL</b>	<b>15,494</b>	<b>77,305</b>	<b>8.5 days</b>	<b>2,034</b>	<b>43,254</b>	<b>26.2 days</b>

As a proportion of total inpatient burn activity (Table 9), severe burn activity accounted for 14% of separations and 60% of bed days utilised in 1996/97 and 14% of separations and 61% of bed days in 2001/02:

It should be noted that the *severe burn bed day utilisation also includes bed days utilised in intensive care units*. ICU hours were reported for burn separations from 1996/97 to 2000/01. ICU bed equivalent was calculated at 75% occupancy as follows:

**Table 10 ICU hours reported for burn injury patients, 1996/97 to 2000/01**

	ICU hours Reported	Equivalent ICU beds @ 75% occupancy
1996/97	22,938	3.6 beds
1997/98	25,494	3.9 beds
1998/99	14,971	2.3 beds
1999/00	18,266	2.8 beds
2000/01	23,892	3.6 beds
<b>Average</b>	<b>21,112</b>	<b>3.2 beds</b>

The combined Burn Units proportion of severe burn activity accounted for 55% of severe burn separations and 73% of bed days in 1996/97 and 50% of separations and 77% of bed days in 2001/02 (Table 11).

**Table 11 Burn Units - severe burn activity, 1996/97 to 2000/01**

		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Concord	Separations	51	58	69	70	72	64
	Bed days	2,152	2,406	3,108	2,155	2,280	2,841
Royal North Shore	Separations	19	30	21	32	44	26
	Bed days	566	907	587	904	1,064	1,028
Children's Hospital at Westmead	Separations	83	44	48	52	60	72
	Bed days	1,913	1,388	1,046	1,250	1,442	1,545
Tamworth	Separations	8	20	16	16	13	8
	Bed days	199	395	270	194	165	117
Westmead	Separations	34	28	16	8	7	4
	Bed days	1,361	1,110	309	143	43	32
<b>Total Burn Units</b>	<b>Separations</b>	<b>195</b>	<b>180</b>	<b>170</b>	<b>178</b>	<b>196</b>	<b>174</b>
	<b>Bed days</b>	<b>6,191</b>	<b>6,206</b>	<b>5,320</b>	<b>4,616</b>	<b>4,994</b>	<b>5,563</b>
Other Hospitals	Separations	162	131	141	150	186	171
	Bed days	2,300	1,750	1,766	1,302	1,571	1,675
<b>TOTAL</b>	<b>Separations</b>	<b>357</b>	<b>311</b>	<b>311</b>	<b>328</b>	<b>382</b>	<b>345</b>
	<b>Bed days</b>	<b>8,491</b>	<b>7,956</b>	<b>7,086</b>	<b>5,918</b>	<b>6,565</b>	<b>7,238</b>

Severe burn activity, managed by the Burn Units, has demonstrated an overall decline in separations and bed days utilised over the five-year period but a significant difference between Units. Whereas Concord Hospital and Royal North Shore Hospital have increased severe burn activity, Westmead Hospital's activity has shown a dramatic decline as to be clinically unsustainable as a severe burn service. Tamworth Hospital's severe burn activity must also be considered marginal with only 117-bed day reported in 2001/02.

## 8. COSTING BURN CARE

### 8.1 Cost of Inpatient Burn Care

To derive an indication of the costs associated with the provision of inpatient burn activity the NSW Hospital Cost Data Collection – 2000/01 cost weights were applied to the AR – DRGs. The cost of burn related activity for 2000/01 by AR – DRG is included in Appendix 13.

For the 2,717 separations in 2000/01 the total cost of hospital inpatient burn activity accounted for \$ 13,587,033. Activity and costs for hospital peer groups is shown in Table 21. Activity associated with the following four AR - DRG accounted for 70% of the costs:

- Y01Z – Severe Full Thickness Burns \$ 5,597,196
- Y02A – Other Burn + Skin graft Age > 64/+Csccl/Comp \$ 1,863,331
- Y62B – Other Burn < 65 - Csccl - Comp \$ 1,831,629
- Y02B - Other Burn + Skin graft Age <65/+Csccl/Comp \$ 1,507,884

**Table 12 Inpatient activity cost by hospital peer group, 2000/01**

	Number of Facilities	Total Seps	Bed Days	Total Costs (\$)
A1 – Principal Referral	13	733	5,909	8,423,442
A2 – Paediatric Specialist	2	855	2,630	2,669,583
A3 – Ungroupable - acute	2	14	63	48,601
B1 – Major Metropolitan	12	389	753	508,635
B2 – Major Non-Metropolitan	8	198	810	710,249
C1 – District Group 1	12	163	436	378,523
C2 – District Group 2	28	171	649	413,202
D1a – Community Acute	20	79	289	188,586
D1b	6	18	56	32,785
D2 – Community non-acute	20	34	114	71,881
F3	3	8	16	17,060
F4	18	53	252	118,141
F8 - UNGROUPABLE	2	2	11	6,345
<b>TOTAL</b>	<b>146</b>	<b>2,717</b>	<b>11,988</b>	<b>13,587,033</b>

### 8.2 Cost of Non Admitted and Associated Burn Care

Whilst inpatient burn related activity in NSW could be costed, the cost contribution of other burn related activity, which comprises the continuum of care, is largely unavailable. Non-inpatient activity, which contributes to the overall cost of burn service provision in NSW, includes:

- Emergency department attendances;
- Outpatient attendances;
- Patient transport and retrieval;
- Rehabilitation, and;
- Burn prevention programs

Some but not all of non inpatient burn related activity in NSW is currently reported:

- Emergency Department occasions of service are reported through the Emergency Department Information System (EDIS). Although burn related activity may be obtained through EDIS where the data specificity allows, EDIS does not include a financial capability. Therefore costing of Emergency Department burn related activity is unavailable at this time.
- Outpatient activity and financial data is reported through the Department of Health Reporting System (DOHRS).
- The development of a classification and reporting of rehabilitation is a component of the AN-DRG SNAP (sub acute and non-acute patient) Project. It is anticipated that burn related activity would be included in the ongoing development of this project.
- Patient transfer and retrieval information is reported through Ambulance and the NSW Medical Retrieval Unit and burn specific may be accessed through the Unit.

It is estimated that the level of non-admitted and rehabilitation burn care in NSW is significant in terms of activity, service delivery sites and cost. For many burn patients multiple outpatient attendances are the norm. Patients with severe burns can expect to require frequent outpatient attendances for two years or more. It is anticipated that the non-inpatient component of burn related activity would increase particularly from the shift from inpatient to non-inpatient care. It is therefore suggested that the measurement and costing of this activity is undertaken to facilitate health services planning and resource allocation to burn services.

## 9. FUTURE DEMAND FOR BURN SERVICES

### 9.1 Factors Influencing Demand for Inpatient Burn Services

#### 9.1.1 *Developments in new technologies and patient care*

Developments in new technologies and patient care over the past 20 years have already achieved significant improvements in terms of survival and outcomes for severely burned patients. Improvements in intensive care, surgical techniques, improvements in pain management modalities, nutritional support, development of skin substitutes and the introduction of pressure garments and scar management technologies have been incorporated into the management regime of burned patients in Australia during this period.

The increased survival of individuals with severe burn injuries has, however, created additional demand for hospital and intensive care beds, operating room time and skin substitutes to provide wound coverage. Fratianne et al (1997 p350) have stated that *the greatest challenge in caring for these (severe burn) patients is achievement of permanent skin closure*. Should a suitable skin substitute become generally available for use prior to 2006 it is likely that this will represent the next phase in the management of burn injury patient. Not only will this development enable better outcomes for the patient but also is likely to have considerable impact on decreasing hospitalisation and therefore bed requirements.

#### 9.1.2 *Impact of burn injury reduction strategies*

Education programs and production modification have been suggested as the two principal strategies in the attempt to reduce the incidence of burn injury (Duggan and Quine 1995).

A study conducted by Streeton and Nolan (1997) has found that paediatric burn admissions in Victoria have decreased as a result of the implementation of a number of burn reduction strategies over a 25-year period in that state. The researchers were also able to demonstrate that the reductions of the different types of burns coincided with the introduction of specific legislation, education and safety modification to products.

Children's nightwear flammability standards (1969), banning of fireworks (1982), introduction of Australian National Plumbing Code AS3500 for 50 degree Celsius maximum hot water delivery (1995), mandatory installation of domestic smoke detectors in new homes (1990) and "Hot water burns like fire" burn prevention education program (1985) represent the major burn prevention strategies introduced in Australia. It is important to note that, as all of these strategies were implemented prior to 1995, it is debatable whether further decreases in paediatric burn admissions can be attributed to these initiatives.

The previously mentioned burn injury prevention strategies appear not to have had the impact on adult injury. This is possibly due to the differences in the profile of the paediatric and adult burn populations. Duggan and Quine (1995 p 1995) reported that the most frequently identified characteristics in the profile of burn victims in their NSW study were:

*"a male aged between 25 and 34 years who experienced an 11-20 percent total surface area flame injury whilst using an accelerant to ignite a slow to burn fire or barbecue in a domestic, urban setting. If the person had been working, at the time of the burn event he was likely to be a motor mechanic who had been welding. For drug usage a burn-injured person was more likely to smoke cigarettes, drink*

*alcohol at hazardous levels and take prescribed psychotropic medications than the general population.”*

Unless new burn injury reduction strategies specifically targeting the adult population are developed and implemented it is unlikely that a decline in the incidence of adult burn injury can be anticipated based on burn reduction strategies.

### **9.1.3. Impact of “change in clinical practice” strategies**

Former practice standards have required that patients remained hospitalised until burn wounds were completely healed. Contemporary burn management aims to minimise hospitalisation to enable the patient to return home and continue treatment on an outpatient basis. It can be anticipated that the use of the outpatient clinic for follow-up care including dressing changes for patients with unhealed wounds will increase.

As has been identified for the management of paediatric burns at RAHC a significant decrease in the demand for inpatient burn services has resulted from a deliberate change in management from inpatient to outpatient and ambulatory care.

The lack of sufficient and standardised non-inpatient burn data for the adult population in Australia precludes the quantification of the current level of non inpatient burn activity and consequently the estimation of future demand for inpatient or non inpatient services.

Still et al (1997) have reported on the outcome of a change in clinical practice strategy for the management of adult burns which was a “progressively evolving program to decrease length of stay (LOS)” at Columbia – Augusta Medical Centre in Georgia, USA. The program comprised:

- Early excision (the optimal goal was within 24 hours of injury)
- Increased outpatient care, and
- Aggressive discharge planning

The plan was introduced gradually over a period of 5 years between 1991 to 1995 and the authors found that it resulted in a significant decrease in length of stay for both small burns (less than 25%) and large burns (greater than 25%).

It would be anticipated that the introduction of similar change in clinical practice strategies and a more rigorous implementation of evidence-based medicine into burn management (Childs 1998) would result in a change in the demand for acute burn services.

## **9.2 Inpatient Services for Severe Burns**

The analysis of burn related inpatient activity in NSW public hospitals for the six-year period 1996/97 to 2001/02 has demonstrated that the overall level of inpatient burn related activity has declined. In terms of bed day utilisation activity has decreased from the equivalent of 47 overnight beds in 1996/97 to 40 beds in 2000/01.

As previously discussed in Section 7 adult and paediatric **severe** burn activity represented between 357 separations and 8,491 bed days in 1996/97 and 345 separations and 7,238 bed days in 2001/02.

To obtain an estimation of future bed requirements for severe burns, acute inpatient activity projections based on historical trends in age standardised separation rates (SSR) and length of stay (LOS) are used. The trends are projected forward to provide an estimated separations rate for 2005/06 and 2010/11 and applied to the projected population.

In recognition of the emergency, and often critical, condition of patients with a severe burn injury and the requirement for appropriate and timely admission to a Burn Unit, the assumption has been made in calculating bed requirements that the expected % days per year when total demand is met is 98%. To meet this demand the expected average occupancy would be 70%. As such 70% occupancy has been used to calculate bed requirement.

**Table 13** Projection of severe burn bed requirements

		ACTUAL						PROJECTED	
		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2005/06	2010/11
Bed days	Total	8,491	7,956	7,086	5,918	6,565	7,238	8,431	9,453
	Adult	6,147	6,257	5,612	4,586	4,833	5,404	6,388	6,899
	Paeds	2,453	1,749	1,474	1,334	1,752	1,834	2,043	2,554
Beds @ 70% occ.	Total	33	31	28	23	26	28	33	37
	Adult	24	24	22	17	19	21	25	27
	Paeds	9	8	6	5	7	7	8	10

Based on these projections it has been estimated that the total number of beds required for the management of severe burns in NSW (including any intensive care component) would be 33 in 2005/06 and 37 in 2010/11.

The **paediatric** requirement for the management of severe burns service has been estimated to be 8 beds in 2005/06 and 10 beds in 2010/11.

The **adult** requirement has been estimated to be 33 beds in 2005/06 and 27 in 2010/11.

It is acknowledged that the unpredictability of burn trauma and therefore hospital admissions, and the difficulty in quantifying the potential impact of any new technologies or changes in burn management practices in Australia are factors which will affect the estimation of resources required for severe burns.

In view of the current progress in the acute management of severe burn injury, particularly in relation to development of tissue culture, it is considered appropriate to make recommendations in relation to a planning horizon of 2005/06 and that requirements for severe burns to 2010/11 are addressed at the time of review of this Severe Burn Clinical Service Plan.

**Recommendation 1:**

That a total of 33 beds (inclusive of the intensive care unit component) are allocated to the management of severe adult and paediatric burns in NSW in 2005/06.

**Recommendation 2:**

That a total of 8 beds (inclusive of the intensive care unit component) are allocated to the management of severe paediatric burns in NSW in 2005/06

**Recommendation 3:**

That a total of 25 beds (inclusive of the intensive care unit component) are allocated to the management of severe adult burns in NSW in 2005/06

### 9.3 Recruitment and retention of a skilled workforce

As previously outlined in Section 3, an effective service for the management of severe burns requires the coordination of a large number of personnel from various disciplines. Not only is the care of the severe burn patient physically and psychologically demanding, it demands commitment and the maintenance of an environment that supports the patient through a protracted and often painful hospitalisation.

In terms of meeting the future demand for severe burn services in NSW the maintenance of appropriate level of burn expertise in the medical, nursing and allied health disciplines to manage burn care across the continuum from intensive care through to acute, rehabilitation and ambulatory care is important.

Burns is a relatively small subgroup of the surgical speciality and attracting surgeons to burn care is difficult. Burn surgery positions require a large amount of on-call and subsequent after hours work. The overall management of burn care and, in particular the devastating nature and frequency of surgical procedures is particularly stressful. The current arrangement for medical postgraduate training for burn management in NSW would be greatly enhanced through the introduction of a Registrar Training Scheme.

The recruitment and retention of a skilled burn nursing workforce is similarly important. Unless sufficient number of acute burn patients are managed in a hospital nursing staff are unable to continuously develop expertise in burn management. The importance of maintaining a core of nursing expertise was particularly evident following the 1993 Ash Wednesday bushfires in South Australia. The large number of severely burned patients admitted to Royal Adelaide Hospital and the subsequent prolonged hospitalisation was managed principally by utilisation of experienced Burn Unit nursing personnel. These nurses functioned as hospital wide team leaders and teachers to nurses with little or no burn nursing experience. A study (Fletcher 1987) undertaken to identify the impact of this event on nursing staff at Royal Adelaide Hospital found significant psychosocial responses (post traumatic stress syndrome) reported by nursing staff involved in burn care, which continued for many months.

The increasing survival rate of patients with severe burns and the increasing need for ongoing outpatient and rehabilitation management requires a larger pool of expertise outside the acute care setting. There is a potential that the shift of expertise will deplete the available pool of expertise for the management of acute burns, and therefore affect the effectiveness of service provision.

## 10. FUTURE SERVICE STRUCTURE

### 10.1 Future model of service delivery for burns

A key element of this Plan is the proposed model of service delivery for the management of severe burns in NSW. Its purpose is to provide an organisational framework that supports the future delivery of burn care that is appropriate, effective, reflects world's best practice and reflects the goals and strategies contained in *Strategic Directions for Health*.

The overriding imperative in the development of a model for burn service delivery is to better coordinate the provision of burns services in NSW and to ensure that there is:

- A coordinated approach to emergency response, triage and evacuation of burn victims;
- Appropriate and expeditious admission of the patient with a severe burn to a Burn Unit;
- Efficient and effective provision of acute burn care;
- Appropriate provision of rehabilitation services,
- An infrastructure that supports the appropriate delivery of care for the non severe burn patient at the AHS level, and;
- Appropriate delivery of burn care across the continuum.

In determining an appropriate model of burn service delivery for NSW, consideration has been given to taking advantage of the existing hospital and service infrastructure as much as possible. It is assumed that the public sector will continue to be the principal provider of burn care in NSW and the private sector will provide some non-complex burn care.

It is proposed that the future model for the delivery of burn services in NSW comprises a combination of centralised and decentralised services appropriate for the management of severe and non-severe burns.

These services would be provided within a formalised Statewide framework for paediatric and adult burn services. This is intended to facilitate more effective coordination of pre hospital, emergency and acute care provision. This approach also reflects the prevailing model of burn service organisation used nationally and internationally and would enable the NSW burn service to be better aligned with other similar Statewide services with which burn services interface.

It is anticipated that burn related activity that has historically out flowed to Burn Units in South Australia or Victoria from GMAHS and FWAHS could continue, similarly with outflows to Burn Units in Queensland from NRAHS.

#### **Recommendation 4:**

That a statewide organizational model for paediatric and adult burn services in NSW be established to provide an integrated framework of care.

Because of the nature of severe burns and the complexity of care requirements it is generally recognised that individuals with a severe burn injury should be managed by a hospital with expertise in complex burn management and an appropriate infrastructure of supporting services. These supporting services include emergency, critical care, surgical and rehabilitation. World's best practice severe burn services are provided in dedicated facilities with operating room and intensive care capability.

The American Burn Association and the American College of Surgeons guidelines for the operating of a Burn Centre advise that an activity level of 65 to 70 acute admissions annually and a daily average of four acute burn patients per day would be required to establish or maintain a viable Burn Unit.

In terms of the services for paediatric severe burns, the future projections indicate that one paediatric Burn Unit is sufficient to meet the needs of the population of NSW to 2006. In view of the role RAHC already plays in the management of burns in NSW and that the hospital maintains an appropriate level of acute burn activity it is recommended that the paediatric Burn Unit is retained at RAHC with a complement of 8 beds.

It is proposed that each AHS be able to provide access to a range of non-severe burn services supported by referral to a Burn Unit for severe and complex burn cases. The strategic alliances between hospitals managing burn cases and the Burn Unit should include formal mechanisms for referral of severe burn patients back to the AHS.

**Recommendation 5:**

That a single statewide paediatric unit for the management of severe burns in NSW is appropriate in terms of efficiency and expertise that the service should be retained at Children's Hospital at Westmead.

In terms of provision of severe burn services for the adult population of NSW the reconfiguration of the four Units (Concord, Royal North Shore, Tamworth Base and Westmead) is indicated. The aims of the reconfiguration are to:

- Ensure that the location of the facilities is more appropriately aligned geographically to areas of greatest service demand;
- Redistribute burn beds to maintain service viability;
- Maximise the utilisation of burn management expertise;
- Facilitate the appropriate admission of severe burns to the Burn Unit, and;
- Minimise impact on intensive care beds in hospitals without burn beds.

This Plan has estimated the bed requirements for management of severe adult burns in NSW in 2005/06 to be 25 beds.

Analysis of adult burn activity has identified that Concord Hospital exceeds all other adult hospitals in NSW in terms of separations and bed days utilised. Concord Hospital has a dedicated Burn Unit, a considerable core of burn expertise and the burn service has expressed an interest in expanding the burn service, particularly in relation to the growing need for burn rehabilitation services. The geographically central location of Concord Hospital is appropriate, in terms of the AHSs of greatest demand (SESAHS, WSAHS and SWSAHS). Considerable infrastructure and experience are in place, although investment will be required. It is therefore recommended that an adult Burn Unit is located at Concord Hospital.

The consolidation of all NSW adult severe burn services at one hospital, however, may be disadvantageous to the long-term provision of adult burn services, particularly in terms of risk management. Ensuring adequate capacity in the case of a burn disaster and to ensure that there is an alternative venue for the management of severe adult burns should Concord

Hospital be out of operation for any reason, it would be appropriate for a second adult Burn Unit to be retained.

In addition, a second Unit would facilitate the retention of a large core of burn expertise. Burn services experience challenges in attracting staff from the various disciplines. The recruitment of surgical staff to a burn service is particularly difficult. These positions require a large amount of on-call and subsequent after hours work. The overall management of burn care and in particular the devastating nature and frequency of surgical procedures is particularly stressful. The maintenance of clinical expertise in burn care for nursing staff and allied health personnel is similarly important.

The Royal North Shore Hospital Burn service is already providing a considerable level of service, with an existing infrastructure and appropriately experienced specialist multidisciplinary burn management team. It is therefore recommended that a second adult Burn Unit is retained at Royal North Shore Hospital.

**Recommendation 6:**

That a statewide Burn Unit for the management of adult severe burns in NSW is retained on two hospital campuses – Concord Hospital and Royal North Shore Hospital.

In view of the recommendation that the 25 adult burn beds are required for the management of severe burns in 2005/06 the number of burn beds at Concord and Royal North Shore Hospitals will need to be increased. It is anticipated that the implementation of a statewide strategy will result in additional activity being managed by these hospitals as severe adult burn cases previously admitted to hospitals decline.

It is recommended that Concord Burn Unit bed complement be increased to 17 and the remaining 8 beds be allocated to Royal North Shore. However, this configuration could be given further consideration in terms of optimal design and staffing issues. The resource implications of this proposal will require closer review and determination.

**Recommendation 7:**

That 17 beds are allocated for the management of severe burns in NSW at Concord Hospital and 8 beds at Royal North Shore Hospital.

## 10.2 Management of Non Severe and Minor Burns

In terms of care provision for the adult and paediatric patient with a non-severe burn it is preferable that, as much as possible, this should be provided within the Area Health Service of residence, in accordance with the role delineation of that hospital.

The NSW Health *Burn Transfer Guidelines* and *Management of Burn Injury* documents facilitate decision-making in relation to the need for admission to a Burn Unit and treatment for burn injuries. However, it is proposed that a network of hospitals around the state be established to enable the provision of an appropriate level of care for the non-severe burn patient by hospitals within the AHS of residence.

It is suggested that principal referral, major metropolitan and non metropolitan hospitals currently providing services for non severe burns would appropriately comprise the network since they already contribute significantly to burn care.

**Recommendation 8:**

That a hospital network for the management of non-severe burns is included in the NSW Model of Burn Service Delivery.

In developing a model for the future delivery of burn services in NSW it is important that an organisation or group be identified to take carriage of the coordination and ongoing development of burn services. The establishment of a Statewide Burn Services Advisory Group is considered an appropriate mechanism to achieve this objective.

It is suggested that the Group would have responsibility for facilitating the development of guidelines that address the coordination of burn services in NSW. Through the establishment of the Group links with other services that play a significant role in the response to events with burn victims – fire-fighters, ambulance, retrieval services, trauma, intensive care, accident prevention organisations would be formalised.

Fire-fighters, ambulance and consumer organisations such as Burn Support Groups make a considerable contribution to the provision of burn services in NSW particularly in terms of community burn prevention campaigns and involvement in researching fire and burn management. The representation of these groups on the Advisory Group would formalise their contribution to the provision of burn services.

The Australian and New Zealand Burn Association (ANZBA) is a national professional organisation of over 20 years standing with membership of individuals involved in the burn care including medical, nursing, allied health and other personnel.

Representation from the Association together with representatives from emergency service organisations, critical care organisations, professional colleges, consumer groups and the Department may comprise this Group.

The role of the Advisory Group may include:

- Development of practice standards for the various disciplines involved in burn management in accordance with international and national best practice guidelines;
- Facilitate networking of hospitals providing severe and non severe burns services;
- Facilitate the development of a standardised methodology for data collection and collection of the data;
- Inform and advise government and non government organisations on appropriate aspects of burn management;
- Participate in the development of burn management education programs for clinical, emergency and rehabilitation personnel;
- Inform and advise on priorities for community based burn prevention programs;

- Determine priorities and facilitate research into burn management and prevention;
- Provide input into disaster planning and disaster management as it relates to burn victims; and
- Identify and facilitate collaborative opportunities with the private sector in terms of education, research and burn management.

**Recommendation 9:**

That a NSW Burns Service Advisory Group be established.

### 10.3 Proposed Funding Model for Burn Services in NSW

Despite the high cost of burn services in NSW there has not been a comprehensive costing study performed on this service. It is estimated that the provision of admitted burn related activity costs in the order of \$14m annually. This reflects only a proportion of the total cost for the continuum of care for burn service delivery that, in addition to admitted hospital treatment, incorporates emergency, rehabilitation and outpatient components. The identification of non admitted burn activity (particularly outpatient and rehabilitation) and costs have previously been identified as a specific limitation in relation to the future planning and funding of burn services in NSW.

To date, funding for the provision of all public burn service provision is provided through the global budget allocation to AHSs, which is guided by the Resource Distribution Formula (RDF). The costs faced by major referral centres for treatment of severe burns is reflected in the current RDF though the adjustment made for the flow of patients and the higher costs allocated to principal referral hospitals due to the severity of patients treated. However, this adjustment does not adequately deal with the rehabilitation costs incurred by Burn Units.

In order to support the recommendation to establish a limited number severe Burn Units for adult and paediatric burns, it is proposed that a central pool of funding be established for the provision of these adult and paediatric severe Burn Units.

Before this model can be implemented, detailed costing studies are required for the full range of services provided by designated severe Burn Units and a data collection system is required to report on the level of activity across admitted and non-admitted services delivered through the severe burn units.

This model of funding could be tailored for the RAHC which is already funded outside of the RDF to provide specialist paediatric services on a statewide basis, and where it would be possible to identify a component of that funding for the provision of the paediatric severe Burn Unit.

The source of funding to the central pool would be from a levy on Area and would be allocated each year through a base budget to support projected average annual activity of each of the Burn Units. However, within the funding model there should be a capacity for the Units to raise additional funds in terms of short-term enhancements to meet any additional severe burn activity associated with disaster management.

It is proposed that funding of services for the management of non severe burn would appropriately continue to be funded through the global allocations to Area and managed within the AHS on the expectation that outflows of non-severe burns from the Area would be minimised and any remaining flows would be reflected in the flow adjustment in the RDF.

In relation to role of the proposed NSW Burn Services Advisory Group it is suggested that the Group could take a leadership role in:

- Monitoring of and reporting on expenditure related to the service delivery for severe burn units and requests for additional funding to the system;
- Facilitating good quality studies to better define the provision of care, outcomes and cost effectiveness of care particularly in relation to the management of severe burns; and
- Advise on a mechanism to facilitate the network arrangement between hospitals providing non-severe burn care.

**Recommendation 10:**

That a funding model be developed for the adult and paediatric severe Burn Units which reflects this statewide role. Funding for the management of non-severe burns continues through global budget allocation to the Area Health Service.

## 11. REVIEW OF THE PLAN

Good progress has already been made in relation to the recommendation of this Plan, as the clinicians who have been actively involved in its preparation continue to have a significant role in its implementation.

The Selected Specialty and Statewide Service Plans will be reviewed on a regular basis. It is expected that the Severe Burn Service Plan will be reviewed in 2006. However, changes in clinical practice and technological change will be monitored in order to determine whether a shorter timeframe for review is required.

## **MEMBERSHIP: SELECTED SPECIALTY SERVICES STEERING COMMITTEE**

Dr Amanda Adrian	Director, Private Health Care Branch NSW Health Department
Ms Leonie Baden	Health Services, Technology and Capital Planning Unit, NSW Health Department
Professor James Bishop	Director, Sydney Cancer Centre Royal Prince Alfred Hospital
Mr Ken Brown	Chief Executive Officer South Western Sydney Area Health Service
Dr Vasco de Carvalho	Area Director Medical Services Central Coast Area Health Service
Dr Steevie Chan	Manager, Clinical Services Planning Unit NSW Health Department
Mr Richard Gilbert	Director, Health Services Development Central Sydney Area Health Service
Ms Deborah Green	Chief Executive Officer South Eastern Sydney Area Health Service
Dr Don Holt	Director, Public Health Unit Northern Sydney Area Health Service
Dr Nigel Lyons	Director, Health Services Development Hunter Area Health Service
Mr Alan McCarroll	Chief Executive Officer Western Sydney Area Health Service
Ms Kathy Meleady	Director, Statewide Services Development Branch NSW Health Department
Ms Tineke Robinson	Director, Health Service Development Illawarra Area Health Service
Dr Tony Sherbon	Chief Executive Officer Northern Rivers Area Health Service
Dr Tim Smyth	Deputy Director General, Policy NSW Health Department
Mr Ric Sondalini	Structural and Funding Policy Branch NSW Health Department

## MEMBERSHIP: GREATER METROPOLITAN SERVICES IMPLEMENTATION GROUP

### Membership

Professor Kerry Goulston	Co-Chair, Associate Dean, Northern Clinical School
Mr Jon Blackwell	Co-Chair, CEO, Central Coast AHS
A/Prof. Debora Picone	Deputy Director General, Policy
Dr Garth Alperstein	Community Paediatrician, Central Sydney AHS
Mr Peter Anderson	Member, Wentworth AHS Board
A/Prof Steven Boyages	Director, Research and Clinical Policy, NSW Health
Dr Tony Burrell	Intensive Care Administration, Nepean Hospital
Prof Peter Castaldi	Chairman, Western Sydney Area Health Service Board
Prof Michael Chapman	Professor, Obstetrics and Gynaecology, St George Hospital
Ms Rosemary Chester	Director, Clinical Services, South Western Sydney AHS
Dr Stephen Christley	CEO, Northern Sydney Area Health Service
Mr Chris Crawford	CEO, Northern Rivers Area Health Service
Dr Patrick Cregan	Surgeon, Nepean Hospital
Dr Barry Duffy	Director, Children's Intensive Care, Sydney Children's Hospital
Prof John Dwyer	Chairman, Division of Medicine, Prince of Wales Hospital
Mr Peter Edwards	Consumer Representative
Ms Elizabeth Harris	Centre for Health Equity Training Research and Evaluation
Prof Michael Hensley	Division of Medicine, John Hunter Hospital
Dr Sue Hodgkinson	Director - Department of Neurology, Liverpool Hospital
Mr Michael Hollands	NSW State Comm, Royal Australasian College of Surgeons
Ms Lynne Johnstone	Lecturer, Health Service Management, Charles Sturt University
Ms Gabrielle Kibble	Previous Deputy Chair, NSW Health Council
A/Prof Jerry Koutts	Department of Clinical Haematology, Westmead Hospital
Dr Veronique Lajoie	General Practitioner, Leichhardt General Practice
Ms Karyn McPeake	Chief Executive Officer, Greater Murray AHS
Ms Judith Meppem	Chief Nursing Officer, NSW Health Department
Ms Katherine Moore	Area Director - Occupational Therapy, Central Sydney AHS
Dr Meng Ngu	Director, Gastroenterology Unit, Concord Hospital
Dr Paul Nicolarakis	General Practitioner
Dr Stephen Nolan	Department of Critical Care, Manly District Hospital
Dr Tony O'Connell	Paediatric Intensivist, The Childrens Hospital at Westmead
Dr John O'Donnell	National Director, Clinical Services and Quality, Mayne Health
Prof Carol Pollock	Department of Medicine, Royal North Shore Hospital
Ms Tineke Robinson	Director, Health Services Development, Illawarra AHS
Dr Simon Roger	Medical Director, Division of Medicine, Central Coast AHS
Dr Stephen Ryan	Senior Associate, Hardes and Associates
Dr Tony Sherbon	Chief Executive Officer, Illawarra AHS
Dr Paul Stalley	Orthopaedic Surgeon, Royal Prince Alfred Hospital
Dr Warwick Stening	Director of Neurosurgery, Prince of Wales Private Hospital
Prof John Uther	Cardiologist, Westmead Hospital

### Department Coordination

Kathy Meleady	Secretariat / Director, Statewide Services Development
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## REFERENCES

- American Burn Association & American College of Surgeons (1995), *Guidelines for the operation of Burn Centres*, Bulletin of the American College of Surgeons, 80:10, 34-41
- Brandt, C.P., Yurko, L., Coffee, T., Fratianne, R. (1998), *Complete integration of inpatient and outpatient burn care: Evolution of an outpatient burn clinic*, Journal of Burn Care & Rehabilitation, 19: 406-408
- Childs, C. (1998), *Is there evidence-based practice for burns*, Burns, 24:29-33
- Demling, R.H. (1995), *The advantage of the Burn Team approach*, Journal of Burn Care & Rehabilitation, 16:8, 569 - 572
- DeSanti, L., Lincoln, L., Egan, Demling, R., (1998) *Development of a burn rehabilitation unit: Impact on burn center length of stay and functional outcome*, Journal of Burn Care & Rehabilitation, 19: 414-419
- Duggan, D., Quine, S. (1995), *Burn injuries and characteristics of burn patients in New South Wales, Australia*, Burns, 21:2, 83-89
- Fletcher, J., (1987), *Stress Management*, Intensive Care Nursing, 3(2):56-60
- Greenfield, E., Jordan, B. (1996), *Advances in burn Wound Care*, Critical care Nursing Clinics of North America, 8:2, 203-213
- Hooper, R.A., Knighton, J., Fish, J., Peters, W., (1997), *Use of skin substitutes in adult Canadian burn centres*, Canadian Journal of Plastic Surgery, 5:2, 112-117
- Jerwood, D.C., Dickson, G.R. (1995), *Audit of intensive care burn patients: 1982 - 92*, Burns, 21:7, 513-516
- Mathews, J.J., Supple, K., Calistro, A., Gamelli, L. (1997), *A Burn Centre cost-reduction program*, Journal of Burn Care & Rehabilitation, 18:4, 358-363
- McGregor, J.C. (1998), *Profile of the first four years of the Regional Burn Unit based at St John's Hospital, West Lothian (1992 – 1996)*, Journal of Royal College of Surgeons Edinburgh, 43:45-48
- Monafo, W.W. (1996) *Initial Management of Burns*, The New England Journal of Medicine, 335:21, 1581-1585
- Munster, A.M., Smith-Meek, M., Sharkey, P. (1994), *The effect of early surgical intervention on mortality and cost-effectiveness in burn care, 1978 - 91*, Burns, 20:1, 61-64
- NSW Health Department (1996), *Transfer guidelines for people with burn injury*
- NSW Health Department (1996) *Management guidelines for people with burn injury*
- Richardson, J.D. (1997), *What's new in trauma and burns*, Journal of the American College of Surgeons, 184:210-216
- Saffle, J.R. (1998) *Predicting outcomes of burns*, The New England Journal of Medicine, 388:6, 387-388
- Sarhadi, N.S., Murray, G.D., Reid, W.H. (1995), *Trends in burn admissions in Scotland during 1970 - 92*, Burns, 21:8, 612-615
- Senior, K. (1999), *A positive approach to burn care*. The Lancet, 353, 1248
- Snelling, C.F.T. (1995), *Burn Unit's share of Canada's total burn care*, Journal of Burn Care & Rehabilitation, 15:5, 519-524
- Still, J., Donker, K., Law, E., Thiruvaiyara, D. (1997), *A program to decrease hospital stay in acute burn patients*, Burns, 3:6, 498-500

## GLOSSARY OF TERMS

- BURN INJURY** A Burn Injury is generally defined as a thermal/chemical injury to the skin or other tissues. Burn injury may result from various causes including scald, flame, chemical, contact with heat source, radiation including sunburn, smoke inhalation, electrical including electrocution and flash burn and explosion
- BURN INJURY - EXTENT** The most widely used method of describing a burn injury is in terms of how much of the body's skin surface has been involved. This is expressed as a percentage of total body surface area (% TBSA). The patient's hand (palm plus digits) represents approximately 1% of body surface area. The "Rule of Nines" or the Lund & Browder chart may be used to record the extent and site of injury.
- BURN INJURY - DEPTH** In addition to the extent of burn, the depth of the burn is an indicator of the severity of burn injury and likely progress of the injury. Depth is generally described in terms of partial thickness (either superficial or deep) or full thickness injury. To a large extent the depth of burn is a significant consideration in determining the need for surgical intervention ie. skin grafting.
- BURN INJURY - SEVERITY**
- **Minor.** The patient requires emergency hospital attendance for assessment, treatment regime and initial wound management. Reassessment and wound management is continued on an outpatient basis.
  - **Non severe.** The patient requires hospitalisation for specialist assessment, monitoring of the patient for development of complications and management of more complex and frequent burn dressings. Non-extensive skin grafting may be required. The duration of hospitalisation for the non-severe burn without complication is 10 days or less for children and 14 days or less for adults.
  - **Severe.** The patient requires immediate, intensive and coordinated specialist care from pre hospital admission through the acute recovery phase to post acute care rehabilitation and post discharge rehabilitation and support. Extensive and complex dressings and skin grafting is required. Hospitalisation is generally in excess of 11 days for children and 15 days for adults
- CRITERIA FOR TRANSFER TO BURN UNIT**
- Source : NSW Health Department (July 1996) **Transfer Guidelines for People with Burn Injury**
- Deep burns involving 10% or more of the body surface in adults, or 5% or more of the body surface area in children.
  - Burns to the face, hands, feet, perineum, inner joint surfaces and inhalational injury
  - burns and any of the following: major pre existing disease, suspected child abuse, concomitant injury
  - Electrical and Chemical burns
- BURN UNIT** A specific area within an acute care hospital for the management of patients with severe burn injuries. Requirements include on campus intensive care services, pathology, radiology and surgical services.

## APPENDIX 1 – American Burn Association, Transfer Guidelines

The American Burn Association and the American College of Surgeons recommend transfer to a burn centre for all acutely burned patients who meet any of the following criteria (Questions concerning specific patients should be resolved by consultation with the burn centre physician):

1. Partial thickness burns  $\geq$  20% TBSA in patients aged 10 – 50 years old.
2. Partial thickness burns  $\geq$  10% TBSA in children aged 10 or adults aged 50 years old.
3. Full thickness burns  $\geq$  5% TBSA in patients of any age.
4. Patients with partial or full-thickness burns of the hands, feet, face, eyes, ears, perineum, and/or major joints.
5. Patients with high-voltage electrical injuries, including lightning injuries.
6. Patients with significant burns from caustic chemicals.
7. Patients with burns complicated by multiple trauma in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be treated initially in a trauma centre until stable before being transferred to a burn centre. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols.
8. Patients with significant ongoing medical disorders that could complicate management, prolong recovery, or affect mortality.
9. Hospitals without qualified personnel or equipment for the care of children should transfer children with burns to a burn centre with the capabilities.
10. Burn injury in patients who will require special social/emotional and/or long term rehabilitative support, including cases involving suspected child abuse, substance abuse and so on.

### References

1. American Burn Association: Hospital and prehospital resources for optimal care of patients with burn injury: Guidelines for Development and Operation of Burn Centres. *Journal of Burn Care and Rehabilitation*, 1990, 11:98-104
2. American College of Surgeons: Resources for Optimal Care of the Injured Patients. 1993. 1993 by the American College of Surgeons, p. 64

(May 1996)

**Source:** [http://medstat.utah.edu/kw/ibc/referral\\_criteria/frcontents.html](http://medstat.utah.edu/kw/ibc/referral_criteria/frcontents.html)

## APPENDIX 2 – Activity by AR-DRG

AR-DRG CODE	AR-DRG DESCRIPTION	1996/97		1997/98		1998/99		1999/00		2000/01		2001/02*	
		Separatio	Bed Days	Separatio	Bed Days	Separatio	Bed Days	Separatio	Bed Days	Separatio	Bed Days	Separatio	Bed Days
901Z	Ext O.R. Pr Unrel To Pdx	320	5,028	328	4,987	9	111	12	61	7	39	3	7
902Z	Non-Ext O.R. Pr Unrel To Pdx	1	27										
961Z	Unacceptable Principal Dx											2	16
A06Z	Tracheostomy Any Age Any Cond	5	251	2	100	10	437	2	86	6	184	8	266
A41Z	Intubation Age<16	1	1	2	38					2	23	3	10
B07B	Prphl & Crani Nerv & Oth Pr-Cc			1	28	1	1						
B60A	N-Acute Para/Quad+/-Or Pr+Ccc	1	61	2	14	2	22	1	10				
B60B	N-Acute Para/Quad+/-Or Pr-Ccc			4	17	8	58	3	47	1	1		
B64Z	Delirium	1	16										
B70A	Stroke +Severe/Compl Dx/Proc	1	46										
B76B	Stroke + Other Cc	3	4			1	1					4	10
B80Z	Other Head Injury	1	1										
C02Z	Enucleations & Orbital Procs	1	13										
C62Z	HypHEMA &Med Managd Eye Trauma	26	41	18	51	23	43	11	66	5	10	11	17
C63B	Other Disorders Of The Eye -Cc	1	4			1	1					1	1
D12Z	Oth Ear,Nose,Mouth & Throat Pr							1	7				
D66A	Oth Ear,Nose,Mouth&Thrt Dx +Cc					1	1					1	18
D66B	Oth Ear,Nose,Mouth&Thrt Dx -Cc	2	6	1	3	4	9	5	11	2	2	2	8
E02C	Other Respiraty Sys Or Pr-Csc	1	55									1	38
E40Z	Resp Sys Dx + Ventilator Suppt	1	12	1	24	1	8	2	19			1	7
E62B	Respiraty Infectn/Inflam+Smcc	2	12										
E68Z	Pneumothorax			1	3								
E75B	Ot Resp Sys Dx A<65+Cc/A>65-Cc	2	7	1	4	1	9	1	8			1	1
E75C	Other Resp Sys Dx A<65 - Cc	6	6	1	8	1	1	3	5	2	3	2	2
G45A	Other Gastrpy+N-Mjr Digest Dis									2	40		
G45B	Other Gastrpy+N-Mjr Dig Dis+Sd											1	1
G70B	Other Digestive System Diag-Cc									1	1		
I02A	Mcrvas Tt/Skin Graft+Csc							1	35	2	43		
I02B	Skin Graft -Csc -Hand	1	25					1	16	1	11		
I13C	Humer,Tib,Fib,Ank Pr A<60-Csc							1	3	1	4		
I26Z	Other Wrist, Hand Procedures	1	15										
J61Z	Other Femoral Fractures											1	15
J64A	Cellulitis A>59 + Csc					1	4					2	13
J64B	Cellulitis A>59 -Csc / A<60			1	2	9	31	7	26	1	4	22	127
J65B	Con Tis Mal,Inc Path Frac A<65											1	2
J67B	Moderate Skin Disorders - Csc							3	5	13	21	7	8
P06A	Neo,Admwt >2499G+Sig Or Pr+Mmp									1	8	1	21
P60B	Neo,Admwt >2499G+Sig Or Pr-Mmp	2	2									2	2
P67A	Neo,Admwt >2499G-Sig Or Pr+Mmp					1	3			1	5		
P67B	Neo,Admwt >2499G-Sig Or Pr+Mjp	1	5										
P67C	Neo,Admwt >2499G-Sig Or Pr+Otp	1	5										
P67D	Neo,Admwt >2499G-Sig Or Pr-Prb	3	10					1	9	1	2		
T01A	Or Proc Infect& Paras Dis+Ccc											1	27
T61B	Postop&Posttr Infect A<55-Csc					2	7						
T64B	Oth Infectous&Parstic Dis-Csc											1	5
X01Z	Mic Tt/Skin Grafts Inj Lwr Lmb					1	18						
X02Z	Mic Tt/Skin Grafts Inj To Hand	3	10	1	1	1	3						
X03Z	Mic Tt/Skin Grafts Other Inj	1	14	2	24	1	11						
X04A	Other Pr Inj Lwr Lmb A>59/+Cc	1	26										
X05Z	Other Pr For Injuries To Hand	1	1							3	3		
X06B	Other Pr Other Injuries - Csc	1	1	3	16	3	10			1	1	3	4
X60C	Injuries A<65									2	2		
X62A	Poisng/Toxc Eff Drugs A>59/+Cc			1	4			4	24			1	6
X62B	Poisng/Toxc Eff Drugs A<60 -Cc	3	3	4	4	9	25			3	4	2	3
X64A	Ot Inj,Pois&Tox Ef Dx A>59/+Cc			1	10	3	6	2	2				
X64B	Ot Inj,Pois&Tox Eff Dx A<60-Cc	7	8			5	6	7	4	9	2	2	
Y01Z	Severe Full Thick Burns	27	1,976	35	2,637	48	2,430	51	2,316	57	2,604	40	2,802
Y02A	Oth Burn+Skn G A>64/+Csc/Comp	3	74	4	123	87	2,283	80	1,848	76	1,719	79	1,687
Y02B	Oth Burn+Skn Gr A<65-Csc-Comp	3	89	3	49	176	1,638	179	1,657	207	1,688	207	1,875
Y03Z	Other Or Procs For Other Burns	15	299	17	406	48	398	46	546	48	376	45	252
Y60Z	Burns,Trans Oth Acut Care <5 D	205	245	224	264	281	317	265	294	304	351	299	349
Y61Z	Severe Burns	158	962	174	874	174	939	190	1,216	172	702	160	658
Y62A	Other Burns A>64/+Csc/Comp	126	1,040	132	1,150	143	1,181	151	1,046	146	1,019	162	1,035
Y62B	Other Burns A<65 -Csc -Comp	834	2,877	872	2,479	975	2,466	909	2,240	1,069	2,352	947	2,085
Z01B	Or Pr+Dx Oth Cnt Hlth Srv-Csc	7	11	3	3	1	1	1	1	2	19	3	3
Z62Z	Follow Up Afr Treat-Endoscopy	737	744	592	606	697	701	653	669	566	651	472	479
Z63A	Other Aftercare + Csc					1	2			3	71	1	13
Z63B	Other Aftercare - Csc					2	32			3	10	6	10
Z64B	Oth Fctr Infl Health Stat A<80									2	6		
<b>Grand Total</b>		<b>2,517</b>	<b>14,033</b>	<b>2,431</b>	<b>13,929</b>	<b>2,729</b>	<b>13,179</b>	<b>2,592</b>	<b>12,280</b>	<b>2,717</b>	<b>11,988</b>	<b>2,508</b>	<b>11,885</b>

\* 2001/02 Incomplete data

## APPENDIX 3 – Activity by Area Health Service of Hospital

AREA HEALTH SERVICE OF HOSPITAL		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
<b>Central Sydney</b>	Separations	144	151	168	196	272	247
	Bed days	2,654	2,861	3,593	2,648	2,891	3,412
<b>Northern Sydney</b>	Separations	139	193	172	140	150	170
	Bed days	974	1,432	966	1,277	1,338	1,477
<b>Western Sydney</b>	Separations	170	180	227	167	250	192
	Bed days	1,977	1,464	748	541	473	354
<b>Wentworth</b>	Separations	29	37	46	34	34	55
	Bed days	125	146	134	83	137	55
<b>South Western Sydney</b>	Separations	153	153	160	140	154	173
	Bed days	566	548	533	402	442	523
<b>Central Coast</b>	Separations	65	78	66	52	83	55
	Bed days	253	340	207	197	283	93
<b>Hunter</b>	Separations	93	137	136	150	140	112
	Bed days	582	874	829	984	545	665
<b>Illawarra</b>	Separations	60	72	87	98	77	84
	Bed days	329	279	246	426	337	238
<b>South Eastern Sydney</b>	Separations	124	164	161	160	145	145
	Bed days	640	880	760	601	706	460
<b>Children's Hospital at Westmead</b>	Separations	1,000	734	895	893	821	714
	Bed days	3,188	2,382	2,255	2,353	2,499	2,459
<b>Northern Rivers</b>	Separations	78	77	97	71	79	69
	Bed days	330	342	482	481	301	203
<b>Mid North Coast</b>	Separations	66	62	65	80	64	69
	Bed days	252	205	267	266	283	183
<b>New England</b>	Separations	93	114	100	98	94	95
	Bed days	566	808	531	469	453	451
<b>Macquarie</b>	Separations	53	60	52	58	55	65
	Bed days	206	367	280	255	148	188
<b>Mid Western</b>	Separations	48	60	70	60	91	70
	Bed days	246	390	257	399	325	325
<b>Far West</b>	Separations	35	27	36	33	41	25
	Bed days	218	168	125	169	223	57
<b>Greater Murray</b>	Separations	129	85	140	113	102	119
	Bed days	682	278	781	499	385	404
<b>Southern</b>	Separations	35	46	51	47	65	49
	Bed days	137	148	185	137	192	159
<b>Other</b>	Separations	3	1		2		
	Bed days	108	17		93		
<b>TOTAL</b>	<b>Separations</b>	<b>2,517</b>	<b>2,431</b>	<b>2,729</b>	<b>2,592</b>	<b>2,717</b>	<b>2,508</b>
	<b>Bed days</b>	<b>14,033</b>	<b>13,929</b>	<b>13,179</b>	<b>12,280</b>	<b>11,988</b>	<b>11,885</b>

\*2001/02 data incomplete

**APPENDIX 3 (a) - Adult activity by AHS of Hospital**

AREA HEALTH SERVICE OF HOSPITAL		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
<b>Central Sydney</b>	Separations	137	145	162	189	256	225
	Bed days	2,614	2,837	3,587	2,641	2,902	3,365
<b>Northern Sydney</b>	Separations	106	103	101	99	121	127
	Bed days	897	1,274	863	1,197	1,296	1,397
<b>Western Sydney</b>	Separations	144	124	154	119	154	118
	Bed days	1,946	1,385	77	480	365	280
<b>Wentworth</b>	Separations	19	26	33	32	29	48
	Bed days	97	127	99	81	131	221
<b>South Western Sydney</b>	Separations	78	93	77	89	90	101
	Bed days	415	453	403	293	322	437
<b>Central Coast</b>	Separations	39	40	41	28	57	35
	Bed days	164	261	158	157	232	69
<b>Hunter</b>	Separations	49	81	61	73	88	71
	Bed days	391	658	455	771	425	482
<b>Illawarra</b>	Separations	22	23	51	62	47	49
	Bed days	199	125	169	324	238	148
<b>South Eastern Sydney</b>	Separations	78	106	98	95	85	96
	Bed days	464	655	609	518	542	352
<b>Children's Hospital at Westmead</b>	Separations	10	6	25	9	16	5
	Bed days	36	39	41	178	58	28
<b>Northern Rivers</b>	Separations	47	49	65	47	52	51
	Bed days	251	199	345	396	221	153
<b>Mid North Coast</b>	Separations	39	41	40	46	49	42
	Bed days	202	163	221	171	263	136
<b>New England</b>	Separations	58	71	76	68	54	65
	Bed days	414	620	423	373	338	362
<b>Macquarie</b>	Separations	33	37	34	34	35	45
	Bed days	167	266	219	191	106	142
<b>Mid Western</b>	Separations	33	41	49	44	64	47
	Bed days	212	344	192	344	261	262
<b>Far West</b>	Separations	22	19	18	21	30	16
	Bed days	187	151	79	101	185	35
<b>Greater Murray</b>	Separations	81	49	89	83	66	73
	Bed days	515	216	657	380	310	281
<b>Southern</b>	Separations	27	30	33	36	48	30
	Bed days	114	86	156	95	158	125
<b>Other</b>	Separations	3			2		
	Bed days	108			93		
<b>TOTAL</b>	<b>Separations</b>	<b>1,025</b>	<b>1,084</b>	<b>1,207</b>	<b>1,176</b>	<b>1,341</b>	<b>1,244</b>
	<b>Bed days</b>	<b>9,393</b>	<b>9,859</b>	<b>9,345</b>	<b>8,784</b>	<b>8,353</b>	<b>8,275</b>

**APPENDIX 3 (b) - Paediatric activity by AHS of Hospital**

AREA HEALTH SERVICE OF HOSPITAL		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	Separations	7	6	6	7	16	22
	Bed days	40	24	6	7	16	47
Northern Sydney	Separations	33	90	71	41	29	43
	Bed days	77	158	103	80	42	80
Western Sydney	Separations	26	56	73	48	96	74
	Bed days	32	79	79	61	108	74
Wentworth	Separations	10	11	13	2	5	7
	Bed days	28	19	35	2	6	13
South Western Sydney	Separations	75	60	83	51	64	72
	Bed days	151	95	130	109	120	86
Central Coast	Separations	26	38	25	24	26	20
	Bed days	89	79	49	40	51	42
Hunter	Separations	44	56	75	77	52	41
	Bed days	191	216	374	213	120	183
Illawarra	Separations	38	49	36	36	30	35
	Bed days	130	154	77	102	99	90
South Eastern Sydney	Separations	46	58	63	65	60	49
	Bed days	176	225	151	83	164	108
Children's Hospital at Westmead	Separations	990	728	870	884	805	709
	Bed days	3,152	2,343	2,214	2,175	2,441	2,431
Northern Rivers	Separations	31	28	32	24	27	18
	Bed days	79	143	137	85	80	50
Mid North Coast	Separations	27	21	25	34	15	27
	Bed days	50	42	46	95	20	47
New England	Separations	35	43	24	30	40	30
	Bed days	152	188	108	96	115	89
Macquarie	Separations	20	23	18	24	20	20
	Bed days	39	101	61	64	42	46
Mid Western	Separations	15	19	21	16	27	23
	Bed days	34	46	65	55	64	63
Far West	Separations	13	8	18	12	11	9
	Bed days	31	17	46	68	38	22
Greater Murray	Separations	48	36	51	30	36	46
	Bed days	167	62	124	119	75	123
Southern	Separations	8	16	18	11	17	19
	Bed days	23	62	29	42	34	34
Other	Separations		1				
	Bed days		17				
TOTAL	Separations	1,492	1,347	1,522	1,416	1,376	1,264
	Bed days	4,641	4,070	3,834	3,496	3,635	3,610

## APPENDIX 4 – Activity by Area Health Service of Residence

AREA HEALTH SERVICE OF RESIDENCE		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	Separations	173	156	123	193	186	186
	Bed days	1,035	1,240	1,029	651	689	1,567
Northern Sydney	Separations	216	238	243	198	205	197
	Bed days	1,056	1,272	1,031	872	830	650
Western Sydney	Separations	506	364	429	466	533	401
	Bed days	2,232	1,564	1,106	1,123	1,312	1,066
Wentworth	Separations	126	142	190	116	154	140
	Bed days	567	585	622	338	617	623
South Western Sydney	Separations	434	362	454	381	352	368
	Bed days	1,757	2,051	1,782	1,821	1,456	1,427
Central Coast	Separations	85	123	90	83	111	86
	Bed days	444	508	342	442	722	247
Hunter	Separations	103	134	161	159	172	130
	Bed days	683	986	1,121	1,255	998	1,171
Illawarra	Separations	76	115	108	111	96	96
	Bed days	922	364	615	660	447	430
South Eastern Sydney	Separations	131	192	199	224	195	209
	Bed days	1,121	1,553	1,310	1,384	1,065	1,343
Northern Rivers	Separations	61	65	92	67	53	57
	Bed days	273	319	534	492	266	177
Mid North Coast	Separations	103	75	84	110	85	87
	Bed days	698	398	489	453	478	433
New England	Separations	89	108	99	110	93	86
	Bed days	564	760	507	631	701	522
Macquarie	Separations	53	57	69	58	55	67
	Bed days	341	333	445	288	162	261
Mid Western	Separations	97	81	102	62	118	99
	Bed days	515	689	449	572	449	640
Far West	Separations	41	33	50	37	47	26
	Bed days	288	297	275	198	259	107
Greater Murray	Separations	124	95	136	111	98	111
	Bed days	822	561	893	479	618	408
Southern	Separations	39	51	53	47	66	59
	Bed days	244	214	283	289	310	387
Other	Separations	60	33	47	59	89	103
	Bed days	471	235	345	332	609	426
<b>TOTAL</b>	<b>Separations</b>	<b>2,517</b>	<b>2,431</b>	<b>2,729</b>	<b>2,592</b>	<b>2,717</b>	<b>2,508</b>
	<b>Bed days</b>	<b>14,033</b>	<b>13,929</b>	<b>13,179</b>	<b>12,280</b>	<b>11,988</b>	<b>11,885</b>

\*2001/02 data incomplete

**APPENDIX 4 (a) - Adult activity by AHS of Residence**

AREA HEALTH SERVICE OF RESIDENCE		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	Separations	67	88	65	80	103	77
	Bed days	724	1,075	889	510	531	1,315
Northern Sydney	Separations	81	82	95	76	105	86
	Bed days	645	780	770	612	686	421
Western Sydney	Separations	124	113	138	128	170	143
	Bed days	1,487	883	596	538	713	641
Wentworth	Separations	38	45	72	52	58	65
	Bed days	289	360	405	240	366	464
South Western Sydney	Separations	109	130	113	138	134	132
	Bed days	874	1,572	1,058	1,355	866	859
Central Coast	Separations	53	49	37	38	62	45
	Bed days	256	338	246	338	503	150
Hunter	Separations	51	79	70	82	107	85
	Bed days	516	771	696	1,050	781	835
Illawarra	Separations	33	26	64	65	61	59
	Bed days	771	134	490	535	309	297
South Eastern Sydney	Separations	84	107	108	100	93	121
	Bed days	792	1,102	1,074	907	718	850
Northern Rivers	Separations	36	42	60	49	31	42
	Bed days	203	224	372	405	204	129
Mid North Coast	Separations	39	45	37	50	58	45
	Bed days	381	298	266	247	409	243
New England	Separations	62	60	76	71	57	61
	Bed days	449	497	404	450	492	417
Macquarie	Separations	32	34	41	29	33	43
	Bed days	198	208	328	176	95	157
Mid Western	Separations	43	47	56	42	70	55
	Bed days	409	571	302	432	327	469
Far West	Separations	22	24	25	24	31	13
	Bed days	202	279	170	129	212	74
Greater Murray	Separations	73	47	75	79	59	67
	Bed days	601	411	695	358	467	263
Southern	Separations	33	36	40	36	48	39
	Bed days	228	142	260	244	229	341
Other	Separations	39	30	35	37	61	66
	Bed days	368	214	324	258	445	341
TOTAL	Separations	1,025	1,084	1,207	1,176	1,341	1,244
	Bed days	9,393	9,859	9,345	8,784	8,353	8,275

**APPENDIX 4 (b) - Paediatric activity by AHS of Residence**

AREA HEALTH SERVICE OF RESIDENCE		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	Separations	106	68	58	113	83	109
	Bed days	311	165	140	141	158	252
Northern Sydney	Separations	135	156	148	122	100	111
	Bed days	411	492	261	260	144	229
Western Sydney	Separations	382	251	291	338	363	258
	Bed days	745	681	510	585	599	425
Wentworth	Separations	88	97	118	64	96	75
	Bed days	278	225	217	98	251	159
South Western Sydney	Separations	325	232	341	243	218	236
	Bed days	884	479	724	466	590	568
Central Coast	Separations	32	74	53	45	49	41
	Bed days	188	170	96	104	219	97
Hunter	Separations	52	55	91	77	65	45
	Bed days	167	215	425	205	217	336
Illawarra	Separations	43	89	44	46	35	37
	Bed days	151	230	125	125	138	133
South Eastern Sydney	Separations	47	85	91	124	102	88
	Bed days	329	451	236	477	347	493
Northern Rivers	Separations	25	23	32	18	22	15
	Bed days	70	95	162	87	62	48
Mid North Coast	Separations	64	30	47	60	27	42
	Bed days	317	100	223	206	69	190
New England	Separations	27	48	23	39	36	25
	Bed days	115	263	103	181	209	105
Macquarie	Separations	21	23	28	29	22	24
	Bed days	143	125	117	112	67	104
Mid Western	Separations	54	34	46	20	48	44
	Bed days	106	118	147	140	122	171
Far West	Separations	19	9	25	13	16	13
	Bed days	86	18	105	69	47	33
Greater Murray	Separations	51	48	61	32	39	44
	Bed days	221	150	198	121	151	145
Southern	Separations	6	15	13	11	18	20
	Bed days	16	72	23	45	81	46
Other	Separations	15	10	12	22	35	37
	Bed days	103	21	22	74	162	113
TOTAL	Separations	1,492	1,347	1,522	1,416	1,376	1,264
	Bed days	4,641	4,070	3,834	3,496	3,635	3,610

## APPENDIX 5 – Activity by Treating Hospital

HOSPITAL	1996/97		1997/98		1998/99		1999/00		2000/01		2001/02*	
	Separations	Bed days	Separations	Bed days	Separations	Bed days	Separations	Bed days	Separations	Bed days	Separations	Bed days
Concord	114	2,486	115	2,661	136	3,469	157	2,537	215	2,798	187	2,459
CHAW	1,000	3,188	734	2,382	895	2,255	893	2,353	816	2,415	714	2,459
Royal North Shore	82	781	88	1,145	74	774	80	1,110	99	1,254	109	1,352
John Hunter	50	400	80	571	88	627	89	693	58	378	58	341
Tamworth	43	352	55	534	54	426	47	324	45	265	43	249
Gosford	46	234	60	204	46	134	42	170	58	207	43	81
Liverpool	69	271	60	244	75	268	60	195	56	204	81	263
Wollongong	36	256	38	182	44	108	47	307	40	188	39	131
St Vincents - PU	22	55	34	188	23	158	27	138	32	179	33	87
St. George	41	273	47	234	52	223	50	125	35	155	40	193
Westmead (all)	95	1,632	65	1,234	68	497	49	305	43	144	30	118
Prince of Wales	12	53	12	34	31	220	21	194	17	142	16	45
Sydney Childrens	20	81	30	148	31	85	29	46	35	139	36	104
Blacktown	21	224	35	96	30	80	25	86	97	134	77	109
Nepean	16	53	31	104	38	115	31	70	25	133	49	121
Lismore	24	125	28	134	33	263	19	166	26	128	20	71
Sutherland	24	152	41	276	20	70	23	54	29	128	16	23
Auburn	34	88	22	67	25	55	20	68	24	106	18	50
Bourke	6	40	7	76	13	52	16	85	12	106	5	25
Broken Hill	16	92	9	60	11	45	10	54	21	98	7	9
Mount Druitt	20	33	58	67	103	114	73	82	89	98	67	77
Orange	21	139	16	106	12	50	14	171	26	96	26	104
Wagga Wagga	36	204	25	109	44	252	31	124	26	95	22	111
Campbelltown	20	45	23	49	25	71	27	57	25	89	23	52
Kempsey	21	36	18	59	16	59	19	76	13	87	14	31
Shoalhaven	12	61	23	64	13	23	23	64	19	80	18	39
Maitland	13	22	18	117	11	25	22	45	51	78	11	35
Dubbo	22	101	27	283	21	89	26	173	26	76	35	123
Moree	15	92	12	52	4	16	7	11	13	76	5	20
Blayney	2	5	2	8	1	1	2	6	6	61	5	19
Macksville	8	23	0	0	4	33	5	18	7	56		
Bankstown/Lidcomb	31	85	29	113	23	106	24	86	21	54	26	136
Coffs Harbour	10	34	13	36	22	42	18	38	22	53	26	43
Queanbeyan	3	18	0	0	2	7	0	0	5	50	4	5
Quirindi	1	6	0	0	1	1	1	1	4	50	1	2
Wyong	19	19	16	76	20	73	9	21	23	50	12	12
Albury	19	59	8	16	31	148	23	173	15	49	30	84
Newcastle Mater	4	22	5	53	8	55	13	91	8	47	10	58
Griffith	23	117	8	22	17	130	14	50	14	46	17	51
Royal Prince Alfred	28	165	30	145	21	103	24	78	22	46	35	92
Canterbury	4	11	5	11	11	21	14	24	34	44	23	58
Casino	7	23	7	21	7	16	5	14	3	44	6	10
Murwillumbah	13	71	10	38	7	15	11	69	17	43	10	24
Woy Woy	0	0	1	33	0	0	0	0	3	41		
Cowra	3	23	2	4	5	7	5	30	7	38	2	58
Goulburn	5	32	4	12	13	67	3	8	12	38	4	15
Fairfield	19	83	21	54	16	53	19	22	23	37	21	34
Bathurst	0	0	14	38	21	83	13	57	15	35	13	33
Wauchope	1	1	5	16	3	3	4	39	2	34	2	14
Narrandera	4	7	6	6	3	75	6	35	4	33	5	5
Milton-Ulladulla	4	4	2	2	6	12	4	5	8	32	9	15
Hornsby	17	27	14	48	18	39	22	55	20	29	18	21
Ryde	11	32	8	50	14	17	8	8	11	28	11	29
Pambula	2	8	3	4	5	13	6	7	11	27	4	4
Bega	3	10	6	16	7	32	8	36	6	26	13	61
<b>Sub Total</b>	<b>2,192</b>	<b>12,454</b>	<b>2,030</b>	<b>12,302</b>	<b>2,322</b>	<b>11,775</b>	<b>2,238</b>	<b>10,854</b>	<b>2,394</b>	<b>11,167</b>	<b>2,149</b>	<b>9,765</b>
Remainder	309	1,462	401	1,627	407	1,404	354	1,426	314	719	359	2,120
<b>Grand Total</b>	<b>2,501</b>	<b>13,916</b>	<b>2,431</b>	<b>13,929</b>	<b>2,729</b>	<b>13,179</b>	<b>2,592</b>	<b>12,280</b>	<b>2,708</b>	<b>11,886</b>	<b>2,508</b>	<b>11,885</b>

\* 2001/02 Data incomplete

## APPENDIX 6 – Activity for Concord Hospital

Activity Summary	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Total Separations	114	115	136	157	215	187
Total Bed days	2,486	2,661	3,469	2,537	2,798	3,244
Day-only separations	5	10	26	16	42	36
Overnight separations	109	105	110	141	173	151
% Day-only separations	4%	9%	19%	10%	20%	19%
Average length of stay excl day-only	22.8 days	25.2 days	31.3 days	17.8 days	15.9 days	21.2 days
Overnight beds @ 75% occupancy	9.0 beds	9.7 beds	12.6 beds	9.3 beds	10.2 beds	11.7 beds

Separation by Separation mode	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
1 - Discharged by Hospital	98	92	101	136	176	157
2 - Discharge own risk			4	2	12	6
3 - Transfer to Nursing Home	2	1	4		2	2
4 - Transfer to Public Psychiatric Hospital						
5 - Transfer to other hospital	3	7	12	7	8	14
6 - Death with Autopsy	3	10	9	8	12	6
7 - Death without Autopsy	1					
8 - Transfer to other Accommodation	2	4	6	1	3	1
9 - Type change Separation	5	1		3	2	1
10 - Discharge on leave						
<b>Total</b>	<b>114</b>	<b>115</b>	<b>136</b>	<b>157</b>	<b>215</b>	<b>187</b>

Bed days by AHS of residence	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	414	652	642	391	327	760
Northern Sydney	15	79	311	60	102	63
Western Sydney	257	335	63	123	397	294
Wentworth	58	75	223	99	225	200
South Western Sydney	208	671	509	770	494	379
Central Coast	2	56	105	10	124	35
Hunter	31		157	105	157	133
Illawarra	529	51	292	214	58	131
South Eastern Sydney	312	558	525	268	219	547
Nth Rivers				1	99	6
Mid North Coast	167				60	49
New England				101	184	141
Macquarie	25		89		12	16
Mid Western	55	46	24	54	65	159
Far West			52		5	12
Greater Murray	131	66	185	1	15	
Southern	87	36	87	152	77	183
Other	195	36	205	188	178	136
<b>Total</b>	<b>2,486</b>	<b>2,661</b>	<b>3,469</b>	<b>2,537</b>	<b>2,798</b>	<b>3,244</b>

Bed days by AR-DRG	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
901Z - Ext O.R. Pr Unrel To Pdx	860	1,017	47		22	
A06Z - Tracheostomy Any Age Any Cond	154	100	397		94	6
A41Z - Intubation Age<16						
E02C - Other Respiraty Sys Or Pr-Csc						
Y01Z - Severe Full Thick Burns	841	1,163	1,358	1,129	1,345	1,733
Y02A - Oth Burn+Skn G A>64/+Csc/Comp	39		883	646	580	788
Y02B - Oth Burn+Skn Gr A<65-Csc-Comp			357	348	302	247
Y03Z - Other Or Procs For Other Burns	48	65	1	21	5	29
Y60Z - Burns,Trans Oth Acut Care <5 D	4	3		3	2	3
Y61Z - Severe Burns	164	79	95	147	106	132
Y62A - Other Burns A>64/+Csc/Comp	129	54	128	108	101	72
Y62B - Other Burns A<65 -Csc -Comp	192	148	185	129	188	160
Z62Z - Follow Up Afrt Treat-Endoscopy				5	11	12
Other	55	32	18	1	42	62
<b>Total</b>	<b>2,486</b>	<b>2,661</b>	<b>3,469</b>	<b>2,537</b>	<b>2,798</b>	<b>3,244</b>

## APPENDIX 7 – Activity for Royal North Shore Hospital

Activity Summary	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Total Separations	82	88	74	80	99	109
Total Bed days	781	1,145	774	1,110	1,254	1,352
Day-only separations	9	10	18	8	10	16
Overnight separations	73	78	56	72	89	93
% Day-only separations	11%	11%	24%	10%	10%	15%
Average length of stay excl day-only	10.6 days	14.6 days	13.6 days	15.3 days	14.0 days	14.3 days
Overnight beds @ 75% occupancy	2.8 beds	4.1 beds	2.8 beds	4.0 beds	4.5 beds	4.9 beds

Separation by Separation mode	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
1 - Discharged by Hospital	69	66	60	64	75	85
2 - Discharge own risk		2		1		
3 - Transfer to Nursing Home	1					1
4 - Transfer to Public Psychiatric Hospital			1		1	
5 - Transfer to other hospital	7	11	8	10	18	19
6 - Death with Autopsy	3	4	3	5	4	3
7 - Death without Autopsy		2			1	1
8 - Transfer to other Accommodation						
9 - Type change Separation	2	1	1			
10 - Discharge on leave		2	1			
<b>Total</b>	<b>82</b>	<b>88</b>	<b>74</b>	<b>80</b>	<b>99</b>	<b>109</b>

Bed days by AHS of residence	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	14	70	73	2	76	435
Northern Sydney	385	455	331	437	507	321
Western Sydney	11	17	90	22	13	40
Wentworth	59			56	4	78
South Western Sydney	3	211	64	84	45	53
Central Coast	88	38	4	155	163	51
Hunter	98	120	65	208	209	212
Illawarra		1	19			2
South Eastern Sydney	36	19	59	41	19	9
Nth Rivers						
Mid North Coast	18	115		31	19	46
New England	20	46			24	10
Macquarie	6		15	7		
Mid Western	1		7	35		58
Far West		6	8			
Greater Murray					158	
Southern	9		7	12	16	25
Other	33	47	32	20	1	12
<b>Total</b>	<b>781</b>	<b>1,145</b>	<b>774</b>	<b>1,110</b>	<b>1,254</b>	<b>1,352</b>

Bed days by AR-DRG	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
901Z - Ext O.R. Pr Unrel To Pdx	377	505				
A06Z - Tracheostomy Any Age Any Cond					10	44
A41Z - Intubation Age<16						
E02C - Other Respiraty Sys Or Pr-Csc						
Y01Z - Severe Full Thick Burns	218	280	397	516	543	701
Y02A - Oth Burn+Skn G A>64/+Csc/Comp		91	174	258	398	209
Y02B - Oth Burn+Skn Gr A<65-Csc-Comp			86	52	175	185
Y03Z - Other Or Procs For Other Burns		57	10	57	4	12
Y60Z - Burns,Trans Oth Acut Care <5 D	3	5	7	5	15	14
Y61Z - Severe Burns	53	76	32	56	14	24
Y62A - Other Burns A>64/+Csc/Comp	27	38	2	52	24	64
Y62B - Other Burns A<65 -Csc -Comp	82	71	43	57	69	84
Z62Z - Follow Up Afr Treat-Endoscopy			23			
Other	21	22		57	2	15
<b>Total</b>	<b>781</b>	<b>1,145</b>	<b>774</b>	<b>1,110</b>	<b>1,254</b>	<b>1,352</b>

## APPENDIX 8 – Activity for Children’s Hospital at Westmead

Activity Summary	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Total Separations	1,000	734	895	893	816	714
Total Bed days	3,188	2,382	2,255	2,353	2,415	2,459
Day-only separations	763	579	713	670	580	494
Overnight separations	237	155	182	223	236	220
% Day-only separations	76%	79%	80%	75%	71%	69%
Average length of stay excl day-only	10.2 days	11.6 days	8.5 days	7.5 days	7.7 days	8.9 days
Overnight beds @ 75% occupancy	8.8 beds	6.6 beds	5.6 beds	6.1 beds	6.7 beds	7.2 beds

Separation by Separation mode	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
1 - Discharged by Hospital	994	731	895	890	815	712
2 - Discharge own risk	1	2		2	1	
3 - Transfer to Nursing Home						
4 - Transfer to Public Psychiatric Hospital						
5 - Transfer to other hospital	4					1
6 - Death with Autopsy	1	1		1		1
7 - Death without Autopsy						
8 - Transfer to other Accommodation						
9 - Type change Separation						
10 - Discharge on leave						
<b>Total</b>	<b>1,000</b>	<b>734</b>	<b>895</b>	<b>893</b>	<b>816</b>	<b>714</b>

Bed days by AHS of residence	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	240	117	93	132	134	218
Northern Sydney	336	332	156	188	110	143
Western Sydney	749	644	443	541	546	363
Wentworth	229	194	202	91	170	141
South Western Sydney	730	351	603	480	452	474
Central Coast	98	83	53	65	163	66
Hunter	36		49	3	101	131
Illawarra	21	80	46	17	60	58
South Eastern Sydney	209	266	129	442	210	400
Nth Rivers			36	29	10	7
Mid North Coast	204	62	169	102	57	147
New England		28	41	85	100	35
Macquarie	110	29	56	38	23	60
Mid Western	64	71	84	86	52	104
Far West	24		12	1		3
Greater Murray	73	92	83	2	84	40
Southern		31		1	44	23
Other	65	2		50	99	46
<b>Total</b>	<b>3,188</b>	<b>2,382</b>	<b>2,255</b>	<b>2,353</b>	<b>2,415</b>	<b>2,459</b>

Bed days by AR-DRG	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
901Z - Ext O.R. Pr Unrel To Pdx	1,343	950	34			
A06Z - Tracheostomy Any Age Any Cond	97		17			48
A41Z - Intubation Age<16	1	31				
E02C - Other Respiratry Sys Or Pr-Csc	55					
Y01Z - Severe Full Thick Burns	236	428	409	509	670	368
Y02A - Oth Burn+Skn G A>64/+Csc/Comp	13		72	47	24	95
Y02B - Oth Burn+Skn Gr A<65-Csc-Comp	2		622	761	720	1,060
Y03Z - Other Or Procs For Other Burns	51	52	35		3	2
Y60Z - Burns,Trans Oth Acut Care <5 D						
Y61Z - Severe Burns	118	72	106	99	61	58
Y62A - Other Burns A>64/+Csc/Comp	1		13	8	28	31
Y62B - Other Burns A<65 -Csc -Comp	516	296	301	291	341	324
Z62Z - Follow Up Aftr Treat-Endoscopy	719	544	637	632	525	435
Other	36	9	9	6	43	38
<b>Total</b>	<b>3,188</b>	<b>2,382</b>	<b>2,255</b>	<b>2,353</b>	<b>2,415</b>	<b>2,459</b>

## APPENDIX 9 – Activity for Tamworth Hospital

Activity Summary	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Total Separations	43	55	54	47	45	43
Total Bed days	352	534	426	324	265	249
Day-only separations	2	3	10	4	3	5
Overnight separations	41	52	44	43	42	38
% Day-only separations	5%	5%	19%	9%	7%	12%
Average length of stay excl day-only	8.6 days	10.2 days	9.5 days	7.4 days	6.2 days	6.4 days
Overnight beds @ 75% occupancy	1.3 beds	2.0 beds	1.5 beds	1.2 beds	1.0 bed	0.9 beds

Separation by Separation mode	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
1 - Discharged by Hospital	35	49	53	40	37	36
2 - Discharge own risk		1				
3 - Transfer to Nursing Home				1		
4 - Transfer to Public Psychiatric Hospital						
5 - Transfer to other hospital	5	3	1	6	5	4
6 - Death with Autopsy						
7 - Death without Autopsy		2				2
8 - Transfer to other Accommodation						
9 - Type change Separation	3					1
10 - Discharge on leave					3	
<b>Total</b>	<b>43</b>	<b>55</b>	<b>54</b>	<b>47</b>	<b>45</b>	<b>43</b>

Bed days by AHS of residence	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	4				1	
Northern Sydney						
Western Sydney						
Wentworth						
South Western Sydney				1		
Central Coast	1					
Hunter	7	41	2		7	10
Illawarra						
South Eastern Sydney						
Nth Rivers		13				
Mid North Coast						23
New England	315	397	346	297	245	181
Macquarie		12	9	11	5	15
Mid Western						
Far West	25	66	69	15	5	20
Greater Murray						
Southern		5				
Other					2	
<b>Total</b>	<b>352</b>	<b>534</b>	<b>426</b>	<b>324</b>	<b>265</b>	<b>249</b>

Bed days by AR-DRG	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
901Z - Ext O.R. Pr Unrel To Pdx	240	373		17	4	1
A06Z - Tracheostomy Any Age Any Cond						
A41Z - Intubation Age<16						
E02C - Other Respiraty Sys Or Pr-Csc						
Y01Z - Severe Full Thick Burns				27		
Y02A - Oth Burn+Skn G A>64/+Csc/Comp			117		62	49
Y02B - Oth Burn+Skn Gr A<65-Csc-Comp			143	94	61	68
Y03Z - Other Or Procs For Other Burns	13	75	19	21	34	23
Y60Z - Burns,Trans Oth Acut Care <5 D	1	3	2	7	8	3
Y61Z - Severe Burns	5	18	41	18	17	43
Y62A - Other Burns A>64/+Csc/Comp	17	9	24	28	10	14
Y62B - Other Burns A<65 -Csc -Comp	67	53	70	74	47	48
Z62Z - Follow Up Afr Treat-Endoscopy						
Other	9	3	10	38	22	
<b>Total</b>	<b>352</b>	<b>534</b>	<b>426</b>	<b>324</b>	<b>265</b>	<b>249</b>

## APPENDIX 10 – Activity for Westmead Hospital

Activity Summary	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Total Separations	95	65	68	49	43	30
Total Bed days	1,632	1,234	497	305	144	118
Day-only separations	11	12	28	11	21	9
Overnight separations	84	53	40	38	22	21
% Day-only separations	12%	18%	41%	22%	49%	30
Average length of stay excl day-only	19.0 days	23.0 days	11.7 days	7.7 days	5.6 days	5.3 days
Equivalent overnight beds @ 75% occupancy	6.0 beds	4.5 beds	1.7 beds	1.1 beds	0.4 beds	0.4 beds

Separation by Separation mode	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
1 - Discharged by Hospital	81	50	58	44	37	26
2 - Discharge own risk	4				2	
3 - Transfer to Nursing Home	1				3	1
4 - Transfer to Public Psychiatric Hospital		1		1		
5 - Transfer to other hospital	4	10	5	4		3
6 - Death with Autopsy	3	3	1		1	
7 - Death without Autopsy						
8 - Transfer to other Accommodation						
9 - Type change Separation		1	2			
10 - Discharge on leave	2		2			
<b>Total</b>	<b>95</b>	<b>65</b>	<b>68</b>	<b>49</b>	<b>43</b>	<b>30</b>

Bed days by AHS of residence	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
Central Sydney	138	143				
Northern Sydney	62	47	9	17	1	2
Western Sydney	872	306	274	212	123	91
Wentworth	94	169	48	1	3	
South Western Sydney	174	248	69	70	2	
Central Coast					1	
Hunter			1	1		
Illawarra	40		1			
South Eastern Sydney	37	28	18	1		
Nth Rivers		41				
Mid North Coast			51			
New England						
Macquarie	9					
Mid Western	155	160	1			
Far West	18	20	1			
Greater Murray		72		2	4	
Southern			16			
Other	33		8	1	10	25
<b>Total</b>	<b>1,632</b>	<b>1,234</b>	<b>497</b>	<b>305</b>	<b>144</b>	<b>118</b>

Bed days by AR-DRG	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
901Z - Ext O.R. Pr Unrel To Pdx	617	372		3		
A06Z - Tracheostomy Any Age Any Cond			12			
A41Z - Intubation Age<16						
E02C - Other Respiraty Sys Or Pr-Csc						
Y01Z - Severe Full Thick Burns	643	638	72	7	1	
Y02A - Oth Burn+Skn G A>64/+Csc/Comp			167	140		29
Y02B - Oth Burn+Skn Gr A<65-Csc-Comp		41	60	30	49	14
Y03Z - Other Or Procs For Other Burns	30	80	49	10	8	
Y60Z - Burns,Trans Oth Acut Care <5 D	3	3	4	2	6	4
Y61Z - Severe Burns	71	5	46	33	8	4
Y62A - Other Burns A>64/+Csc/Comp	20	18	2	20	14	12
Y62B - Other Burns A<65 -Csc -Comp	204	76	46	57	49	40
Z62Z - Follow Up Afr Treat-Endoscopy	4	1	1			
Other	40		38	3	9	15
<b>Total</b>	<b>1,632</b>	<b>1,234</b>	<b>497</b>	<b>305</b>	<b>144</b>	<b>118</b>

## APPENDIX 11 – Bed days utilisation per 10,000 adult population

AREA HEALTH SERVICE OF RESIDENCE	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Ave 6 years	Adult Population 2000	Bed days per 10,000 pop
Central Sydney	724	1,075	889	510	531	1,315	841	413,343	20
Northern Sydney	645	780	770	612	686	421	652	644,567	10
Western Sydney	1,487	883	596	538	713	641	810	539,563	15
Wentworth	289	360	405	240	366	464	354	238,961	15
South Western Sydney	874	1,572	1,058	1,355	866	859	1,097	599,861	18
Central Coast	256	338	246	338	503	150	305	229,456	13
Hunter	516	771	696	1,050	781	835	775	428,148	18
Illawarra	771	134	490	535	309	297	423	275,038	15
South Eastern Sydney	792	1,102	1,074	907	718	850	907	649,414	14
Northern Rivers	203	224	372	405	204	129	256	203,926	13
Mid North Coast	381	298	266	247	409	243	307	205,511	15
New England	449	497	404	450	492	417	452	134,752	34
Macquarie	198	208	328	176	95	157	194	77,842	25
Mid Western	409	571	302	432	327	469	418	129,284	32
Far West	202	279	170	129	212	74	178	37,051	48
Greater Murray	601	411	695	358	467	263	466	197,192	24
Southern	228	142	260	244	229	341	241	143,024	17
<b>TOTAL</b>	<b>9,025</b>	<b>9,645</b>	<b>9,021</b>	<b>8,526</b>	<b>7,908</b>	<b>7,925</b>	<b>8,675</b>	<b>5,146,933</b>	<b>17</b>

AREA HEALTH SERVICE OF RESIDENCE SEVERE BURNS	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Ave 6 years	Adult Population 2000	Bed days per 10,000 pop
Central Sydney	521	840	751	297	302	1,164	646	413,343	16
Northern Sydney	409	597	499	373	491	299	445	644,567	7
Western Sydney	1,164	654	334	196	356	323	505	539,563	9
Wentworth	158	268	228	114	277	522	261	238,961	11
South Western Sydney	567	1,231	829	973	597	573	795	599,861	13
Central Coast	162	139	132	201	360	61	176	229,456	8
Hunter	377	398	399	729	574	649	521	428,148	12
Illawarra	659	53	316	366	176	156	288	275,038	10
South Eastern Sydney	550	829	825	481	446	616	542	649,414	8
Northern Rivers	113	42	122	67	103	5	75	203,926	4
Mid North Coast	266	119	103	54	132	130	134	205,511	7
New England	214	256	185	210	266	258	232	134,752	17
Macquarie	98	65	124		9	60	71	77,842	9
Mid Western	271	300	55	157	61	369	202	129,284	16
Far West	53	156	71	15	60	23	63	37,051	17
Greater Murray	187	189	357	24	248	58	177	197,192	9
Southern	124	14	80	140	97	220	113	143,024	8
<b>TOTAL</b>	<b>5,893</b>	<b>6,150</b>	<b>5,410</b>	<b>4,397</b>	<b>4,555</b>	<b>5,486</b>	<b>5,315</b>	<b>5,146,933</b>	<b>10</b>

## APPENDIX 12 – Bed days utilised per 10,000 paediatric population

AREA HEALTH SERVICE OF RESIDENCE	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Ave 6 yrs	Paeds Pop 2000	Bed days per 10,000 pop
Central Sydney	311	165	140	141	158	252	195	79,056	25
Northern Sydney	411	492	261	260	144	229	300	135,123	22
Western Sydney	745	681	510	585	599	425	591	150,435	39
Wentworth	278	225	217	98	251	159	205	74,764	27
South Western Sydney	884	479	724	466	590	568	619	182,856	34
Central Coast	188	170	96	104	219	97	146	63,084	23
Hunter	167	215	425	205	217	336	261	112,583	23
Illawarra	151	230	125	125	138	133	150	72,876	21
South Eastern Sydney	329	451	236	477	347	493	389	126,140	31
Northern Rivers	70	95	162	87	62	48	87	55,398	16
Mid North Coast	317	100	223	206	69	190	184	54,921	34
New England	115	263	103	181	209	105	163	38,441	42
Macquarie	143	125	117	112	67	104	111	24,971	45
Mid Western	106	118	147	140	122	171	134	37,223	36
Far West	86	18	105	69	47	33	60	10,512	57
Greater Murray	221	150	198	121	151	145	164	57,768	28
Southern	16	72	23	45	81	46	47	39,415	12
<b>TOTAL</b>	<b>4,538</b>	<b>4,049</b>	<b>3,812</b>	<b>3,422</b>	<b>3,471</b>	<b>3,534</b>	<b>3,804</b>	<b>1,315,566</b>	<b>29</b>

AREA HEALTH SERVICE OF RESIDENCE SEVERE BURNS	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Ave 6 yrs	Paeds Pop 2000	Bed days per 10,000 pop
Central Sydney	148	32	55	2	47	107	65	79,056	8
Northern Sydney	246	279	65	107	24	71	132	135,123	10
Western Sydney	278	381	169	195	160	124	218	150,435	14
Wentworth	148	98	38	30	130	62	84	74,764	11
South Western Sydney	453	127	249	137	342	309	270	182,856	15
Central Coast	137	59	4	48	151	41	73	63,084	12
Hunter	75	74	186	67	135	232	128	112,583	11
Illawarra	53	50	41	4	68	59	46	72,876	6
South Eastern Sydney	267	299	74	336	191	407	262	126,140	21
Northern Rivers	29		100	48	29	1	41	55,398	7
Mid North Coast	213	51	158	71	7	135	95	54,921	17
New England	52	121	66	109	153	81	97	38,441	25
Macquarie	104	34	69	47	14	50	53	24,971	21
Mid Western	17	50	70	62	44	71	52	37,223	14
Far West	46		35		1	27	27	10,512	26
Greater Murray	116	73	95	16	90	67	76	57,768	13
Southern		20		17	43		27	39,415	7
<b>TOTAL</b>	<b>2,382</b>	<b>1,748</b>	<b>1,474</b>	<b>1,296</b>	<b>1,629</b>	<b>1,844</b>	<b>1,729</b>	<b>1,315,566</b>	<b>13</b>

## APPENDIX 13 – Cost by AR-DRG, 2000/01

AR-DRG	AR-DRG DESCRIPTION	2000/01		Total costs (\$)
		Separations	Bed Days	
901Z	Ext O.R. Pr Unrel To Pdx	7	39	51,372
A06Z	Tracheostomy Any Age Any Cond	6	184	392,295
A41Z	Intubation Age<16	2	23	35,838
B60B	N-Acute Para/Quad+/-Or Pr-Ccc	1	1	5,136
C62Z	Hyphema &Med Managd Eye Trauma	5	10	8,916
D66B	Oth Ear,Nose,Mouth&Thrt Dx -Cc	2	2	3,396
E75C	Other Resp Sys Dx A<65 - Cc	2	3	3,053
G45A	Other Gastrpy+N-Mjr Digest Dis	2	40	5,417
G70B	Other Digestive System Diag-Cc	1	1	1,149
I02A	Mcrvas Tt/Skin Graft+Csccl-Hand	2	43	51,703
I02B	Skin Graft -Csccl-Hand	1	11	12,460
I13C	Humer,Tib,Fib,Ank Pr A<60-Csccl	1	4	4,386
J64B	Cellulitis A>59 -Csccl / A<60	1	4	2,953
J67B	Moderate Skin Disorders - Csccl	13	21	14,658
P06A	Neo,Admwt >2499G+Sig Or Pr+Mmp	1	8	41,432
P67A	Neo,Admwt >2499G-Sig Or Pr+Mmp	1	5	6,477
P67D	Neo,Admwt >2499G-Sig Or Pr-Prb	1	2	2,344
X05Z	Other Pr For Injuries To Hand	3	3	7,484
X06B	Other Pr Other Injuries - Csccl	1	1	2,896
X60C	Injuries A<65	2	2	2,078
X62B	Poisng/Toxc Eff Drugs A<60 -Cc	3	4	4,304
X64B	Ot Inj,Pois&Tox Eff Dx A<60-Cc	4	9	6,760
Y01Z	Severe Full Thick Burns	57	2,604	5,597,196
Y02A	Oth Burn+Skn G A>64/+Csccl/Comp	76	1,719	1,863,331
Y02B	Oth Burn+Skn Gr A<65-Csccl-Comp	207	1,688	1,507,884
Y03Z	Other Or Procs For Other Burns	48	376	237,719
Y60Z	Burns,Trans Oth Acut Care <5 D	304	351	539,746
Y61Z	Severe Burns	172	702	509,593
Y62A	Other Burns A>64/+Csccl/Comp	146	1,019	640,474
Y62B	Other Burns A<65 -Csccl -Comp	1,069	2,352	1,831,629
Z01B	Or Pr+Dx Oth Cnt Hlth Srv-Csccl	2	19	3,092
Z62Z	Follow Up Aftr Treat-Endoscopy	566	651	162,492
Z63A	Other Aftercare + Csccl	3	71	18,178
Z63B	Other Aftercare - Csccl	3	10	6,911
Z64B	Oth Fctr Infl Health Stat A<80	2	6	2,281
<b>Grand Total</b>		<b>2,717</b>	<b>11,988</b>	<b>13,587,033</b>

**Selected Specialty and Statewide Service Plan  
NUMBER FOUR – SEVERE BURN SERVICE**