



**ACI** NSW Agency  
for Clinical  
Innovation

# Model of Care

## NSW Statewide Burn Injury Service



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# FOREWORD

Severe burns are devastating for patients and families and among the most difficult injuries for clinicians to manage. They frequently involve two of the most vulnerable groups in society – young children and the elderly – and often happen at home. All of us want to ensure that these terrible injuries are prevented wherever possible and when they do occur the care we provide is the best we can offer.

This comprehensive Model of Care covers the spectrum from prevention through hospital and acute care to ongoing treatment, rehabilitation and reconstruction. While it is aimed primarily at the State's three specialist burns units, it offers helpful advice for clinicians anywhere confronted with a burn injury.

I would like to extend my appreciation to the members of the NSW Severe Burn Injury Service Implementation Group who developed the initial model, and the ACI Burn Injury Network (Statewide Burn Injury Service) clinicians who have reviewed it with the benefit of the most recent evidence-based research.

I particularly want to acknowledge the burn injury survivors and the doctors, nurses and allied health professionals involved in burn injury care who helped ensure we got it right.

Thank you all very much.



Dr Hunter Watt

*Chief Executive, Agency for Clinical Innovation*

# BACKGROUND

The care requirements of a patient who has sustained a severe burn injury (*NSW Health Burn Transfer Guidelines- NSW Severe Burn Injury Service – 2nd Edition*) are considerable and complex. The initial period of hospitalisation is lengthy and often followed by many months or years of follow-up care and rehabilitation.

In 2006-07, there were 2049 hospitalisations of NSW residents for injuries resulting from burns (including scalds). In recent years there has also been an average of 37 deaths a year from this cause. The rate of hospitalisation for burns was higher for males (36.6 per 100,000) than females (23.9 per 100,000). During this same period 685 patients were admitted to the three NSW Severe Burn Units.

Young children have the highest rates of hospitalisations for burns, followed by elderly people and young males. Burns and scalds in young children often occur in the home and are often caused by hot beverages, hot tap water, and saucepans of hot liquids including fats and oils (Harrison and Steel, 2006). In 2006-07 in NSW, 71% of all burns hospitalisation in 0-4 year olds were for scalds, at the rate of 97.5 per 100,000.

In recognition of the need to plan for a number of more highly specialised health services on a statewide basis, NSW Health, under the auspices of the Selected Specialty Steering Committee, undertook a series of service planning reviews. In 2003 Statewide Services Development Branch of the former Department of Health completed the development of the NSW Severe Burn Services Plan.

The Severe Burn Services Plan proposed the configuration of severe burn services in NSW including the number of burn beds required to meet the needs of the community to 2010/11 and the number and location of Burn Units. There was also a proposal for a funding model for adult and paediatric Severe Burn Units which reflects their statewide role. This proposal remains unmet.

The Plan also recommended the development of an integrated management structure to coordinate the services provided by the Burn Units. This has been achieved by the formation of the ACI Burn Injury Network (Statewide Burn Injury Service).

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# GLOSSARY

ACI	Agency for Clinical Innovation
ACCC	Australian Competition and Consumer Commission
AHPC	Australian Health Protection Committee
AMRS	Aeromedical and Medical Retrieval Service
ANZBA	Australian and New Zealand Burn Association
CEC	Clinical Excellence Commission
CHW	the Children's Hospital at Westmead
CNE	Clinical Nurse Educator
CNC	Clinical Nurse Consultant
CRGH	Concord Repatriation General Hospital
EMSB	Emergency Management of Severe Burns course
GMCT	Greater Metropolitan Clinical Task Force
GMTT	Greater Metropolitan Transition Taskforce
HETI	Health Education Training and Institute
HSFAC	Health Service Functional Area Coordinator
ICU	Intensive Care Unit
MIMMS	Major Incident Medical Management Support course
N2O	Nitrous Oxide
NETS	Newborn and paediatric Emergency Transport Service
NMDA	N-Methyl-D-aspartic acid
NSAI	Non Steroidal Anti Inflammatory
NSW	New South Wales
OFT	Office of Fair Trading
PCA	Patient Controlled Analgesia
RNSH	Royal North Shore Hospital
RRCS	Royal Rehabilitation Centre Sydney
SBSIG	Severe Burn Service Implementation Group
SJS	Steven Johnson Syndrome
TBSA	Total Body Surface Area
TENS	Toxic Epidermal Necrolysis Syndrome

# CHAPTER 1: INTRODUCTION

The Agency for Clinical Innovation (ACI) is a statutory health corporation established in 2010 by the NSW Government in response to the Report of the Special Commission of Inquiry into Acute Care Services in NSW Public Hospitals (the Garling Report).

Built on the foundations established by its predecessors, the Greater Metropolitan Transition Taskforce (GMTT) and Greater Metropolitan Clinical Task Force (GMCT), the ACI engages doctors, nurses, allied health professionals, managers and the wider community in clinician-led networks to design, promote and help implement high-quality, safe and cost-effective care for patients in the NSW health system.

The ACI works closely with the Bureau of Health Information, Health Education and Training Institute (HETI), Cancer Institute NSW and Clinical Excellence Commission (CEC).

ACI has established statewide clinical networks, including the ACI Burn Injury Network (Statewide Burn Injury Service) to provide excellence in burn care through a coordinated approach across campuses in three hospitals. The Statewide Burn Injury Service:

- is the statewide referral service for patients with severe burn injury and is often the most appropriate referral service for other major skin loss disorders/diseases/injury e.g. Toxic Epidermal Necrolysis Syndrome (TENS), Steven Johnson Syndrome (SJS), necrotising fasciitis
- through networking with other hospitals, provides care for patients with non-severe burn injury
- provides clinical leadership and expertise in the management of burn injury and other major skin loss disorders/diseases
- promotes best practice in clinical care, research, data collection and analysis and education
- is supported by a service directorate provided by the ACI

To provide a framework for the provision of burn care across the three campuses a Model of Care has been developed. The NSW Statewide Burn Injury Service Model of Care encompasses the continuum of care from hospital admission and acute care through to rehabilitation and ongoing management. The Model has been designed to address the provision of burn care for adult and paediatric patients. However, where specific requirements for burn care for paediatric patients have been identified, these have been indicated in the relevant areas of the Model.

The initial development of the Model of Care was undertaken by the NSW Severe Burn Service Implementation Group (SBSIG). This is the 2nd edition reviewed by the ACI Burn Injury Network (Statewide Burn Injury Service). Development of the Model of Care included input from medical, nursing and allied health clinicians involved in the care of patients with severe burn injury and burn survivors.

# 2. FRAMEWORK OF THE MODEL OF CARE

## 2.1 Principles of Burn Injury Management

The NSW Statewide Burn Injury Service Model of Care is based on the principle that management of the patient with severe burns comprises four phases (Sheridan 2002)

1. initial evaluation and resuscitation
2. initial wound excision and biological closure
3. definitive wound closure
4. rehabilitation and reconstruction.

## 2.2 Quality and Burn Injury Management

The NSW Health document *A Framework for Managing the Quality of Health Services in NSW* (1999) describes a framework for managing and improving health care quality in the NSW health system. The conceptual basis for the framework, places the consumer at the centre and the providers of health care services are responsible to the patient for treatment, education, health promotion and other health-related services. The framework identifies six dimensions of quality and five cross-dimensional issues.

The six dimensions of quality are:

- safety
- consumer participation
- effectiveness
- access
- appropriateness
- efficiency.

The five cross-dimensional issues are:

- competence of health care providers
- continuity of care
- information management to support effective decision-making
- education and training for quality
- accreditation of health services.

The following sections outline how the Model of Care reflects the quality framework.

### 2.2.1 Safety of burn care

- Patient care is provided in accordance with clinical practice guidelines developed by the ACI Burn Injury Network (Statewide Burn Injury Service).
- The minimisation of infection risk is a priority issue, with infection surveillance mechanisms in place.
- Medical, nursing and allied health staffing levels and expertise are sufficient to maintain safety in management of burn patients.
- The ACI Burn Injury Network (Statewide Burn Injury Service) promotes fire safety and burn injury prevention activities in the community.
- Optimal first-aid management and initial resuscitation of the patient with a severe burn injury are provided.

### 2.2.2 Consumer participation in burn care

- The ACI Burn Injury Network (Statewide Burn Injury Service) adopts a holistic and multidisciplinary approach to patient management.
- The patient, family and carers are central in the decision making process.
- Through the process of 'negotiated care', staff strive to empower patients, their family and carers to manage the consequences of a burn injury.
- Informed decision making for patients and their family and carers regarding treatment options is available at all stages of management, from initial injury to rehabilitation and reconstruction.

### 2.2.3 Effectiveness of burn care

- Clinical practice is guided through the development and use of clinical practice guidelines.
- There is a focus on best practice in burn care, which includes the monitoring of clinical outcomes, clinical variation, conduct of research and conduct of education and training initiatives in relation to burn injury.

- The ACI Burn Injury Network (Statewide Burn Injury Service) uses and promotes the development and measurement of key performance indicators.

## 2.2.4 Access to burn care

- The ACI Burn Injury Network (Statewide Burn Injury Service) uses benchmarked criteria to identify those patients with a burn injury who require admission to a Burn Unit (Burn Transfer Guidelines – NSW Severe Burn Injury Service – 2nd Edition) [http://www.health.nsw.gov.au/policies/gl/2008/GL2008\\_012.html](http://www.health.nsw.gov.au/policies/gl/2008/GL2008_012.html)
- The ACI Burn Injury Network (Statewide Burn Injury Service) provides access to appropriate support services such as medical imaging and clinical laboratories on a 24-hour basis.
- Surgical intervention may be undertaken in accordance with the clinical condition and surgical plan for the individual patient.
- Burn-specific rehabilitation and psychosocial care are an integral part of the ACI Burn Injury Network (Statewide Burn Injury Service).
- Specialist care is ongoing according to the patient's needs.

## 2.2.5 Appropriateness of burn care

- The ACI Burn Injury Network (Statewide Burn Injury Service) uses a documented and multidisciplinary plan of care for the individual burn patient.
- Interventions are performed to agreed and evidence-based indications.
- Appropriate service evaluation is undertaken to identify unmet need as well as overuse of treatment.
- The appropriateness of clinical practice guidelines and the provision of care is regularly reviewed.

## 2.2.6 Efficiency of burn care provision

- The ACI Burn Injury Network (Statewide Burn Injury Service) collects relevant clinical and other data and uses these data to monitor its efficiency.
- There is an emphasis on early intervention to minimise the risk of complications.
- The provision of a seamless model of burn care enables

the patient to efficiently move from acute care to rehabilitation, step-down facility and ambulatory care.

- The ACI Burn Injury Network (Statewide Burn Injury Service) utilises a coordinated approach to discharge planning, including the need for future reconstructive surgery.
- The ACI Burn Injury Network (Statewide Burn Injury Service) is engaged in investigating opportunities for the introduction of new technologies that increase efficiency and effectiveness of patient care.

## 2.2.7 The burn team

- To provide optimum outcomes for a patient with a severe burn injury, a team of health care professionals with a range of expertise is required. The multidisciplinary team approach is a hallmark of current and best-practice burn management. The burn team includes relevant medical staff including surgeons (eg plastic, paediatric, trauma), anaesthetists, intensivists and psychiatrists as well as nursing and allied health personnel.
- The patient is admitted under the primary care of a Burn Surgeon and as necessary may be under joint care with other specialists.
- The nature of severe burn injury frequently necessitates inclusion of other health care professionals in the management of the burn patient. The burn team has 24-hour access to a range of clinical specialties and support services including:

- Acute and chronic pain
- Anaesthetics
- Cardiology
- Cardiothoracic surgery
- Ear Nose and Throat
- Gastroenterology
- General Medicine
- Geriatric Medicine
- General surgery
- Haematology
- Infectious disease
- Intensive Care
- Renal Medicine
- Neurology
- Neurological surgery
- Obstetrics/gynaecology
- Ophthalmology
- Orthopaedic surgery
- Pathology
- Psychiatry
- Clinical Psychology
- Pulmonary
- Radiology
- Urology
- Rehabilitation Medicine
- Peer Support
- Drug and Alcohol

## 2.3 Clinical pathways and clinical practice guidelines

- The adoption of a standardised Model of Care by the ACI Burn Injury Network (Statewide Burn Injury Service) aims to achieve the best possible patient outcomes based on contemporary burn practice.
- Whilst the Model of Care provides the clinical and organisational framework for the service, the development and implementation of clinical pathways and clinical practice guidelines will define the individual care requirements for the patient with a severe burn injury.
- Clinical Practice Guidelines are available on the ACI Burn Injury Network (Statewide Burn Injury Service) web site.
- The development of the clinical practice guidelines is supported by a program of ongoing review.

## 2.4 Research

Research incorporating basic science and clinical studies is part of an ongoing burns research program across the ACI Burn Injury Network (Statewide Burn Injury Service).

### 2.4.1 Data collection

- The availability of consistent and reliable data is imperative for the effective implementation of the Model of Care and its ongoing success.
- A minimum dataset has been developed to capture relevant activity and clinical data to facilitate the monitoring of care, measurement of outcomes, clinical variation and performance indicators and to inform burn injury prevention strategies and programs.
- The ACI Burn Injury Network (Statewide Burn Injury Service) contributes data to the Australian and New Zealand Burn Association Bi-National Burn Registry.
- Data collection and management is supported by data clerks and data manager positions.

## 2.5 Teaching

- The ACI Burn Injury Network (Statewide Burn Injury Service) promotes a culture of teaching and learning. Each of the Burn Units is actively involved in education programs within the community and for non burn care health professional groups.
- The ACI Burn Injury Network (Statewide Burn Injury Service) recognises the Emergency Management of Severe Burns (EMSB) course as being integral to emergency burn education. The network aims to facilitate the attendance of nurses, allied health and all medical officers to complete this course within 12 months of their appointment to a Burn Unit.
- The need for ongoing professional development for burns nursing and allied health staff including (where appropriate) the acquisition of tertiary qualifications is recognised. Training for specialist burns care staff is provided by on-the-job training and burn care courses developed and run by the ACI Burn Injury Network (Statewide Burn Injury Service).
- In addition to providing education for health care professionals, the network is involved in the provision of community education focused on the importance of prevention and appropriate first aid measures. Liaison with authorities such as the Fire and Rescue NSW, WorkCover, Kidsafe, the Australian Competition and Consumer Commission (ACCC) and the Office of Fair Trading (OFT) assists with development in this area.

## 2.6 Quality and accreditation

- Evaluation of clinical and management performance is a critical element in the provision of quality care by the ACI Burn Injury Network (Statewide Burn Injury Service).
- Of critical importance is the commitment of Local Health Districts to quality and continuous improvement through the attainment of accreditation by approved external bodies, in accordance with the NSW Health Quality Framework.
- The ACI Burn Injury Network (Statewide Burn Injury Service) is involved in and contributes to the Bi-National Burn Registry which includes quality indicators that reflect structural issues, process and outcomes for burn patients. The aim is to achieve improvements in care and the processes by which patient care is provided.

- The ACI Burn Injury Network collects clinical outcome measures for patients treated as in- and outpatients in the three Burn Units. These are reported on and practice reviewed.

## 2.7 Telehealth

- NSW Telehealth has an extensive network to over 280 facilities, which supports 35 clinical services. The use of telehealth connects patients, carers and health care providers, improving access to quality public health care, particularly in rural and remote parts of NSW. Telemedicine is about utilising telecommunications in image transfer and videoconferencing to improve access to quality health care.
- The use of Telehealth to support the early assessment and management and ongoing post acute care of burn injured patients should be utilised. Currently email consultation services are set up at the three acute Burn Units for these purposes.

## 2.8 Production of cultured skin substitutes

- An important aim of the Model of Care is improvement in patient outcomes, particularly survival of patients with massive burn injury, faster recovery from burn injury, and improved functional and cosmetic result.
- A cultured skin cell laboratory has been established at Concord Hospital to produce skin substitute material. The laboratory engages in the production of cultured keratinocytes (Sood 2010) to supply the three Burn Units of the ACI Burn Injury Network. The skin laboratory team communicates, educates and supports the multidisciplinary teams within the network.
- Further development and research in tissue engineering will be ongoing and assessed by the ACI Burn Injury Network (Statewide Burn Injury Service).
- The skin laboratory is required to meet Therapeutic Goods Administration (TGA) regulatory standards.

## 2.9 Burn disaster planning and management

- Burn injury is one of the most common injuries to occur in a mass casualty situation (Chim 2007).
- Therefore, during the planning and response to a disaster, trained burns specialists should be involved (Phua 2010).
- To facilitate this process, involved burn specialists must have disaster management training, and understand their responsibilities in an emergency situation. Any burns staff to be deployed in a disaster situation would have completed the Emergency Management of Severe Burns (EMSB) course and a Major Incident Medical Management Support (MIMMS) course or equivalent.
- Each Burn Unit is required to have a local hospital disaster plan with an annex relating to severe burn. Each Burn Unit will be guided by their hospital disaster plans. If NSW burn casualties exceed the capacity of the Burn Units, it may be necessary to activate the National Mass Casualty Plan. This decision would be made by the State Health Service Functional Area Coordinator (HSFAC), Medical Controller in consultation with the Chief Health Officer, Australian Health Protection Committee (AHPC).

## 2.10 Burn injury prevention

- The ACI Burn Injury Network (Statewide Burn Injury Service) is to have a burn prevention officer who will lead and provide direction in implementing burn prevention strategies. To achieve this, the officer will consult and collaborate with other NSW health promotion providers such as Kidsafe, NSW Health and Fire and Rescue NSW in addition to national and international burn prevention groups. The officer will also liaise with authorities such as WorkCover, the Australian Competition and Consumer Commission (ACCC) and the Office of Fair Trading (OFT). The prevention officer will utilise data obtained from the ACI Burn Injury Network (Statewide Burn Injury Service) clinical database to develop targeted prevention programs, and contribute to the analysis and evaluation of prevention outcomes from the programs, and will also participate in whole-of-government planning initiatives regarding burns prevention at clinical and community level, where appropriate.

# 3. ACUTE CARE MANAGEMENT

## 3.1 Admission to NSW Burn Units

Appropriateness of admission to the Statewide Burn Injury Service is based on criteria outlined in the NSW Health Burn Transfer Guidelines - NSW Severe Burn Injury Service – 2nd Edition. Initial emergency care for severely injured burn patients is also outlined in this guideline: [http://www.health.nsw.gov.au/policies/gl/2008/GL2008\\_012.html](http://www.health.nsw.gov.au/policies/gl/2008/GL2008_012.html)

These criteria are consistent with those of the Australian and New Zealand Burn Association and the International Society for Burn Injuries:

- partial thickness burns in adults >10% TBSA
- full thickness burns in adults > 5% TBSA
- partial/full thickness burns in children >5% TBSA
- burns to the face, hands, feet, genitalia, perineum and across major joints
- chemical burns
- electrical burns including lightning strikes
- burns with concomitant trauma
- burns with associated inhalation injuries
- circumferential burns of the limbs or chest
- burns in patients with pre-existing medical disorders that could adversely affect patient care and outcomes.
- suspected non-accidental injury including children, assault or self-inflicted
- pregnancy with cutaneous burns
- burns at the extremes of age – infants and frail elderly
- patients with major skin loss (disorder, disease, injury) will also be considered for admission to the burn unit for appropriate management.

Limitations: Treatment in a specialist Burn Unit is not required for patients suffering inhalation injury without cutaneous burns.

- Admission to the Burn Unit may occur through:
  - direct presentation by the patient to the Emergency Department
  - contact of the Burn Unit by referring hospital or doctor
  - contact of the Burn Unit by the Ambulance Service of NSW
  - contact of the Burn Unit by the NSW Retrieval services; Aeromedical and Medical Retrieval Services (AMRS) or Newborn and Paediatric Emergency Transport Service (NETS)
  - direct contact with the Burn Unit at Children’s Hospital at Westmead
  - Contact with the ACI Burn Injury Network (Statewide Burn Injury Service) via email/photo referral system.
- Initial assessment of the patient is undertaken in the Emergency Department. Transfer to the Burn Unit or Intensive Care Unit is undertaken in accordance with the Admission Guidelines for the individual Burn Unit.
- Immediate contact is made with the surgical/plastic surgery/burns registrar/Fellow on call, to coordinate treatment.
- Admission or transfer of a burn patient is only accepted following consultation with the plastic surgery/burns registrar/Fellow. In the event that the plastic surgery/burns registrar is not contactable, the specialist on call will be contacted. If the specialist on call is not responding, the Medical Director of the Burns Centre is to be contacted.

The individual who accepts the admission is responsible for ensuring that the Burn Unit and Emergency Department are notified and that the ICU is involved in the admission process where relevant.

## 3.2 Assessment of the burn injury

- For a patient with a severe burn injury, as with any trauma patient, prompt and accurate assessment is crucial. The initial assessment of the patient therefore involves ensuring that airway, ventilation and circulation are not compromised.
- The magnitude of the burn injury is largely dependent on the extent of total body surface area (TBSA) involved, depth of the burn, age of patient, co morbidities and the presence of inhalational injury.
- The recent trend to early surgical intervention in the management of severe burns has increased the need for accurate and early prediction of burn depth. The determination of depth of burn injury has historically been based on expert clinical assessment. To facilitate more precise assessment of burn injury, Laser Doppler technology has been introduced (Kim 2010) (Mill 2009).
- Based on the initial assessment, a plan of care is developed and documented for each patient. The burn team undertakes monitoring of the patient's condition and review of the plan of care on an ongoing basis including formal case management meetings.

## 3.3 Burn wound management

- Necrotic burnt tissue provides an environment for the proliferation of micro-organisms exposing the patient to the risk of infection, delayed healing and complications. As such, meticulous attention is paid to the management of the burn wound.
- Burn wound management is based on the principles that:
  - burn wound dressings are applied to provide a local environment which optimises healing and minimises discomfort
  - the range of products used includes silver impregnated dressings, petroleum-based dressings, semi-permeable membrane dressings, absorptive dressings, dressings impregnated with anti-microbials, hydrocolloid dressings, retention dressings, topical negative pressure dressings and others
  - systemic antibiotics will be used only when specifically indicated and in consultation with Infection Control personnel.

- Burn wound care is complex, time-consuming and a painful procedure, particularly for those patients with an extensive burn injury. As such, nursing staff who are experienced in the management of severe burn injury undertake burn care and dressing changes.

## 3.4 Pain and symptom management

- Severe burn injury and major skin loss cause severe pain. The nature of burn care frequently involves protracted surgical and non-surgical procedures which also cause episodes of increased pain. Commonly, patients experience longstanding pain or ongoing parasthetic sensations in their wounds for many years following injury.
- Pain management is integral to the care of the burn patient and patients admitted to the NSW Burn Units are provided with a comprehensive pain management service incorporating a range of management modalities. The Pain Management Services at Concord Hospital, Royal North Shore Hospital and Children's Hospital at Westmead provide a consultancy service to the Burn Units that focuses on catering for the needs of each individual patient.
- A range of therapeutic approaches to the management of acute pain are provided, for example:
  - Opioids given intravenously, continuous, patient controlled analgesia (PCA), slow release, transdermal, trans-mucosal eg morphine, fentanyl, endone, oxynorm, fentanyl patch
  - N-Methyl-D-aspartic acid (NMDA) receptor antagonist eg ketamine
  - Non steroidal anti inflammatory (NSAI) eg oral and/or rectal paracetamol
  - Inhalational anaesthetics eg N2O, methoxyflurane
  - Local, block and regional anaesthetics
  - Anti anxiolytics eg midazolam
  - Antidepressants and/or anticonvulsants for chronic pain eg dopamine, gabapentin
  - Non pharmacological eg massage, music
- In addition to acute pain management, patients are provided with treatment for chronic and neuropathic pain.
- Complementary therapies and non-pharmacological pain relief also play an important role in pain

management and could include distraction or diversion activities, relaxation and hypnosis.

- The management of symptoms of pruritis associated with wound and skin graft healing is a particular challenge following burn injury. The NSW Burn Units employ treatment options such as antihistamines, topical applications and vibration.
- The ACI Burn Injury Network (Statewide Burn Injury Service) actively seeks new drugs, or innovative methods, to improve patient comfort from the symptoms of pruritis.

## 3.5 Surgical intervention

Access to burn surgery is predicated on the condition of the patient and on the burn wound. There must be 24-hour access to operation rooms. As such the recommended approach to surgical management of the burn patient is as follows:

- Emergency surgery within 24 hours post-burn injury to prevent complications associated with deep circumferential burns or deep muscle damage, including involving constricting eschar (dead skin tissue) or fascia.
- Complete early excision of the necrotic burn tissue within 1- 5 days post-injury and coverage with a skin graft or skin substitute.
- Secondary wound coverage.
- Reconstruction and scar revision.

### 3.5.1 Within the first 24 hours post-injury

The requirement for urgent surgical intervention within the 24 hours post-burn injury may involve:

- Surgical division of constricting necrotic tissue (escharotomy) associated with circumferential burns. Escharotomy of the torso is performed to minimise restriction of chest movement and lung ventilation.
- Similarly, escharotomies are performed for circumferential deep burns of extremities, including digits, to minimise compromise to blood flow.
- Fasciotomy (surgical division of the fascia) in the case of deep burns involving underlying tissue and muscle. This type of extensive injury is generally the result of high-voltage electrical burns.

- The nature of emergency surgery necessitates skilled surgical staff and priority access to operating room facilities. Missed diagnosis, delay in surgical intervention or inadequately performed escharotomy or fasciotomy can jeopardise patient outcomes including irreversible nerve and muscle damage (Yowler et al 2001).

### 3.5.2 Within 1- 5 days post-injury

- Early excision of the necrotic burn tissue and coverage with a skin graft or skin substitute has become the gold standard for the management of deep partial thickness and full thickness burns (Chang et al 2010).
- There may be exceptions where clinical judgement may justify delay of excision depending on special areas of the body such as palms of hands and soles of feet.
- Initial surgery is undertaken as soon as the patient's condition has stabilised. The aim of the surgery is to remove (debride) as much of the burn eschar as possible and provide wound coverage.
- Wound coverage is best achieved by harvesting the patient's own skin (autograft) and this is the preferred treatment. However, patients who have sustained deep burns involving large areas of body surface (in excess of 40%) may have insufficient area of available donor sites to achieve total wound coverage. Surgical techniques, such as meshing of split skin grafts, offer limited increase in wound coverage.
- Skin substitute materials, including commercial bioengineered or similar artificial products, as well as cultured epithelial autograft (CEA) may be used within the NSW Burn Units as a means of providing wound coverage.

### 3.5.3 Five days and greater post-injury

- Depending on the condition of the patient and the extent of surgical intervention, serial sessions of surgery may be necessary to attain total wound coverage in the following weeks.
- Although relatively uncommon, upper and lower extremity amputations are occasionally required after deep flame burns, electrical burns or because of associated trauma such as motor vehicle accident or explosion.

### 3.5.4 General considerations relating to burn surgery

- Access to operating theatres
  - 24-hour access to an emergency operating theatre and theatre staff is required to undertake surgery on major burns under general anaesthetic in the acute phase including escharotomy, burn excision and wound closure, including skin grafting.
  - Daily access to dedicated burns operating theatre and staff is required for debridement, and/or wound closure of acute burn wounds under general anaesthetic on a non-emergency basis.
  - The aim of the ACI Burn Injury Network (Statewide Burn Injury Service) is to provide a burns operating theatre co-located with the Unit, in accord with world's best practice.
- Surgery for severe burn injury is a significant challenge for the Burn Team. Burn surgery is a significant physiological trauma for the patient and is often associated with:
  - Significant blood loss as a consequence of extensive burn-wound debridement and harvesting of donor skin. Availability of blood products is essential.
  - Intraoperative hypothermia as a consequence of skin loss and the patient's decreased ability to maintain body temperature, combined with exposure of debrided wounds. Provision of an environment and equipment to maintain the patients body temperature is essential.
- Perioperative care of patients with severe burn injury requires cross-disciplinary planning and organisation of surgical, anaesthetic, haematological and intensive care personnel. This is particularly important for those patients who have surgery commenced while being managed in the Intensive Care Unit.
- Perioperative management of severe burn injury includes post-procedural application of dressings. These procedures are often extensive, complex, painful and labour-intensive. The requirement for positioning and splinting frequently requires the expertise of the burn physiotherapist or occupational therapist in the surgical team.

### 3.6 Infection control

- A major clinical focus in the management of severe burns is infection control. Patients with burn injuries are at a high risk of infection.
- The aim is to give maximum protection of patients with a large area of skin injury utilizing purpose-designed isolation rooms in the Burn Units.
- The Burn Team maintains close liaison with microbiology and infection control personnel, particularly in relation to the maintenance of patient-related and environmental infection control programs.
- Patient-related infection control programs include routine swabs of all patients on admission to the Burn Unit (or transferring from ICU) and at weekly intervals.
- Environmental infection control programs include routine swabbing of the patient's immediate accommodation areas including bed, mattress, physiological monitoring equipment, bath and/or shower facilities and therapy equipment.

### 3.7 Medication and pharmaceutical

- The provision of medications and pharmaceutical products for the patient with a severe burn injury may include:
  - Analgesics for background, breakthrough and procedural pain, acute, chronic and neuropathic pain
  - Antibiotics for the prevention and treatment of infection if indicated by microbiology results
  - Electrolyte and vitamin supplements
  - Medications to reduce pruritis
  - Antidepressants as required prescribed by treating psychiatric team members
  - Medications required for patients undergoing withdrawal from nicotine, alcohol and other drugs
  - Aperients
  - Antiemetics
  - Proton Pump inhibitors eg Somac®

- The Burn Team works closely with the pharmacist in the management of patient care. The role of the pharmacist includes:
  - Daily review of medication charts to minimise risk of drug interaction, currency of orders and adequate supply of medications
  - The regular provision of information to the patient, carer and family regarding medication regimens during the admission and on discharge
  - Provision of medications on discharge.
  - Assistance with Therapeutic Goods Administration (TGA) approval for certain medications eg Sulfamylon®.

## 3.8 Case management

Case management is an integral process which coordinates continuity of care and should begin with the admission of the patient. It has been found that the introduction of trauma case management can decrease length of stay (LOS) and patient morbidity (Curtis 2004).

Recovery from a severe and complex burn injury can be an extremely lengthy, complicated and painful event. This can range from 1-2 years through to a lifetime. Effective case management can add to the quality of care and life of the individual with a burn in a major way. The areas that require support from case management can include; physical, psychological, social, vocational, reintegration into community and complications specific to burn injury.

Case management for these complex cases should begin in the acute care facility and continue throughout the long term care of the patient and provide a long term point of contact for patients. This long term service is required to facilitate periodic re-assessment by burns services to monitor changes in the functionality of clients over time and to ensure they are receiving the benefits of the latest knowledge and technological advances in burn management (Weed 2005).

## 4. NURSING MANAGEMENT

- Contemporary burn nursing practice involves the provision of nursing care in a highly complex clinical and technological environment, requiring a high level of clinical competence and the possession of a repertoire of observation, administration, management and technical skills. As such, burn nursing is recognised as a nursing specialty.
  - Nursing staff constitute the largest component of the multidisciplinary burn team and assume 24-hour responsibility for patient safety, advocacy and well-being. Nursing personnel contribute to positive patient outcomes through the provision of holistic care to patients with burn injury and major skin loss, and their families, from initial presentation through all phases of acute and ongoing care. Coordination of the multidisciplinary Burn Team is usually a nursing responsibility.
  - Each patient admitted to a NSW Burn Unit undergoes an initial nursing assessment, and an individualised nursing plan is developed in consultation with the patient and/or carer. This plan is continuously reviewed to reflect patient needs.
  - The multifaceted and critical care requirements of patients managed by the Burn Team require appropriate numbers of nursing staff with the necessary expertise to provide direct patient care during the acute care phase. Nursing staff assignment is based on the acuity of the patient, which at times requires nursing-to-patient ratios greater than 1:1, particularly for ventilated patients with large burn dressings.
  - Burn Unit nursing staff are integrally involved in the perioperative management of the burn patient, including the provision of nursing care during burn surgery.
  - Effective pain and pruritis management is an important nursing goal in the provision of care for burns and major skin loss. Nursing staff work closely with other disciplines with regard to assessment, delivery and evaluation of patient requirements for pain and pruritis management.
  - Wound management is typically a major responsibility of nursing staff. The nursing goal of effective wound care is to identify and effectively manage each stage of wound healing, including inflammatory, proliferative and maturation responses, to augment timely wound closure. The often lengthy and complex dressing procedures and the preponderance of new wound care products and surgical technologies in the management of burn injury and major skin loss impact on the patient's acuity. In order to ensure quality patient outcomes, wound management often requires intensive nursing care by staff with a high level of clinical expertise.
  - While nursing care is provided in the Burn Unit, wound management of critically ill patients managed in ICU is coordinated by the nursing staff in the Burn Unit. A large component of nursing care in the ICU is social and emotional support to the family and friends of the critically ill burn patient.
  - Nursing staff contribute to rehabilitation of patients with burn and major skin loss injury and provide the holistic care which patients require, in addition to that provided by allied health staff and rehabilitation medical specialists.
  - Nursing care of the burn and major skin loss patient focuses on quality patient outcomes provided in an environment of commitment to research, learning and evidence-based practice.
  - Nursing staff contribute to service management, quality improvement, education (student and peer) and research.
  - Clinical practice guidelines outlining nursing care for burn patients have been developed and are available on the ACI website.
- Many burn patients are managed on an outpatient basis. As such, a nursing-led clinic with highly skilled staff should comprise an integral part of the burn care provided. Nurses will be provided adequate facilities in which to manage minor burn wounds that encompass safety, quality care and patient privacy.

# 5. ALLIED HEALTH PRACTICE

Allied health services have a significant role in the management of burns and major skin loss patients. Allied health disciplines involved in the provision of care to burns and major skin loss patients may include clinical psychology, nutrition and dietetics, occupational therapy, orthotics, pharmacy, physiotherapy, child life therapy, speech pathology and social work.

Allied health services contribute at all stages of the continuum of care – during the acute phase, the rehabilitation phase and as part of the ongoing health, community care and resettlement of patients with burns and major skin loss. Allied health services aim to optimise both physical (functional and cosmetic) and psychosocial post-injury outcomes. Outpatient community care may include home, school, pre-school and workplace visits. Allied health services provide information and expert consultation to assist community services in their management of patients.

The achievement of positive patient outcomes depends on multidisciplinary cooperation and the application of evidence-based practice to allied health service delivery. All the disciplines that make up the multidisciplinary team work together to achieve the best outcomes for the patient.

Allied health disciplines contribute to service management, quality improvement, education (student and peer) and research.

For each allied health discipline there are clinical practice guidelines available on the ACI website. These guidelines have been developed by clinicians and are periodically reviewed. There are common guidelines with the Australian and New Zealand Burn Association (ANZBA) Allied Health Guidelines.

The NSW Statewide Burn Injury Service Model of Care highlights various conditions and issues assessed and treated by the allied health disciplines.

## 5.1 Skin/soft tissue, scar management contractures, and related problems

- Burn injury and major skin loss cause skin contracture, which leads to soft tissue shortening, a decrease of range of movement and loss of function. The occupational therapist and/or physiotherapist assesses each patient on admission.
- An individualised therapy plan is developed and implemented.
- Treatment may include splinting, positioning, exercise and early mobilisation. Complicated splinting may require the expertise of the orthotist.
- The occupational therapist and/or physiotherapist is responsible for ongoing evaluation and modification of the treatment regimen until scar maturation and beyond if required.
- The aim of occupational therapy and physiotherapy is to minimise the risk of skin and/or soft tissue contracture and related problems.
- The occupational therapist and/or physiotherapist is responsible for providing ongoing outpatient ambulatory care for rehabilitation of burn and major skin loss patients after discharge. This can be either at the Burn Unit facility or may be referred to other local services when available, with ongoing advice and support from the Burn Unit therapists.
- Speech pathologists are also involved in the assessment and management of orofacial contractures during the acute and/or rehabilitation phases, which may have an impact on swallowing and communication as well as appearance and social acceptance. Orofacial contracture management is conducted in close collaboration with the occupational therapist and/or physiotherapist in accordance with individual site policies.
- Scar management commences in the acute phase and is continued until scar maturation, which may take up to two years. The occupational therapist and/or physiotherapist reviews the process of scar maturation regularly, with treatment updated

accordingly. Widely accepted scar management techniques include pressure garments (Engrav 2010), splinting, and the application of topical agents such as silicon gel sheets (Momeni 2009). Complicated splinting may require the expertise of the orthotist.

## 5.2 Oedema management

- Inadequate oedema and scar management can lead to an increase in contracture formation, as well as poor functional and cosmetic outcome.
- Oedema management in the acute phase of burn treatment is essential. Oedema can delay wound healing, leading to formation of thick scar tissue and loss of movement. A variety of techniques is used to manage oedema during this phase. Oedema management is the responsibility of the occupational therapist, physiotherapist and nursing team.
- Chronic oedema may require specialist intervention and referral to these services.

## 5.3 Respiratory complications

- Prevention of respiratory-related complications is an important element in the management of burn patients. The development of respiratory complications increases mortality and morbidity (including prolonging the length of stay); hence aggressive respiratory physiotherapy is essential.
- The physiotherapist assesses each burn patient on admission and an individualised treatment plan is implemented.
- Respiratory physiotherapy should commence as soon as possible in the mechanically ventilated burn patient and continue on a regular basis, to prevent ventilator-associated pneumonia. Acquiring this condition can increase length of stay in the ICU and impact on the patient's recovery and rehabilitation
- Where clinically indicated, respiratory physiotherapy treatment is provided seven days a week.

## 5.4 Activities of daily living

- Burn injury may result in loss of functional ability and occupational performance, which can impact on a burn patient's independence in daily living activities.

- Each patient is assessed by the occupational therapist on life roles and tasks and an individualised therapy program aiming to optimise return to pre-morbid lifestyle and socio-cultural environment implemented.
- The occupational therapist is responsible for ongoing evaluation and modification of the treatment regimen.
- The Child Life therapist aims to help children cope with their hospital experience, by using medical play, procedural support and appropriate play experiences that accommodate the child's abilities and interests.
- Initially the focus of occupational therapy is on self-care tasks such as feeding, toileting and grooming. As the patient progresses, the occupational therapist will assess activities of daily living such as work or school needs, handwriting, vocational and avocational activities and homemaking.
- The occupational therapist, in complex cases such as facial and severe hand injuries, optimises the patient's occupational performance and provides education and support to the patient, family and other professionals in the team
- Prior to discharge, the occupational therapist or physiotherapist may visit the patient's home, pre-school, school or place of employment to assess the requirement for modification.

## 5.5 Nutrition

- Burn injury or major skin loss can result in hypermetabolism, increased protein breakdown and altered immune function. Without early and ongoing nutrition support these patients are at risk of malnutrition, delayed wound healing and poor outcomes. All patients admitted as inpatients to NSW Burn Units are referred to the dietitian. Patients seen in the outpatient clinic by the NSW Burn Units can be referred to the dietitian if a patient is deemed to be at nutritional risk.
- Following referral, the dietitian provides a comprehensive nutritional assessment, considering the patient's percentage burn, anthropometry, biochemistry, co-morbid conditions and pre-injury nutrition status, allowing for social or cultural needs. Nutritional requirements for each patient are calculated and a nutrition care plan, with a focus on both macro-nutrient and micro-nutrient adequacy, is implemented.
- Patients with severe burns will need early enteral tube feeding and feeding tubes should be inserted as soon as possible. Small bowel feeding tubes should be

considered to reduce delays in feeding due to gastric intolerance and fasting for theatre. Patients with smaller burn injuries often require oral nutritional support which is individualised for each patient by the dietitian.

- The patient's nutritional status including weight is monitored regularly and medical nutritional therapy is adjusted accordingly.
- Throughout the intervention the dietitian provides education to the patient and their family about their nutritional support recommendations.
- Ensuring adequate nutrition is a priority for the whole multi-disciplinary team. Routine care activities should not interfere with the provision of meals or enteral feeds. Fasting times for tests or surgery should be minimised.
- Nutritional surveillance and care continue throughout the acute and rehabilitation phases of care, balancing nutritional intake and optimising weight.
- Outpatient follow-up is determined on an individual basis according to the patient's nutritional progress and ongoing requirements.

## 5.6 Swallowing and communication

- The speech pathologist provides comprehensive clinical assessment and management of burn patients with swallowing, voice and communication disorders as a result of the burn injury or secondary complications such as sepsis, debility, scarring or presence of a tracheostomy.
- Instrumental investigations for swallowing and voice problems can be carried out. These include modified barium swallow, fibre-optic evaluation of swallowing and laryngoscopy. The speech pathologist will work closely with radiology and ENT services in these instances.
- Regular therapy is carried out in relation to swallowing, voice or communication problems, and ongoing support and education to relatives and carers, or to other professionals in the multidisciplinary team, is provided as required.
- The speech pathologist will be involved in the discharge planning for burn patients, who will be referred on to a community- or hospital-based speech pathologist if required.

## 5.7 Psychosocial issues

- A burn injury is a frightening and potentially life-changing event for patients and families. As a result of this loss/change in their lives, they can often face many difficult emotions at varying stages after the injury.
- One implication of the increasing survival of patients with a burn injury is the need for psychosocial support for patients and their families/significant others, which the social worker and clinical psychologist provide. Burn treatment procedures are often associated with intense pain. The impact of the burn can result in permanent disability and disfigurement. Given the nature of burn injury and its treatment there are many stressors that may trigger psychological problems, particularly those associated with anxiety and depression.
- Social work and clinical psychology provide assessment and intervention to burn patients from a wide range of psychosocial backgrounds. Psychosocial assessment and treatment begins on admission, and is continuous throughout as the patients' and families' needs change at different stages of recovery.
- The social worker's role is to undertake a thorough psychosocial assessment in order to review family history (including trauma responses, mental health history and risk factors as well as family strengths) to enable appropriate interventions and support to be provided to both family and burn survivors during the inpatient period as well as provision of short and long term outpatient therapeutic services to enable positive reintegration and adjustment.
- Assessment and management of emotional distress, pain-coping strategies, grief and bereavement, survival and mental health issues and dealing with changes in body image are necessary in the care of burn patients in order to ensure adequate compliance with treatment and rehabilitation goals.
- Following discharge, patients and their families continue to receive psychosocial intervention. There is ongoing review of adjustment from hospital to home and, if appropriate, referral to other agencies will be made. Issues which may have to be addressed at this time include change in body image and lifestyle, relationship difficulties and return to work or school programs.
- Burn injury is one of the most common manifestations of non-accidental injury in children. Increased awareness of child abuse and the increasing expertise of burn clinicians have enabled early identification of potential non-accidental burn injury.

# 6. MENTAL HEALTH MANAGEMENT

- A significant number of adult patients admitted to the NSW Burn Units have pre-existing mental health problems, which may include substance abuse, personality disorder, depression, chronic mental illness and dementia. A proportion of patients are admitted as a consequence of self-inflicted burn injuries or arson.
- During the acute treatment phase, a high proportion of adult burn patients develop delirium, post-traumatic stress symptoms, depression, anxiety and other psychological reactions requiring mental health assessment and intervention.
- During the rehabilitation phase, post-traumatic symptoms, depression, body image issues and any pre-existing mental health problems require ongoing management.
- Management of patients with suspected non-accidental burn injury includes hospital admission, which provides the opportunity for appropriate psychiatric as well as physical assessment and provision of care.
- Mental health personnel comprising a psychiatrist and psychiatric registrar are integral members of the Burn Team. They provide mental health care to burn patients during all phases of the continuum of care.
  - Components of mental health care may include:
    - Psychiatric assessment
    - Risk assessment for self-harm or violence
    - Prescription of psychotropic medication
    - Implementation of the Mental Health Act 1990 where applicable
    - Use of a range of therapeutic psychological techniques for patients and families.
  - Referral to, and integration with, other mental health services such as community mental health teams are important. Mental health staff also have an active and vital role in the psychological support and education of other service staff, thereby promoting team cohesion.
  - Following discharge from the NSW Burn Units a proportion of patients require referral to other mental health services or transfer to a psychiatric hospital or forensic unit. Some patients continue to receive ongoing psychiatric care through the NSW Burn Units.
- It is well established that there is an over-representation of psychiatric and psychological disorders in burn patient populations, with estimates varying between 20% and 75% (Wisely 2010) problems in adult patients with a burn injury premorbidly, and which may develop during the continuum of care, best-practice psychological management of burns involves baseline psychiatric assessment of all admissions and of the more severe outpatients. This, together with the need to provide regular mental health review and management to inpatients and outpatients with burns, necessitates the input of psychiatric staff for sessions of several hours a number of times per week.

# 7. SUB-ACUTE AND STEP-DOWN

- Contemporary burn management should include a program of early intervention rehabilitation and availability of sub-acute or step down facilities to enable the patient to progress from acute hospital care to less dependent care with self management options.
- Step down or sub-acute facilities that are linked to acute services achieve a seamless continuum of care by enabling patients with burns to participate in self care activities, prepare for discharge and enable their significant others to participate in their program of care.
- Availability of such facilities increases the ability to discharge patients early from the acute care facilities. This is particularly relevant to rural and remote patients that are unable to be discharged to a supported home environment local to the acute burn unit ambulatory care services. Provision of an environment that encourages autonomy and independence for burn patients is an important part of facilitating return to function by avoiding the prolonged dependency that extended hospitalisation can foster.

# 8. REHABILITATION AND RECONSTRUCTION

Historically, the focus has been on the acute phase of burn management with less emphasis on long-term management. Patients are now surviving a severe burn injury of up to a 90% body surface area burn, which previously they would not have survived, increasing the requirement for protracted periods of rehabilitation.

The increasing survival rate of patients with severe burn injury highlights the need to address the rehabilitation requirements of patients, including reconstructive surgery.

The World Health Organisation defines rehabilitation as “a process aimed at enabling [patients] to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional levels. Rehabilitation provides disabled people with the tools they need to attain independence and self-determination.”

## 8.1 Rehabilitation

- Rehabilitation begins on admission to the acute Burn Unit, as the start of a continuum of rehabilitation through all stages of recovery and care
- The successful rehabilitation of severe burn patients relies on a well-coordinated multidisciplinary team of health professionals including medical, nursing and allied health services.
- The rehabilitation process is collaborative, with the patient, family and/or carer and community central to the continuing care of the burn survivor. The team is patient and family focused and has an interdisciplinary approach. The whole patient and family unit must be considered when addressing rehabilitation needs. Physical factors and social, psychological and emotional adjustment to a severe burn injury must be taken into account.
- This process should maximise function, minimise disability, promote self-acceptance and facilitate patient reintegration into the community (including community education) and back into the workplace, if applicable.
- Severe burn injury may lead to a loss of functional ability due to deconditioning, loss of range of active movement, loss of limbs or digits, difficulty coping with emotional stress and impaired mental health. This can impact on the patient’s ability to carry out activities of daily living and ability to return to work, recreation, community or school activities. Rehabilitation to achieve resumption of previous life and occupational roles and activities is usually a prolonged and difficult process.
- Patients and their families, in significant numbers, admitted to NSW Burn Units often have pre-existing dysfunctional social skills including life and parenting skills (Wisely 2010), substance abuse, chronic and acute mental illness and dementia. A proportion of patients are admitted as a consequence of self-inflicted burn injuries, physical abuse or arson. All these issues add to the special nature and challenge of burns rehabilitation
- Burn-specific rehabilitation facilities have been shown to decrease length of stay and improve restoration of function compared to general rehabilitation facilities (DeSanti 1998).
- Rehabilitation medicine has an important role in the discharge planning process, which needs to be considered as soon as practicable after admission.
- The rehabilitation team is also responsible for referral and liaison with external rehabilitation facilities for ongoing management.
- Periodic follow-up of outpatients by rehabilitation medicine is important to assess the need for further specific physical, psychosocial, surgical and/or vocational interventions. At this stage liaison with providers of vocational rehabilitation services can assist the patient’s return to satisfactory employment.
- Major complications such as heterotopic ossification, neuropathies, amputations, post-traumatic stress disorder and psychosocial adjustment to major body image change can occur. Dealing with these complications as well as medico-legal issues, liaising with insurance rehabilitation providers, premorbid mental health problems and family functioning or

circumstances, are all considerations when allocating staff and resources to the rehabilitation of these complex patients with severe burns.

- The numbers of severely burned patients or patients with severe skin loss requiring inpatient rehabilitation are relatively small. As specialised skills and expertise need to be maintained with a critical mass of patients, this is best done by having one burns inpatient rehabilitation centre that cares for these patients

## 8.2 Reconstruction

- Improved survival rates have led to an increased requirement for post-burn reconstruction to improve function and cosmesis.
- Contractures are usually dealt with by way of release and local flap repair, or with further grafting, sometimes using bio-engineered products.
- Skin resurfacing may be achieved by using dermabrasion, further grafts, cultured epithelial autografts and other bio-engineered products, tissue expansion, local soft tissue transfer or microsurgical free flaps, prefabricated or otherwise.
- Long term follow-up of burn patients by the Burn Units is required to assess the need for reconstructive surgery or other advances in burn care that may be offered to improve long term outcomes.
- For many patients with severe burns, reconstructive surgery is necessary for optimal long-term quality of life. This is particularly true for the paediatric population when a burn leaves scar tissue that does not grow and stretch with the rest of the body.
- The timing of elective surgery is critical to maximising function and cosmesis. Elective surgery can unnecessarily disrupt progress in rehabilitation, particularly if it occurs during the early stages, since there is a period of functional loss after each surgery that needs to be recovered. To optimise patient outcome, the decision to perform reconstructive surgery and the timing of that surgery should therefore be made in consultation with the patient, rehabilitation medicine and allied health staff, ideally in a multidisciplinary clinic setting.

# 9. PEER SUPPORT

Adult Peer Support Program offering one on one peer support should be available to patients during their acute hospital admission at the burns units and the inpatient rehabilitation centre.

Ideally, Peer Support should also be able to extend across into other delivery modes (groups), contexts (outpatient and community settings) and consumer groups (families and carers). Peer support offers experiential familiarity and understanding of the lived experience of a burn injury and the recovery of same.

Talking with someone who has been affected by a burn injury can help to reduce isolation. Peer Support creates a social contact for patients and can offer them assistance in finding strength, hope, new meaning and validation through the sharing of experience. The Program should promote and value peer matching, taking into account factors including, but not limited to:

- Geographical location
- Cultural sensitivity
- Degree and location of burn
- Preferences including gender and life stage
- Availability of the peer supporter
- Personality compatibility

Central to positive adjustment and improved recovery from a burn injury is 'hope' (Sproul et al, 2009). A Peer Support Program has the ability to instil hope and motivate - hope of improved health, hope of recovery, and hope of family and community re-integration.

The Peer Support Program should employ comprehensive recruitment, screening and training processes in order to maximise benefit, and minimise harm, for patients. Peer Supporters should display good adjustment behaviour and are actively re-engaged in community life and be skilled in separating their own experience from that of the patient.

# 10. AMBULATORY CARE

The increasing survival rate of patients with severe burn injury and the growing trend towards management of non-severe burn injury without hospitalisation have resulted in the development of dedicated ambulatory burn care clinics.

An ambulatory burn clinic is an integral part of burn care, providing the link between inpatient care and rehabilitation. It is envisaged that the volume of burn activity managed on an ambulatory basis will continue to increase. Ambulatory care clinics are co-located with the acute inpatient Burn Unit.

An ambulatory clinic may provide:

- Assessment and dressing of minor and non-severe burns
- Follow-up burn dressing and skin graft management for patients after discharge
- Long-term scar management and symptom control after discharge from dressings clinics
- Patient and family education and support
- Advisory services to other hospitals, health care professionals and the community
- Care for burn patients who require surgery, with interim burn care until the day of surgery
- Patients with other acute skin conditions that would benefit from wound care input by a recognised expert burns team.

## 10.1 Adult ambulatory burn clinics

- provide a seven-day a week ambulatory burn service
- are managed by senior nursing clinicians
- have access to allied health services
- are attended by a burn surgeon
- accept patients referred from a hospital emergency department, general practitioners, other hospitals, community health services, or self-referred

- burn injury of up to 10% of total body surface area may be managed on an ambulatory basis as appropriate.

## 10.2 Paediatric ambulatory burn clinics

- provide a seven-day a week ambulatory burn service
- are managed by the full-time Burns Nurse Practitioner
- have access to allied health services
- consult with a burn surgeon
- accept patients referred from a hospital emergency department, general practitioners, other hospitals, community health services, or self-referred
- burn injury of up to 10% of total body surface area may be managed on an ambulatory basis as appropriate.

## 10.3 Allied health ambulatory burn services

Burn patients may require ongoing care from an allied health team for months or years and for the more severely burned patients, a lifetime, long after the designated burn “dressing” clinic care is completed.

These allied health outpatient services should have access to:

- Physiotherapy
- Occupational Therapy
- Social Work
- Speech Pathology
- Nutritional support
- Clinical Psychology

# 11. MINOR BURN MANAGEMENT

It is often difficult to define a minor burn, as classification is not solely reliant on burn size or depth. Whilst severe burns are managed in specialist Units, most burns are minor and can be managed by local hospitals or medical practitioners. It is recommended that for patients with burn injuries on first presentation, an outlying hospital or local medical practitioner should contact a Burn Unit for consultation and advice. The ACI Burn Injury Network (Statewide Burn Injury Service) provides support to clinicians through the development of guidelines, education material available on the website, digital email consultations and education sessions.

If healing time is delayed over 10-12 days, the patient should be referred to the Burn Unit for review and treatment.

Burns which do not fit the criteria for referral to a Burn Unit may later develop significant scarring and/or functional and psychosocial impairment. In such cases, patients should be referred to a Burn Unit for follow-up care, rehabilitation and reconstruction.

## 11.1 Digital email consult

It is possible to email digital photographs of burn wounds to Burn Units. Contact must be made between referring and accepting medical and/or nursing staff. Photographs must be taken in accordance with guidelines and must be accompanied by injury history and patient consent.

Email consultation addresses

- CHW: [kidsburns@chw.edu.au](mailto:kidsburns@chw.edu.au)
- RNSH: [burnsconsult@nscchahs.health.nsw.gov.au](mailto:burnsconsult@nscchahs.health.nsw.gov.au)
- CRGH: [crghburns@email.cs.nsw.gov.au](mailto:crghburns@email.cs.nsw.gov.au)

# 12. SPECIAL PAEDIATRIC REQUIREMENTS FOR BURN CARE

The care of paediatric burn patients requiring treatment, as inpatients and in the ambulatory care service, requires paediatric-specific services. These include but are not limited to:

- Teacher/s available on a daily basis (during school term) for adolescents and school-aged children, preferably in a hospital school setting
- Child Life Therapists
- Paediatric-appropriate treatment rooms
- Paediatric medical and surgical specialists
- Paediatric nursing and allied health staff
- Starlight Foundation (or similar) services
- Child Protection Unit
- Burns Camps for children as part of the rehabilitation process (Maslow 2010).

# 13. CONTACT DETAILS

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# 16. NSW BURN UNITS

The ACI Burn Injury Network (Statewide Burn Injury Service) comprises three Burn Units located at Concord Repatriation General Hospital (CRGH), Royal North Shore Hospital (RNSH), and the Children's Hospital at Westmead (CHW). Adult burn patients are cared for by the Burns Units at CRGH and RNSH. RNSH is the preferred site for patients with associated multi-trauma injuries, spinal injuries and women who are past the first trimester of pregnancy. Each Unit provides intensive care, acute, ambulatory burn care and allied health services.

## Concord Repatriation General Hospital (CRGH)

Concord Hospital is a teaching hospital of the University of Sydney and has had a Burn Unit since 1941. The Burn Unit at CRGH is today a purpose-built facility located on the seventh floor of the main inpatient block with a capacity of 16 beds, of which 10, including 8 isolation rooms, are currently commissioned. Burn patients requiring intensive care are admitted to the CRGH ICU. The Burn Unit incorporates a purpose-built dedicated operating room and is co-located with the Burn Ambulatory Care facility and the Burns Allied Health facility.

A Chair of Burn Injury and Reconstructive Surgery has been established via the University of Sydney and the Concord Clinical School. Intensive research is being conducted at a dedicated tissue engineering laboratory at the onsite ANZAC Institute, in addition to the Skin Culture Laboratory at CRGH which conducts research and provides cultured skin for NSW's three Burn Units.

## Royal North Shore Hospital (RNSH)

Royal North Shore Hospital is a designated Major Trauma Centre and teaching hospital of the University of Sydney. There are currently 7 commissioned burn beds on the Burns and Plastics Unit and 2 dedicated ICU burn beds. In addition to acute burn patients, the ward also accommodates plastic and reconstructive surgery patients. The Unit incorporates an operating room and is co-located with the Burn Ambulatory Care facility and the Allied Health facility.

The RNSH Unit has the capacity to conduct ongoing burn research through the Kolling Medical Institute and Sutton Laboratories.

## The Sydney Children's Hospital Network, Westmead Campus

The Children's Hospital at Westmead is a designated paediatric Major Trauma Centre and teaching hospital of the University of Sydney. The Burn Unit at the Children's Hospital at Westmead is located in Clubbe Ward. There are currently 8 dedicated burn beds, 6 located in Clubbe ward and 2 in the Paediatric ICU. A dedicated burns operating theatre in the main theatre complex is planned for 2011. An Ambulatory Care unit is co-located with the Burn Unit. The Children's Hospital Burn Research Institute (CHBRI) is affiliated to the University of Sydney and incorporates a wound healing laboratory where research is focused on burn wound healing and the biology of scar formation.

## Royal Rehabilitation Centre Sydney

Currently the Royal Rehabilitation Centre Sydney provides inpatient rehabilitation for burn clients with major complications or special needs who would benefit from a more intensive inpatient rehabilitation program. These clients have a longer length of stay than general. The particular groups provided for include people with problems from heterotopic ossification, amputation, major joint restriction and behavioural problems. The Royal Rehabilitation Centre provides intensive physical therapy, hand therapy, wound and skin management, aid and equipment prescription and training, prosthetic and orthotic prescription, environmental assessments, wheelchair prescriptions and psychosocial adjustment to disability. The Centre's philosophy is to optimise a patient's independence, and is set in an open environment, minimising problems from isolation.

## Location of Burn Units comprising the network



