

NSW Severe Burn Injury Service

Model of Care



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NSW Severe Burn Injury Service

1

The care requirements of a patient who has sustained a severe burn injury 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 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 1999 Statewide Services Development Branch 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.

The plan also recommended the development of an integrated management structure to coordinate the services provided by the Burn Units.

In 2000, the Minister for Health released the *Reports of the NSW Health Council and the Ministerial Advisory Committee on Health Services in Smaller Towns*, leading to the establishment of the NSW Government Action Plan for Health. In implementing the Action Plan, the Greater Metropolitan Services Implementation Group (GMSIG) endorsed the NSW Severe Burn Services Plan. The GMSIG Report (p106) stated that a single New South Wales Burns Service would be established with units located at Concord Repatriation General Hospital, Royal North Shore Hospital and The Children's Hospital at Westmead.

The NSW Severe Burn Injury Service:

- has been established to provide excellence in burn care through a coordinated approach across three hospital campuses
- is the statewide referral service for patients with severe burn injury
- 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
- promotes best practice in clinical care, research and education.

To provide a framework for the provision of burn care across the three campuses a Model of Care has been developed. The NSW Severe Burn Injury 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 development of the Model of Care was undertaken by the NSW Severe Burn Service Implementation Group. The process included input from medical, nursing and allied health clinicians involved in the care of patients with severe burn injury and involved a process of consultation through all stages of its development.

NSW Severe Burn Injury Service – Burn Units

The NSW Severe Burn Injury Service comprises three Burn Units located at Concord Repatriation General Hospital (part of South Western Sydney Area Health Service), Royal North Shore Hospital (part of North Sydney/Central Coast Area Health Service) and The Children's Hospital at Westmead.

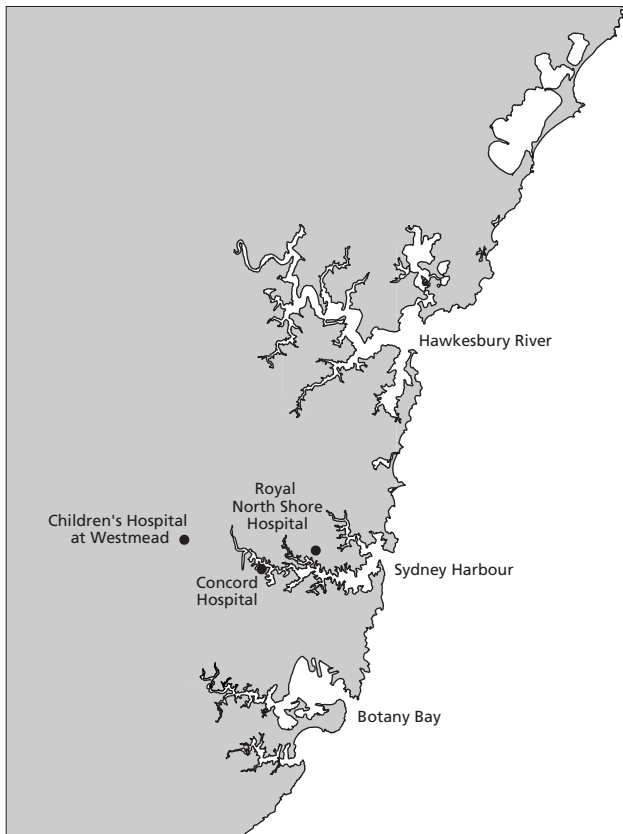


Figure 1. Location of Burn Units comprising the NSW Severe Burn Injury Service

Royal North Shore Hospital

Royal North Shore Hospital is a designated major Trauma Centre in NSW. The Burn Unit at Royal North Shore Hospital is a purpose-built facility incorporated into the newly commissioned Douglas Building. The Unit is located close to the hospital's Emergency Department and helipad. In addition to the accommodation of inpatients with a burn injury, the ward also accommodates plastic and reconstructive surgery patients. A dedicated operating room is incorporated into the unit and the Ambulatory Care facility is collocated with the unit.

The Children's Hospital at Westmead

The Children's Hospital at Westmead is a designated major Trauma Centre in NSW. The Burn Unit at The Children's Hospital at Westmead is located in Clubbe Ward. An Ambulatory Care Unit is collocated with the ward.

Concord Repatriation General Hospital

The Burn Unit at Concord Repatriation General Hospital is a newly constructed facility located on the seventh floor of the main inpatient block. This facility includes 16 beds, configured as eight isolation rooms and four double rooms. The unit incorporates an operating room and is collocated with the Burn Ambulatory Care facility and the Allied Health facility.

A Skin Culture Laboratory has been established at Concord Repatriation General Hospital and it is intended that, in the future, the laboratory will be the source of cultured skin for the three Burn Units.

Framework of the Model of Care

2

Principles of burn injury management

The NSW Severe Burn Injury Service Model of Care is based on the principle that management of the patient with severe burns comprises four phases (Sheridan 2002, p5500):

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

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 public health system in NSW. The conceptual basis for the framework has the consumer as the focus 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 NSW Severe Burn Injury Service Model of Care reflects the quality framework, as follows:

Safety of burn care

- Patient care is provided in accordance with clinical practice guidelines developed by the service.
- The minimisation of infection risk is a priority issue for the service 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 service promotes fire safety and burn prevention activities in the community.
- Optimal first-aid management and initial resuscitation of the patient with a severe burn injury are provided.

Consumer participation in burn care

- The service adopts a holistic and multidisciplinary approach to patient management.
- The patient and the family are central in the decision-making process.
- Through the process of 'negotiated care', staff strive to empower patients/families to manage the effects of burn injury.
- Informed decision-making for patients and their families regarding treatment options is available at all stages of management from initial injury to completion of rehabilitation.

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, conduct of research and conduct of education/training in relation to burn injury.
- The service uses and promotes the development and measurement of key performance indicators.

Access to burn care

- The service uses agreed criteria to identify those patients with a burn injury who require admission to a Burn Unit.
- The service provides access to appropriate support services such as medical imaging and clinical laboratory on a 24-hour basis.
- Surgical intervention may be undertaken in accordance with the clinical condition and surgical plan for the individual patient.
- Rehabilitation and emotional rehabilitation are an integral part of the service.

Appropriateness of burn care

- The service uses a documented and multidisciplinary plan of care for the individual burn patient.
- Interventions are performed to agreed and evidence-based indications.
- Appropriate research is undertaken to identify unmet need as well as overuse of treatment.
- There is an ongoing mechanism in place to measure the appropriateness of clinical practice guidelines and the provision of care.

Efficiency of burn care provision

- The service collects relevant clinical and other data and uses these data to monitor the efficiency of the service.
- 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 and ambulatory care.
- The service utilises a coordinated approach to discharge planning, including the need for future reconstructive surgery.
- The service is engaged in investigating opportunities for the introduction of new technologies that increase efficiency and effectiveness of patient care.

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 psychiatrists, nursing and allied health personnel.
- 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.

Clinical pathways and clinical practice guidelines

- The adoption of a standardised Model of Care by the NSW Severe 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 care requirements for the patient with a severe burn injury.
- The development of the clinical practice guidelines will be supported by a program of ongoing review based on measurement of outcomes.

Research

Data collection

- The availability of consistent and reliable data is an imperative for the effective implementation of the Model of Care and its ongoing success.
- It is intended that a minimum dataset will be developed to capture relevant activity and clinical data to facilitate the monitoring of care, measurement of outcomes and performance indicators.

Teaching

- The NSW Severe 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 professional groups.
- The service recognises the Emergency Management of Severe Burns (EMSB) course as being integral to emergency burn education. The service aims to facilitate the attendance of registered nurses and senior medical officers to complete this course within 12 months of their appointment to a Burn Unit.
- The service recognises the need for ongoing professional development for nursing and allied health staff including (where appropriate) the acquisition of tertiary qualifications.
- In addition to providing education for health care professionals, the service 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 NSW Fire Brigades, WorkCover, Kidsafe, and NSCA (National Safety Council of Australia) may assist with development in this area.

Quality and accreditation

- Evaluation of clinical and management performance is a critical element in the provision of quality care by the NSW Severe Burn Injury Service.
- The relevant Area Health Services and hospitals demonstrate the commitment to quality and continuous improvement, through the attainment of accreditation by approved external bodies in accordance with the NSW Health Quality Framework.
- It is intended that the NSW Severe Burn Injury Service also engage in the development of a verification program for burn service based on the USA Burn Centre Verification program.

Telehealth

- Since 1996 the NSW Government's NSW Telehealth Initiative program has provided funding for the expansion of existing telehealth clinical services, development of new telehealth services and the trialling of innovative telehealth services. The Telehealth network in NSW comprises 160 health facilities including public hospitals, community health centres, Aboriginal Medical Services, Correctional Health Centres and the Mental Health Tribunal.
- The NSW Burn Injury Telehealth Medicine for Rural and Remote Services Project has been established and funded through the NSW Telehealth Initiative program. The Burn Unit at Concord Hospital manages the project.

Production of cultured skin substitutes

- An important aim of the Model of Care is improvement in patient outcomes, particularly in terms of survival of patients with massive burn injury, faster recovery from burn injury, and improved functional and cosmetic result.
- A skin substitute material: a cultured skin cell laboratory has been established at Concord Hospital. The laboratory will engage in the production of cultured keratinocyte to supply the three Burn Units of the NSW Severe Burn Injury Service.
- Further development in tissue engineering will be assessed by the NSW Severe Burn Injury Service and, if appropriate, included in the activity of the skin culture laboratory.

3 Acute care management

Admission to the NSW Severe Burn Injury Service

Appropriateness of admission to the NSW Severe Burn Injury Service is based on criteria outlined in the *NSW Health Transfer Guidelines for People with a Burn Injury*.

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

- partial/full thickness burns in adults >10% TBSA
- partial/full thickness burns in children >5% TBSA
- burns to the face, hands, feet, genitalia, perineum, major joints
- chemical burns
- electrical burns including lightning strikes
- burns with concomitant trauma
- burns with inhalation injuries
- burns in patients with pre-existing medical disorders that could adversely affect patient care and outcomes.

Patients sustaining a non-accidental burn injury should be considered for admission to a NSW Severe Burn Injury Service.

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

- Requirement for admission to the Burn Unit may occur through:
 1. Direct presentation by the patient to the Emergency Department
 2. Contact of the Burn Unit or Intensive Care Unit by referring hospital or doctor
 3. Contact of the Burn Unit or Intensive Care Unit by the NSW Ambulance Service.

- 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 on call to coordinate patient's treatment.
- Admission or transfer of a burn victim is only accepted following consultation with the Plastic Surgery/Burns Registrar. In the event that the Plastic Surgery/Burns Registrar is not contactable, the specialist on call is to 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 Units and Emergency Department are notified and that the ICU is involved in the admission process where relevant.

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, 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 to the NSW Severe Burn Injury Service.
- 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.

Burn wound management

- Necrotic burnt tissue provides an environment for the proliferation of microorganisms exposing the patient to the risk of infection, delayed healing and complications. As such, meticulous attention is paid to the management of the burn wound.
- Burn wound management is based on the principles that:
 1. Burn wound dressings are applied to provide a local environment which optimises healing and minimises discomfort
 2. The range of products used includes petroleum-based dressings, semipermeable membrane dressings, absorptive dressings, dressings impregnated with anti-microbial ointments with retention dressings
 3. 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.
- Burn wound care necessitates significant commitment of nursing time. Dressing for major burns may take two hours or more and require two or more nursing staff. Attending to burn care and wound dressings for critically ill burn patients in the Intensive Care Unit adds considerably to the workload to Burn Unit nursing staff as well as the demands of intensive care management.

Pain and symptom management

- Severe burn injury causes severe pain. The nature of burn care frequently involves protracted surgical and non-surgical procedures which cause episodes of increased pain. Commonly patients experience longstanding pain or ongoing parasthetic (itching) sensations in their wounds for many years following injury.
- Pain management is integral to care of the burnt patient and patients admitted to the NSW Severe Burn Injury Service are provided with a comprehensive pain management service incorporating a range of pain 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.
- The service uses a range of therapeutic approaches to the management of acute pain including:
 1. Patient Controlled Intravenous Analgesia (PCA) with or without sedation
 2. Continuous narcotic infusions
 3. Slow-release opiates and pain-relieving medications
 4. Inhalational agents such as nitrous oxide
 5. A variety of non-opiate analgesics
 6. Appropriate addition of anxiolytics or sedatives.
- In addition to the acute pain management the service provides treatment for chronic pain and neuropathic pain.
- Complementary therapies and non-pharmacological pain relief also play an important role in pain management in the service.
- The management of symptoms of pruritis associated with wound and skin graft healing is a particular challenge following burn injury. The service employs treatment options such as antihistamines, topical applications, vibration and biopton.
- The service actively seeks new drugs, or innovative methods, to improve patient comfort from the symptoms of pruritis.

Surgical intervention

Access to burn surgery is predicated on the condition of the patient and on the burn wound. As such the NSW Severe Burn Injury Service approach to surgical management of the burn-patient is as follows:

1. Emergency surgery within 24-hours post-burn injury to prevent complications associated with deep burns, often involving muscle or other tissue
2. Early excision of the necrotic burn tissue within 1-4 days post-injury and coverage with a skin graft or skin substitute
3. Secondary wound coverage
4. Reconstruction and scar revision.

a. 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, particularly digits, to minimise compromise to blood flow
- fasciotomy (surgical division of the fascia) in the case of deep burns involving skin damage and underlying tissue and muscle damage. This type of extensive injury is generally the result of high-voltage electrical burns
- amputation of limbs or digits. Although relatively uncommon, upper and lower extremity amputations are occasionally required after electrical burns or because of associated trauma such as motor vehicle accident or explosion.

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).

b. Within 2-3 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 (Holmes et al 2003 p47).
- 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 is the preferred treatment. However, patients who have sustained deep burns involving large areas of body surface (in excess of 40%) 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 material, including Transcyte, Integra or similar artificial products, as well as cultured epithelial autograft (CEA) are used by the NSW Severe Burn Injury Service as a means of providing wound coverage.

c. Five days and greater post-injury

- Dependent on the condition of the patient and the extent of surgical intervention, serial sessions of surgery may be necessary to attain total debridement and wound coverage.
- As far as possible, all necrotic tissue should be removed by 21 days after injury.

d. General considerations relating to burn surgery

- 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:
 1. Significant blood loss as a consequence of extensive burn wound debridement and harvesting of donor skin
 2. Intraoperative hypothermia as a consequence of skin loss and the patient's decreased ability to maintain body temperature combined with exposure of debrided wounds

- Perioperative care of patients with severe burn injury requires cross-disciplinary planning and organisation of surgical, anaesthesia 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 and labour-intensive. The requirement for positioning and splinting frequently requires the expertise of the burn physiotherapist or occupational therapist in the surgical team.

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 NSW Severe Burn Injury Service aims to give maximum protection of patients with a large area of skin injury.
- 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 including routine swabs of all patients on admission to the Burn Unit (or transferring from ICU) and at weekly intervals.
- Environmental infection control programs include three-monthly swabbing of the immediate patient accommodation areas including bed, mattress, physiological monitoring equipment, bath/shower facilities.

Medication and pharmaceutical

- The provision of medications and pharmaceutical products for the patient with a severe burn injury may include:
 1. Analgesics for acute, chronic and neuropathic pain
 2. Antibiotics for the prevention and treatment of infection
 3. Electrolyte and vitamin supplements
 4. Medications to reduce pruritis and assist in wound healing
 5. Antidepressants and nicotine replacement and medications to prevent drug withdrawal.
- The Burn Team works closely with the pharmacist in the management of patient care. The role of the pharmacist includes:
 1. Daily review of medication charts to minimise risk of drug interaction, currency of orders and adequate supply of medications
 2. The regular provision of information to the patient/carer regarding medication regimens during the admission and on discharge
 3. Provision of medications on discharge.

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 and well-being. Nursing personnel contribute to positive patient outcomes through the provision of holistic care to patients with severe burn injury 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 the NSW Severe Burn Injury Service undergoes an initial nursing assessment. An individualised nursing plan is developed in consultation with the patient and/or carer. The plan is continuously reviewed to reflect the needs of the patients.
- 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 in excess of 1:1.
- 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 management is an important nursing goal in the provision of care for the burn patient. Nursing staff work closely with other disciplines with regard to assessment, delivery and evaluation of patient requirements for pain management.
- Burn wound management is typically a major responsibility of nursing staff. The nursing goal of effective wound care is the control of colonisation, the prevention of infection, and aiding patient comfort until surgery is performed. The often lengthy and complex dressing procedures, the preponderance of new wound care products and surgical technologies used in the management of burn injury impact on the patient's acuity. In order to ensure quality patient outcomes, wound management often requires intensive nursing care provided by staff with a high level of clinical expertise.
- While nursing care is provided in the Burn Unit, wound management of the critically ill patients managed in the Intensive Care Unit is coordinated by the nursing staff in the Burn Unit.
- Nursing staff contribute to rehabilitation of patients with burn 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 patient focuses on quality patient outcomes provided in an environment of commitment to research, learning and evidence-based practice.

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

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 severe burns. 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 severely burnt patients.

The achievement of positive patient outcomes depends on multidisciplinary cooperation and the application of evidence-based practice to allied health service delivery.

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

For each allied health discipline there are detailed referenced clinical practice guidelines. These guidelines have been developed by clinicians and are periodically reviewed. The clinical practice guidelines are available from clinicians at each Burn Unit.

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

Skin/soft tissue contractures and related problems

- Burns injury causes skin contracture, which leads to soft tissue shortening, a decrease of range of movement and loss of function. The occupational therapist/physiotherapist on admission assesses each patient.
- 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/physiotherapist is responsible for ongoing evaluation and modification of the treatment regimen until scar maturation.
- The aim of the occupational therapy/physiotherapy is to minimise the risk of skin/soft tissue contracture and their related problems.
- The occupational therapist/physiotherapist is responsible for arranging the ambulatory care of burn patients after discharge.

Oedema and scar 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, 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.
- Scar management commences in the acute phase and is continued until scar maturation, which may take up to two years. The occupational therapist/physiotherapist review the process of scar maturation regularly. Treatment is updated accordingly. Widely accepted scar management techniques include pressure garments, splinting and the application of topical agents. Complicated splinting may require the expertise of the orthotist.

Respiratory complications

- Prevention of respiratory-related complications is an important element in the management of a patient with a severe burn injury. 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.
- Where clinically indicated, the provision of respiratory physiotherapy treatment is provided seven days a week.

Activities of daily living

- Burn injury may result in loss of functional ability, which can impact on a burn patient's independence in daily living activities.
- Each patient is assessed by the occupational therapist and an individualised therapy program is implemented.
- The occupational therapist is responsible for ongoing evaluation and modification of the treatment regimen.
- Children will participate in a play program directed by the play therapist, that is suitable for their level of development in addition to their clinical needs.
- 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 instrumental activities of daily living such as work or school needs, vocational and avocational activities and homemaking.
- Prior to discharge, the occupational therapist or play therapist may visit the patient's home, pre-school, school or place of employment to assess the requirement for modification.

Nutrition

- Early and ongoing nutrition support is a vital component of the care of severe burn patients. Referral to the dietitian should be made immediately on admission.
- The dietitian assesses the patient, determines his/her nutritional requirements and instigates appropriate nutritional support. The patient's nutritional status is monitored regularly and medical nutritional therapy is adjusted according to his/her changing needs.
- Nutritional surveillance and care continues throughout the acute and rehabilitation phases of care. The regularity of monitoring and follow-up is determined by the patient's progress.

Swallowing and communication

- The speech pathologist provides comprehensive clinical assessment and management of severe 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. Any appropriate member of the Burn Team may make referrals to the speech pathologist.
- Instrumental investigations for swallowing and voice problems can be carried out. These include modified barium swallow (MBS), fibre-optic evaluation of swallowing (FEES) and laryngoscopy. The speech pathologist will work closely with radiology and ENT in these instances.
- Regular therapy is carried out in relation to swallowing, voice or communication problems, and ongoing support and education to relatives/carers, or to other professionals in the multidisciplinary team, is provided as required.
- The speech pathologist will be involved in the discharge planning for severe burn patients and they will be referred on to a community- or hospital-based speech pathologist if required upon discharge.

Psychosocial issues

- A burn injury is a frightening and potentially life-changing event for patients and families. Because 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 severe burn injury is the need for psychosocial support for patients and their families/significant others. The social worker and clinical psychologist provide this. 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 their recovery.
- 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 the patient with a severe burn injury, in order to ensure adequate compliance with treatment and rehabilitation goals.

6 Mental health management

- 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/school programs.
- A significant number of adult patients admitted to the NSW Severe Burn Injury Service 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 phase of burn treatment a high proportion of adult patients with a severe burn injury 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.
- Burn injury is one of the most common manifestations of non-accidental injury in children. Increased awareness of child abuse and increasing expertise of burn clinicians has enabled early identification of potential non-accidental burn injury.
- Management of patients with suspected non-accidental burn injury includes hospital admission. Hospital admission provides the opportunity for appropriate 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 severe burn patients during all phases of the continuum of care.
- Components of mental health care may include:
 1. Psychiatric assessment
 2. Risk assessment for self-harm or violence
 3. Prescription of psychotropic medication
 4. Implementation of the *Mental Health Act 1990* where applicable
 5. 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 is 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 Severe Burn Injury Service 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 Severe Burn Injury Service.
- In view of the high rate of mental health problems in adult patients with a severe burn injury premorbidly, and which may develop during the continuum of care, best-practice psychological management of severe 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 severe burns, necessitates the input of psychiatric staff for sessions of several hours a number of times per week.

Rehabilitation and reconstruction

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Historically, the acute phase of burn management has been the focus, with little emphasis on the long-term management of burn patients. The increasing survival rate of patients with severe burn injury has highlighted the need to address the rehabilitation requirements of burn patients, including reconstructive surgery.

Rehabilitation

- A rehabilitation specialist and a rehabilitation registrar are integral members of the multidisciplinary Burn Team. Rehabilitation medicine provides assessment, consultation and follow-up management of the significant disability suffered by patients with a severe burn injury.
 - The rehabilitation process is carried out in conjunction with allied health services. Rehabilitation commences as soon as the patient is admitted to the Burn Unit or the Intensive Care Unit.
 - Rehabilitation aims to assist the patient through the recovery from injury, and to eventually achieve the highest level of functional ability.
 - Contemporary burn management includes a program of early intervention rehabilitation and availability of step-down facilities to enable the patient to progress from acute hospital care to less dependent care with self-management options.
 - Step-down facilities that are linked to acute services achieve a seamless continuum of care by allowing 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 accommodation increases the ability to discharge patients early from the acute care facilities.
 - Provision of an environment that encourages autonomy and independence for burn patients is an important part of facilitating return to function by avoiding the prolonged dependency that extended hospitalisation can foster.
- Rehabilitation medicine 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 the ongoing management of the patient with a severe burn injury.
 - Periodic follow-up of outpatients by rehabilitation medicine is important to assess the need for further specific physical, psychosocial, surgical and vocational interventions. At this stage liaison with providers of vocational rehabilitation services can assist the patient's return to satisfactory employment.

Reconstruction

- Improved survival rates have led to an increase in the 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, perhaps using bio-engineered products.
- Skin resurfacing may be achieved by using further grafts, cultured epithelial autografts, local soft tissue transfer or microsurgical free flaps, prefabricated or otherwise.

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Ambulatory care

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

An ambulatory burn clinic is an integral part of burn care. It provides the link between inpatient care and rehabilitation. It is envisaged that the volume of burn activity managed on an ambulatory basis will continue to increase.

An ambulatory burn clinic may provide:

1. Assessment and dressing of minor and non-severe burns
2. Follow-up burn dressing and skin graft management for patients after discharge
3. Long-term scar management and symptom control after discharge
4. Patient and family teaching and support
5. Advisory service to other hospitals, health care professionals and community
6. Patients with a burn who require surgery, with interim burn care until the day of surgery.

Adult ambulatory burn clinic

The adult ambulatory burn clinics at Concord Hospital and Royal North Shore Hospital:

- will provide a seven-day per week ambulatory burn service
- are managed by a full-time clinical nurse specialist
- accepts patients referred from the hospital's emergency department, general practitioners, other hospitals, community health services, or self-referred.

Paediatric ambulatory burn clinic

The paediatric ambulatory burn clinic at Children's Hospital at Westmead:

- will provide a seven-day per week ambulatory burn service
- is managed by a full-time Nursing Unit Manager 1
- accepts patients referred to the clinics from the hospital's 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.

Contact details

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