National Health Emergency Plan: Multiple Complex Burn Action Plan

2011
Foreword

Health emergencies can range from the slow build-up of an infectious disease outbreak to the sudden devastation of an earthquake. Often the consequences are extreme and the likelihood is certain, but the actual timing is impossible to predict. All we can be sure of is that such events will certainly happen, that the health sector has to be ready to respond to them and that our plans need to be robust enough to last, yet flexible enough to deal with any foreseeable circumstances.

The National Health Emergency Plan 2008 (NHEP) shows how we in the health and disability sector would work together in a coordinated way with other government agencies to respond to disasters and emergencies.

The National Health Emergency Plan: Multiple Complex Burn Action Plan (the Action Plan) will provide specific guidance to the health sector in the event of a national burn emergency. It is designed to be used with the NHEP, which provides more detailed information in areas common to all disasters such as communication.

International attention to the emergency management of a burn disaster has been heightened by a number of recent events, most notably the Bali bombing in October 2002, and more recently, the response following the Black Saturday Fires of February 2009 in Victoria, Australia.

In the latter case, Australia was able to handle the entire patient load, and this became an important focus of local and national pride and unity during a period of turmoil. This Plan aims to enable New Zealand – in particular the New Zealand National Burn Service (NBS), with support from the Ministry of Health – to respond in a similar fashion to care for patients in a comparable New Zealand emergency.

The philosophy of the NBS is to provide an integrated national service to care for all burn patients within New Zealand. In the event of an emergency, the clinical load will be shared between the four regional burn units (RBUs) and the National Burn Centre (NBC) to avoid a single unit becoming overwhelmed.

The Ministry of Health acknowledges the contribution of the sector in developing this Action Plan, and the significant developments that have resulted from this work, including the establishment of skin banks; the prediction of sustainable capacity in critical areas such as intensive care and the development of teamwork. This work is an acknowledgement that any burn emergency in New Zealand will impact on a wide range of services, including ambulance and emergency care.

Charles Blanch
Director Emergency Management
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1. Introduction

New Zealand has four regional burn units (RBUs), co-located with regional plastic surgery units at Christchurch Hospital, Christchurch; Hutt Hospital, Wellington; Waikato Hospital, Hamilton and Middlemore Hospital, Auckland. The National Burn Centre (NBC), co-located with the Auckland RBU at Middlemore Hospital, opened in 2006. The four RBUs and the NBC make up the New Zealand National Burn Service (NBS). Each unit sits within a district health board (DHB) structure, which has overall responsibility for management functions, including accounting for cross boundary referrals. Each RBU is located within a hospital or regional service capable of treating trauma, with established trauma services and an intensive care unit (ICU) capable of providing ventilatory support.

The focus of this Action Plan is on managing multiple complex burns in an emergency, and in particular, the resourcing required in such an emergency. It is expected that local RBU and DHB emergency planning will be cognisant of the management of major trauma associated with burns that is likely to be required in such a situation.

Purpose of this Action Plan

This Action Plan provides specific direction to the health sector in the event of a national burn emergency. It must be read in conjunction with the National Health Emergency Plan 2008 (NHEP)\(^1\), which provides overarching direction to the health sector, the Ministry of Health and the whole of government in the event of a health-related emergency. This Action Plan documents an agreed sequence of actions to be implemented in the event of a national burn emergency where injuries meet the Australia and New Zealand Burn Association’s guidelines for referral to an RBU.

Appendix Five outlines the average operative time and other resources needed for given burn sizes at various stages of care. This information will enable objective estimation of when the clinical response is likely to become unsustainable with available resources. It will also facilitate estimations of the likely resource requirement for any given number of multiple (new and existing) burn patients.

This Action Plan has been developed by the RBUs and the NBC in association with DHBs and the Ministry of Health.

Activating the Multiple Complex Burn Action Plan

A national health emergency will be declared when a single RBU or the NBC is overwhelmed or is unlikely to be able to sustain the required clinical response to a burn incident due to the number and complexity of burn patients or a lack of resources. At this point, this Action Plan will be activated by the Ministry of Health in consultation with the NBS.

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The management of an incident involving multiple complex burn injuries will have serious immediate and ongoing implications for regional and national health services in New Zealand. In particular, there will be requirements for:

- specialist triage (see below)
- intensive care, including isolation and ventilation for prolonged periods of time
- for each patient, multiple operating theatre visits and intra-operative decisions made by clinically skilled individuals over weeks to months per patient
- prolonged and intensive use of resources.

These needs are outlined in Appendix 5. They reinforce the important point that it is burn size, rather than burn numbers, that is the major determinant in declaring a National Health Emergency and implementing this Action Plan.
2. Relationship between this Action Plan and the National Health Emergency Plan

This Action Plan is a sub-plan of the NHEP. It describes the specific response required of the NBS, DHBs and the Ministry of Health in the case of a multiple complex burn emergency.

The Ministry will activate the NHEP when local or regional responses are overwhelmed or have the potential to be overwhelmed. At this point the Ministry will also assess whether the National Health Co-ordination Centre (NHCC) needs to be activated. The role of the NHCC is to provide national coordination of the health sector in an emergency.

Coordination of a health emergency at the national level will be affected by two factors in particular:

- whether the Ministry of Health is the lead government agency involved, or providing support to the lead agency
- the size and scope of the health sector and inter-agency coordination required to manage the response.

Since 2004, the Ministry’s focus in this area has included publication of a series of emergency management-related documents to provide guidance in a health-related emergency. These mostly strategic documents are underpinned by specific action plans. Along with this Action Plan, the suite of guidance documents and action plans includes the following:

- Getting Through Together: Ethical values for a pandemic (2007) (published by the National Ethics Advisory Committee)

The relationship between these documents and the NHEP is illustrated below.
National emergencies are managed by a lead agency, which may be assisted by support agencies. In a civil defence emergency, the lead agency is the Ministry of Civil Defence and Emergency Management (MCDEM). MCDEM will adhere to the arrangements in the National Civil Defence Emergency Management Plan to manage the adverse consequences of such an event.

A range of other government agencies may take the lead in an emergency, depending on the nature of the incident. The lead agency is determined by government, and the decision will be made in discussion with MCDEM. If an emergency primarily involves multiple burn injuries, it is likely that the Ministry of Health will be required to act as lead agency with support and advice from the NBS.
3. Principles of Multiple Complex Burn Management in New Zealand

Planning for health emergencies should:

- encompass reduction, readiness, response and recovery
- enable an appropriate response to all potential hazards
- be applicable locally, regionally and nationally
- support the protection of all health service workers, health and disability service consumers and the population at large
- support services that are best able to meet the needs of patients/clients and their communities during and after an emergency event, even when resources are limited, and ensure that special provisions are made for hard-to-reach, vulnerable communities so that emergency responses do not create or exacerbate inequalities
- adopt an all-hazards (‘hazardscape’) approach and consider all natural and man-made hazards cumulatively across a given area
- recognise the importance of engaging with different cultures and communities, to ensure an inclusive approach
- include an awareness of the way resources, human and other, can be used to help people from culturally and linguistically diverse communities, and overseas visitors who may be unfamiliar with New Zealand practices
- accommodate the provision of welfare to health and disability providers’ staff affected by the emergency.

This Action Plan reflects the following principles agreed between burn service providers, their DHBs and the Ministry of Health.

New Zealand burn patients will be treated in New Zealand. In the event of a national health emergency being declared, the Ministry of Health will coordinate emergency management. This may include a request for international support and cooperation. Decanting patients to Australia is not an integral part of this Action Plan.

Burn patients will be treated by the people most skilled in burn management. Professionals skilled in burn management are predominantly located at the four RBUs. This has implications for the clinical staff assigned to triage a burn disaster and provide subsequent clinical care.

Requirement for local planning

RBUs and the NBC are expected to develop and document their own emergency response and recovery plans to meet the requirements of this Action Plan in conjunction with their DHBs. Planning will include managing high complex burn patients who would not normally receive ongoing treatment in the particular facility. Local planning will be coordinated with DHBs’ major trauma management plans and will include documented arrangements with key service providers such as ambulance services, emergency departments and regional hospitals without a burn service.

This Action Plan assumes that effective strategies to reduce risk and ensure readiness to cope with a burn emergency are in place throughout the NBS. It provides guidance to RBUs, the NBC and all DHBs with a focus on the response and recovery phases of emergency management according to the health sector alert code system.
Planning is expected to reflect the four ‘R’s structure accepted for national emergency planning in New Zealand, as follows:

**Reduction** involves a consideration of natural or man-made risks that are significant because of the likely adverse consequences they represent for human life and property. The key factor within the reduction phase is risk mitigation.

Risk mitigation strategies start with identifying and analysing of significant natural and man-made hazards. Analysis of these hazards, using a matrix based on the associated likelihood of emergency and potential consequences, enables calculation of a value representing the level of risk involved. The risk can then be prioritised. Thereafter a risk mitigation strategy can be developed to eliminate risks where practicable and, where not, to reduce the likelihood and magnitude of their impact.

**Readiness** involves planning and developing operational arrangements before an emergency happens. It includes considering response and recovery. It involves equipping, training and exercising in preparedness for all emergencies identified in risk analysis. All systems need to be developed, tested and refined in readiness for response.

**Response** involves those actions taken immediately after recognising an emergency is taking place or is imminent, during and after an emergency. It also involves the recovery of affected communities.

**Recovery** includes those processes that begin after the initial impact has been stabilised and extends until normal business has been restored. The aim is the immediate, medium-term and long-term holistic regeneration of a community following an emergency. Recovery also encompasses all opportunities to learn from an emergency response in order to reduce the risks from future emergencies. Health-related agencies from a local, regional, national or all-of-government level may be involved, and economic, social or legislative issues may be considered.

**Activation trigger**

Health emergency plans (HEPs) are activated when usual resources are overwhelmed or have the potential to be overwhelmed in a local, regional or national health emergency. For an event to trigger activation of a HEP, it must require more than the business-as-usual emergency management.

Appendix 5, which presents data derived from cases treated at the NBC, highlights the average resource requirements for delivering care to a burn patient, based on burn size and time from injury.

If a receiving RBU is unable (or likely to be unable) to provide the appropriate sustained clinical response to a burn incident, it will advise the Ministry of Health in conjunction with the NBS, to activate this Action Plan.

The NBC is the only unit with dedicated and protected burn operating theatre access. This is currently set at 1,440 minutes per week. Other RBUs use the acute surgery list, which is shared with other theatre users caring for acute surgical cases. When the operative requirement is greater than 1440 minutes per week, the RBUs may implement the options outlined in the ‘Local plan: decanting and reallocation to maximise capacity and resources’ section of this Action Plan.

**Sequence of response**

This Action Plan expands on and modifies the framework outlined in the 2006 ‘Guidelines for Dealing with Disasters Involving Large Numbers of Extensive Burns’, endorsed by the International Society for Burn Injuries (*Burns* 2006; 32: 933-9), so that it is compatible with the New Zealand
health system. Once this Action Plan has been activated, a sequence of events follows, as outlined below.

**Initial assessment – burn assessment and triage**

Burn-injured patients will normally be taken to the nearest hospital by first responders (such as an ambulance service), for assessment and treatment. In some instances, it may be beneficial to triage at the scene of the emergency. At other times, it may be beneficial to bring triage close to the scene of the emergency, or to triage life-threatening injuries, including the burn, at the closest regional trauma hospital (beyond the RBU).

In essence, a burn injury is not immediately life-threatening, and its assessment should be carried out after immediately life-threatening injuries have been stabilised and treated.

**Establishing types of burn injury and referring to RBUs**

Agreed referral criteria (see Appendix 2) determine which burn injuries require referral to an RBU. Each RBU has a predetermined catchment area collectively covering all of New Zealand; health providers within these regions are already familiar with the referral process.

The most severe burn injuries will be transferred from a RBU to the NBC for intense and specialised care. Due to the large resource demands of a severe burn injury (see Appendix 5), transfer to the NBC is not an automatic process. The RBUs and the NBS will use available capabilities and capacity and existing processes to manage the combined needs of existing and new burn patients.

**Caring for burn patients with associated major trauma**

There are established trauma guidelines on caring for major trauma patients, which prioritise treatment to address various life-threatening conditions (beginning with a focus on airway, breathing and circulation). Immediate treatment for burn patients with concomitant major trauma will be provided within a context of routine major trauma assessment, transport and treatment.

Although a burn injury remains a major threat to life, in the first 24–48 hours, so long as fluid resuscitation, emergency procedures such as escharotomies (splitting burnt skin to allow circulation to limbs and/or breathing), and wound care are performed by competent health professionals in a supportive environment under the guidance of the burn team, the patient’s transfer to a RBU or the NBC need not be immediate and can instead be planned and coordinated.

**Progression of care**

During the course of treatment, the needs of burn patients will vary, and health providers’ choices in terms of appropriate care become wider.

The immediate care needs of burn patients are the same as those of any other trauma patient. They can be delivered by existing first responders and established trauma centres, with support from burn teams, to ensure that there is adequate fluid resuscitation, temperature control, wound care and recognition of life- or limb-threatening constrictions requiring escharotomies.

Initial burn care (24–72 hours post-burn) is highly resource-dependent, and one focus of the NBS has been to concentrate the skills and resources required to care for patients with life-threatening burn injuries at the NBC at Middlemore Hospital. The major resource requirement during the initial
phase is operative (requiring surgeons, anaesthetists, theatre time and the ICU); allied health and
nursing requirements becoming more predominant in the later stages of care. The speed of an
individual patient’s progress, typically measured in weeks, is highly dependent on the burn size
(see Appendix 5).

Although there is a wide variation of methods of burn wound management practiced in the world,
the New Zealand NBS has agreed on the principles outlined in Appendix 1. These consensus
guidelines were developed not only to standardise care but also to facilitate the transfer of patients
requiring ongoing treatment.

The intermediate and rehabilitation phase occurs once the burn wound is sufficiently closed so
that the patient is no longer in a life-threatening condition. Further surgeries may be required;
these can be done at the NBC, an RBU or even a hospital with plastic surgery services.

Communication

Communication between RBUs and the NBC in an emergency

Referrals to the NBC are made following an agreed process, documented in the NBS Framework,
and are subject to bed availability (this includes intensive care beds), (see Appendix 3).

All burn injuries require a referral form to be completed by the referring clinician
(www.nationalburnservice.co.nz/pdf/referralform.pdf, see also Appendix 3); this form is
forwarded to and discussed with the local RBU. The process of referral follows the agreed pathway
as documented in the Guideline: Referral, Transfer and Discharge in the NBC

In an emergency, it is important that communication be maintained between affected RBUs, the
NBC, the local affected community and the concerned wider community. Communications staff
within DHBs will be responsible for communicating with the media.

Communication using the single-point-of-contact system (SPOC)

The single-point-of-contact (SPOC) system is a method used to provide effective 24-hours, seven-
days-a-week emergency communication between DHBs, their public health units and the Ministry.

The system is an integral component of readiness and remains in place at all times. It
supplements, but does not replace, normal day-to-day non-emergency communications channels
and processes within the NBS and associated DHBs.

The business-as-usual communication methods used by the NBC and the NBS – an on-call clinician
and a cascade system – will continue to be used in the event of an emergency response.

Local plan: decanting and reallocation to maximise capacity and resources

The high and variable resource needs associated with the care of a burn mean that multiple
options are required in order to provide a graduated response that will minimise the impact on
other health delivery areas.
Decanting of patients refers to the transfer of patients to make space for others. Implementation of this Action Plan may require either all or a combination of:

- transfer of burn patients at different stages of care out of the NBC to RBUs (or vice versa), to make resources available for new burn patients and/or vice versa
- transfer of non-burn patients out of the hospitals where the NBC or RBUs are located to other hospitals, including transfer of non-burn ICU patients within the New Zealand ICU network, to ensure adequate capacity in ICU beds located at RBUs and the NBC.

Reallocating involves reprioritisation of available resources. Implementation of this Action Plan may require either all or a combination of the following.

- Burn team members (such as plastic surgeons, nurses or anaesthetists) employed at RBUs or the NBC and routinely involved in burn care typically have other responsibilities within the DHB. In an emergency, these responsibilities may be deferred to others with the appropriate skills in the same DHB to allow the burn team to concentrate on delivering burn care.
- Other staff (such as plastic surgeons) normally employed at DHBs in a non-burn capacity who are capable of supporting the burn team may be redeployed to burn care.

To increase capacity, implementation of this Action Plan may require all or a combination of:

- increasing the frequency and number of operating lists per week dedicated to burn care (which will require reduction in other surgical services not involved in the current emergency)
- increasing the duration of theatre shifts
- increasing in-patient burn injury bed capacity
- increasing the availability of support services (including but not limited to allied health, nursing, laboratory and radiology services).

Recruiting involves calling in additional resources not normally available. Implementing this Action Plan may require all or a combination of:

- leave cancellation
- roster alteration
- part-time employees taking on full-time employment
- recruitment of professionals with appropriate skills from outside the DHB (locally, regionally, nationally or internationally).

Rostering and coordination of limited resources is vitally important given the need for sustained intervention by a small number of capable health care professionals that is likely to arise in an emergency involving burn injuries. Staff fatigue and burn-out is best managed by rotating and relieving staff in a pre-determined and controlled manner. Implementing this Action Plan may require both or a combination of the following:

- implementing the processes outlined above
- coordinating teams to provide continuous but limited periods of service (for example two weeks), to ensure that safe work hours and rest periods during the day, between shifts and between periods of service, are maintained.
4. Health Sector Roles and Responsibilities

The responses required of the stakeholder groups identified in the following table are based on emergency plans developed by DHBs locally and regionally; and more specific plans developed by the RBUs and the NBC.

Primary responsibility for the management of an emergency lies with the affected local provider, which may be the local DHB or the DHB regional group, if a regional emergency plan is activated. At each phase of an emergency, specific actions need to be taken at the local, regional and national level.

Ambulance responsibilities

Mass casualty incident (MCI) including a multiple complex burn (MCB) response

The expected sequence of events in the case of an MCI/MCB emergency is as follows:

1. An MCI with MCB occurs. (This will probably involve police in a search-and-rescue type operation and/or MCDEM in a mass evacuation.)

2. Emergency services are notified by someone telephoning 111 and identifying the appropriate emergency service. The 111 National Crisis Communications Centre (NCCC) will then transfer the call to one of the three Emergency Ambulance Communications Centres (EACCs), which are located in Auckland, Wellington and Christchurch.

3. The initial assessment of an incident occurs by the first responders at the scene using standard risk assessment processes.

4. Once an incident has been classified by an EACC, local DHBs and the Ministry of Health will be notified. Police and fire services are informed routinely by the Communications Centres. Civil Defence Emergency Management (CDEM) groups will be informed of all serious incidents.

5. Ambulance services will attend the scene and further assess the incident risk. Depending on what they assess the risks to be, they will develop an escalation and response plan.

If regional ambulance resources are overwhelmed, ambulance services will activate their NCCC, which will coordinate with the NHCC and other national emergency management structures as required. The NCCC will coordinate the ambulance response.

St John maintains the National Transport Plan for an MCI on behalf of the ambulance sector. This Plan addresses various transport options, which include road-based ambulances, rotor and fixed-wing civilian and Defence Force aircraft, and other private transport options such as trains and buses. The Transport Plan focuses on transporting the injured to the appropriate DHB/s and decanting the receiving DHB/s in order to increase their capacity.
<table>
<thead>
<tr>
<th>Roles and responsibilities by health sector alert code</th>
<th>National Health Emergency Plan: Multiple Complex Burn Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambulance services</strong></td>
<td><strong>Principal role:</strong> Provides first response</td>
</tr>
<tr>
<td><strong>District Health Boards</strong></td>
<td><strong>Principal role:</strong> Local operational management of response</td>
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<tr>
<td><strong>Regional Burns Units</strong></td>
<td><strong>Principal role:</strong> Regional coordination of burn management with DHBs</td>
</tr>
<tr>
<td><strong>National Burns Centre</strong></td>
<td><strong>Principal role:</strong> National coordination of burn management between RBUs</td>
</tr>
<tr>
<td><strong>Ministry of Health</strong></td>
<td><strong>Principal role:</strong> National and international coordination</td>
</tr>
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</table>

**Key roles and responsibilities across all alert codes**

- Coordinates health sector response at the operational level
- Provides information to NBC and DHBs of any potential need to activate the plan
- Provides strategic direction on health sector response at the national level
- Liaises with other agencies at the national level
- Liaises with international agencies

**Counties Manukau DHB (location of NBC)**

- Coordinates and manages the health sector response in their own region to ensure the NBC has maximum capacity by:
  - Activating local Memoranda of Understanding (MoUs) to decant patients from burn and ICU beds
  - "Ring fencing" theatre time for burn operations
- Provides technical advisory group(s) and ensures they analyse critical data as required
- Liaises with other agencies at the local level
- Liaises with Ministry to implement local recovery plan

**Senior medical staff within the NBS and NBC liaise with each other to determine clinical capacity throughout the NBS/Ministry, NBC and RBUs and liaise with the Ministry regarding sustainable capacity through SPOC system**

**Provides information and advice to the Minister**

- Provides information to NBC and RBUs of any potential need to activate the plan
- Provides information to the Ministry and DHBs of any potential need to activate the Plan
- Provides information and advice to the Minister
- Provides strategic direction on health sector response at the national level
- Liaises with other agencies at the national level
- Liaises with international agencies

**Acts as a link between the NBC and RBUs and liaises with Ministry regarding sustainable capacity through SPOC system**

**National Health Emergency Plan:**

- Communicates with:
  - local DHBs to assist with local/regional response to a burn emergency
  - NBC regarding clinical support matters including decanting and transfer of patients
- Supports transfer of burn patients
- Coordinates health sector operational response at the national level
- Provides information to NBC and RBUs and DHBs of any potential need to activate the Plan
- Provides information to the Ministry and DHBs of any potential need to activate the Plan
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- Provides information to the Ministry and DHBs of any potential need to activate the Plan
- Provides information and advice to the Minister
- Provides clinical and public health advice on control and management
- Approves/directs distribution of national reserve supplies
- Ensures that adequate supplies and equipment are available to support NBC in an extreme emergency
- Plans for recovery
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</tr>
</thead>
</table>
| **Code White: Information** | - Monitors situation  
- Reviews response plans  
- Advises staff and checks their availability  
- Checks equipment and supplies | - Monitors situation and obtains intelligence reports and advice from ambulance services  
- Advises all relevant staff, services and service providers of the event and developing intelligence  
- Liaises with the Ministry regarding media statements  
- Reviews local and regional HEPs  
- Prepares to activate emergency plans  
- Liaises with other emergency management agencies within the region  
**Counties Manukau DHB (location of NBC)**  
- Liaises with NBC in preliminary planning  
- Prepares to decant ICU | - Advises appropriate staff and NBS of Code White  
- Reviews sustainable capacity using Appendix Five as a guide  
- Commences preliminary planning to increase capacity with a particular emphasis on ICU capacity  
- Reviews potential availability (liaising with human resources departments), of staff with burn experience  
- Alerts emergency equipment suppliers  
**Other RBUs**  
- Review sustainable capacity, using Appendix Five as a guide | - Reviews sustainable capacity, using Appendix Five as a guide  
- Commences preliminary planning to increase capacity with a particular emphasis on ICU capacity  
- Reviews potential availability (liaising with Counties Manukau DHB human resources department), of staff with burn experience  
- Investigates possibility of decanting non-burn/plastic clinical load onto other suitably credentialed clinicians  
- Liaises with NBS to determine additional capacity nationally  
- Alerts emergency equipment suppliers  
- Provides clinical advice to the Ministry | - Issues Code White Alert through SPOC system  
- Monitors situation and continues surveillance  
- May activate a national incident on Emergency Management Information System (EMIS)  
- Advises DHB chief executives, DHB SPOC and all public health unit managers of emerging situation and potential developments  
- Provides media and public with information and advice  
- Liaises with international agencies |
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<th>National Burn Centre</th>
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<tbody>
<tr>
<td>Code Yellow: Standby</td>
<td>Provides first response</td>
<td>Continues to monitor situation, confirm staff and their availability</td>
<td>Preparations to activate DHB emergency operations centre (EOC)</td>
<td>RBU closest to incident</td>
<td>Issues Code Yellow Alert through SPOC</td>
</tr>
<tr>
<td></td>
<td>Provides first response</td>
<td>Prepares equipment and supplies</td>
<td>Identifies and appoints DHB incident management team</td>
<td>DHB closest to the incident</td>
<td>Identifies and appoints national incident management team</td>
</tr>
<tr>
<td></td>
<td>Provides first response</td>
<td>Prepares to activate regional coordination</td>
<td>Completes arrangements to decant existing patients to free beds for new incoming burns</td>
<td>Prepares to activate regional coordination</td>
<td>Activates a national incident management team</td>
</tr>
<tr>
<td></td>
<td>Provides first response</td>
<td>Advises and prepares all staff, service and service providers</td>
<td>Completes arrangements to decant patients to free beds for incident admissions</td>
<td>Completes arrangements to decant patients to free beds for incident admissions</td>
<td>Assesses whether activation of the NHCC is required, and activates if necessary</td>
</tr>
<tr>
<td></td>
<td>Provides first response</td>
<td>Manages liaison with local agencies</td>
<td>Monitors local situation and liaises with the Ministry</td>
<td>Monitors local situation and liaises with the Ministry</td>
<td>Determines and communicates strategic actions for response to the incident</td>
</tr>
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<td></td>
<td>Provides first response</td>
<td>Manages liaison with local agencies</td>
<td>Manages liaison with local agencies</td>
<td>Manages liaison with local agencies</td>
<td>Identifies national technical advisory group(s) as required</td>
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<tr>
<td></td>
<td>Provides first response</td>
<td>Facilitates transfer activities</td>
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<td>Advises the health sector via the SPOC system</td>
</tr>
<tr>
<td></td>
<td>Provides first response</td>
<td>Prepares to accept decontaminated burn patients from NBC and RBU closest to incident</td>
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<td>Manages liaison with other government agencies</td>
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<td>Ministry of Health Principal role: National and international coordination</td>
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</tr>
<tr>
<td><strong>Code Red: Activation</strong></td>
<td>• Performs scene triage • Performs initial treatment • Identifies appropriate DHB or other health provider to treat the injured • Transports patients in order of priority • Coordinates and communicates with other emergency service providers (such as fire and police) • Alerts the closest DHB • Alerts the Ministry • May activate (Ambulance) National Co-ordination Centre • May inform CDEM Groups • May implement national transport plan • May request DHBs supply expert assistance to the incident</td>
<td>DHB closest to the incident • Activates DHB EOC • Activates DHB incident management team • Manages DHB primary, secondary and public health service response • Liaises with other agencies at a district level • Provides Regional Co-ordination Centre with DHB/community intelligence • Facilitates transfer of burn patients to RBUs and NBC • Works with RBU to facilitate recovery planning</td>
<td>RBU closest to incident • Activates RBU emergency plan • Decants patients from RBU as appropriate • Reallocates or recruits additional staff and resources as appropriate • Receives burn patients via emergency department • Assesses and treats patients according to clinical priority • Engages in inter-clinician discussion within NBS to: – prioritise transfer of patients from RBU to RBU; and RBU to NBC – monitor patient progress and transfer to and from NBC according to clinical need</td>
<td>• Activates NBC emergency plan • Decants burn patients as appropriate • Reallocates clinical resources to provide necessary clinical response, as guided by Appendix 5 • Reallocates or recruits additional staff and resources as appropriate • Receives burn patients via emergency department • Assesses and treats patients according to clinical priority • Engages in inter-clinician discussion within NBS to: – prioritise transfer of patients from RBU to RBU; and RBU to NBC – monitor patient progress and transfer to and from NBC according to clinical need</td>
<td>• Issues Code Red Alert; thereafter communicates via the four regional coordinators • Activates a national incident on EMIS • Coordinates health response at national level • Activates the NHCC • Activates national technical advisory group • Monitors the situation and revises and communicates strategic actions for response • Approves/directs distribution of national reserve supplies • Considers strategic recovery issues • Provides clinical and public health advice on control and management • Carries out national public information management activities • Manages liaison with other government agencies • Manages liaison with international agencies • Implements recovery planning</td>
</tr>
</tbody>
</table>

(Continued on next page)
**Code Red: Activation**

<table>
<thead>
<tr>
<th>Health sector alert code</th>
<th>Ambulance services</th>
<th>District Health Boards</th>
<th>Regional Burn Units</th>
<th>National Burn Centre</th>
<th>Ministry of Health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Principal role: Provides first response</td>
<td>Principal role: Local operational management of response</td>
<td>Principal role: Regional coordination of burn management with DHB</td>
<td>Principal role: National coordination of burn management between RBUs</td>
<td>Principal role: National and international coordination</td>
</tr>
<tr>
<td><strong>Other RBUs</strong></td>
<td></td>
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<td>(Continued from previous page)</td>
<td>(Continued from previous page)</td>
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<tr>
<td><strong>Decant patients as required</strong></td>
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<tr>
<td><strong>Receive transferred burn patients as required, transferring to RBU/ICU according to clinical need</strong></td>
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<tr>
<td><strong>Assess and treats patients according to clinical priority</strong></td>
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<tr>
<td><strong>Engage in inter-clinician discussion within NBS to prioritise of transfer patients from RBU to RBU and RBU to NBC</strong></td>
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<tr>
<td><strong>Monitor patient progress and transfer to and from NBC according to clinical need</strong></td>
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<tr>
<td><strong>Liaises with Ministry through SPOC on the sustainable capacity of the NBS</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Plans transfer of patients within New Zealand</strong></td>
<td></td>
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<tr>
<td><strong>Commences recovery planning:</strong></td>
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<tr>
<td>– for NBC</td>
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<tr>
<td>– within the NBS</td>
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<tr>
<td>National Burn Centre</td>
<td>Principal role: National coordination of burn management between RBUs</td>
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<tr>
<td>Ministry of Health</td>
<td>Principal role: National and international coordination</td>
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<tr>
<td>Code Green:</td>
<td>Stand down</td>
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<td></td>
<td>Issues: Code Green Alert</td>
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<td></td>
<td>Advises other government and international agencies of stand down</td>
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<td>Advises media and public</td>
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<td></td>
<td>Stands down Ministry incident management team</td>
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<tr>
<td></td>
<td>Stands down NHCC</td>
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<td></td>
<td>Focuses activities on national recovery issues within the health sector</td>
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<td></td>
<td>Implements recovery plan in conjunction with other agencies on recovery</td>
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<td></td>
<td>Supplies national information on recovery</td>
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<td></td>
<td>Manages national debrief and evaluation of events</td>
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<tr>
<td></td>
<td>Reviews plans</td>
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<table>
<thead>
<tr>
<th>Regional Burn Units</th>
<th>Principal role: Regional coordination of burn management with DHB</th>
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</thead>
<tbody>
<tr>
<td>DHB closest to incident</td>
<td>Activates RBU recovery plan</td>
</tr>
<tr>
<td></td>
<td>Stands down DHB EOC incident management team</td>
</tr>
<tr>
<td></td>
<td>Focuses on recovery activities in the region</td>
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<tr>
<td></td>
<td>Facilitates debriefs</td>
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<td></td>
<td>Provides Ministry with information following debriefs</td>
</tr>
<tr>
<td></td>
<td>Reviews and updates plans</td>
</tr>
<tr>
<td>Other RBUs</td>
<td>Activate RBU recovery plan</td>
</tr>
<tr>
<td></td>
<td>Transfer out-of-area patients back to local RBUs according to NBS criteria</td>
</tr>
<tr>
<td></td>
<td>Debriefs and reviews the local RBU emergency plan with staff and emergency services and updates plan as necessary</td>
</tr>
<tr>
<td></td>
<td>Reviews plans</td>
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</tbody>
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<thead>
<tr>
<th>District Health Boards</th>
<th>Principal role: Local operational management of response</th>
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<td></td>
<td>Facilitates debriefs</td>
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<td></td>
<td>Provides Ministry with information following debriefs</td>
</tr>
<tr>
<td></td>
<td>Reviews and updates plans</td>
</tr>
<tr>
<td>Counties Manukau DHB</td>
<td>(location of NBC)</td>
</tr>
<tr>
<td></td>
<td>Transfers patients back to NBC EOC according to NBS criteria</td>
</tr>
<tr>
<td></td>
<td>Debriefs and reviews the local NBC emergency plan with staff and emergency services and updates plan as necessary</td>
</tr>
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<td>Other RBUs</td>
<td>Debriefs and reviews the local NBC emergency plan with staff and emergency services and updates plan as necessary</td>
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</table>

<table>
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<tr>
<th>Ambulance services</th>
<th>Principal role: Provides first response</th>
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<tbody>
<tr>
<td>Code Green: Stand down</td>
<td>Stands down (Ambulance) National Co-ordination Centre</td>
</tr>
<tr>
<td></td>
<td>Provides first response</td>
</tr>
<tr>
<td></td>
<td>Facilitates debriefs</td>
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</table>
Glossary and Abbreviations

**District Health Emergency Plan (DHEP):** a plan that describes the health emergency functions and capability required by the DHB, which takes an all-hazards approach and provides for both immediate events, short duration events and extended emergencies, on both small and large scales, as relevant to the DHB population. The DHEP will be built around the four Rs of emergency management: reduction, readiness, response and recovery.

**Emergency Ambulance Communications Centre (EACC):** a term used to describe one of three Ambulance Communications Centres located in Auckland, Wellington and Christchurch that dispatch the country's fleet of more than 600 ambulances, 250 rural doctors and nurses (under the PRIME programme), more than 40 emergency helicopters, the coastguard and other modes of response.

**Emergency Operations Centre (EOC):** an established facility where the response to an incident may be supported.

**Health Sector Emergency Management Information System (EMIS):** a web-based emergency information system that is used as the primary tool within the health sector for the management of local, regional and national emergencies. EMIS complements existing business-as-usual systems (such as EpiSurv and patient management systems).

**Ministry of Civil Defence and Emergency Management (MCDEM):** the Government's lead advisor in making New Zealand and its communities resilient to hazards and disasters through a risk management approach to the four Rs.

**National Burn Centre (NBC):** a centre that provides inpatient care for the highest level of burn injury complexity, defined as equal to or greater than 30 percent TBSA.

**National Burn Service (NBS):** the four regional burn units and the National Burn Centre provide an integrated national service for all burn patients within New Zealand.

**National Health Co-ordination Centre (NHCC):** a service that provides national coordination of the health sector in an emergency. It is the main conduit for intelligence information across the health sector.

**National Health Emergency Plan (NHEP):** a Ministry 'umbrella' plan incorporating other health emergency-specific action plans; for example, the National Health Emergency: Multiple Complex Burn Action Plan, and the New Zealand Influenza Pandemic Action Plan. The NHEP provides guidance for the New Zealand health and disability sector for emergency management.

**Regional burn unit (RBU):** a unit that provides specialised and acute burn care treatment to patients based on the Australian and New Zealand Burn Association (ANZBA) referral criteria.

**Regional Health Emergency Plan (RHEP):** a plan that sets out the proposed response of DHBs in a given region to a regional incident and establishes a generic process for the management of regional incidents, irrespective of origin. It contains task assignments, assignments of roles and responsibilities, standard forms, and other relevant guidance.

**Single Point of Contact (SPOC):** a system used to facilitate communications in the health sector.

**Sustainable capacity:** analysis of treatment data for varying levels of burn injury used to develop an interim model to predict sustainable capacity in RBUs and the NBC. Prospective data collection and analysis will provide more accurate and detailed information over time. This model and the ongoing communication system within the NBS form the basis for the safe management of people with burn injury on a day-to-day basis and in a regional or national emergency.
Appendix 1: Management of Burn Care Services

1) Organisation and management of burn care services in New Zealand

Burn care services in New Zealand are provided by primary, secondary and tertiary level health care providers, according to the severity and complexity of the burn injury.
2) Escalation pathway for the management of a multiple complex burn emergency

**Code White**

- Local DHB enacts emergency plan
- Regional Health Emergency Plan (RHEP) ready to activate
- Other RBUs and NBC on standby

**Can the emergency be managed locally?**

- Yes
  - Local RBU emergency plan used to manage incident
  - Other RBUs/NBC remain on standby and may supply clinical expertise if required

- No
  - CAN THE OTHER RBUS AND NBC COPE WITH CASUALTIES WITHIN THEIR SUSTAINABLE CAPACITY?

**Code Yellow**

- Can the other RBUs and NBC cope with casualties within their sustainable capacity?

  - Yes
    - NBS’s emergency plan used to manage incident
  
  - No
    - CAN THE MINISTRY AND OTHER RBUS/NBC COPE WITH CASUALTIES WITHIN THEIR SUSTAINABLE CAPACITY?

**Code Red**

- Can the Ministry and other RBUs/NBC cope with casualties within their sustainable capacity?

  - Yes
    - Ministry action, responsibility and authority activated under the NHEP
  
  - No
    - CAN THE OTHER RBUS/NBC ON STANDBY COPE WITH CASUALTIES WITHIN THEIR SUSTAINABLE CAPACITY?

**Level 2 – Major incident – NBC**

- NBC/RBUs and their DHBs activate emergency plans
- Activate relevant DHB plans
- All other RHEPs ready to activate

**Level 3 – National Health Emergency**

- Ministry of Health assumes coordination of emergency
- NHEP: Multiple Complex Burn Action Plan activated

**Local and regional DHB action, responsibility and authority activated under NHEP**

**NBS action, responsibility and authority activated under NHEP**

**National Health Emergency Plan: Multiple Complex Burn Action Plan**
Appendix 2: Referrals

1) Burn referral criteria
The Australian and New Zealand Burn Association (ANZBA) recommends that patients should be referred to an RBU if they have:

- burns equal to or greater than 10 percent of TBSA
- burn in certain special areas (for example, involving the face, hands, feet, genitalia, perineum, or major joints)
- a full-thickness burn affecting more than five percent TBSA
- an electrical burn (including lightning injury)
- chemical burns
- a burn injury with an inhalation injury
- circumferential burn of the limbs or chest
- burns at the extremes of age (young children and the elderly)
- a burn injury with a pre-existing medical condition that could complicate management, prolong recovery, or affect mortality
- a burn injury with concomitant trauma (for example a fracture) in which the burn injury poses the greater immediate risk of morbidity or mortality.

Referral to the National Burn Centre
Severe burn injuries warrant consultation with, and typically transfer to, the NBC. These include:

- burns equal to or greater than 30 percent TBSA
- patients predicted to require prolonged ventilation (greater than 48 hours)
- full-thickness burns greater than 15 percent TBSA in the very young or very old
- electrical burns – caused by high voltage, with underlying tissue damage
- significant chemical burns.

Referrals to the NBC are made through the local RBU.

The NBS's website www.nationalburnservice.co.nz details the referral process and provides a resource for both clinicians and service users (see also Appendix 3).
2) The burn injury referral pathway

Referring doctor rings RBU

Suitable for NBC referral?

Yes

Transfer to RBU

No

Referring consultant and/or RBU consultant rings on-call burn nurse and faxes referral to RBU and NBC

Conference call
On-call burn nurse calls back referring consultant and/or RBU consultant with on-call NBC consultant to discuss referral

Suitable for NBC referral?

Yes

Is there surgical capacity?

Yes

Needs ICU bedspace?

Yes

Conference call
On-call burn nurse and NBC consultant liaise with Middlemore Hospital ICU consultant. May require additional call to referring consultant/RBU consultant for clarification OR Starship Paediatric ICU consultant

Accepted by ICU

No

New Call
On-call burn nurse and NBC consultant contact referring consultant and RBU consultant about 'decline' within two hours of receipt of faxed referral

Yes

Transfer to RBU

No

Decline Referral
On-call burn nurse faxes referring consultants and RBU consultant confirmation of 'declined' referral

Decanting Policy
Consider decanting a less acute burn to either the referring RBU or back to domicile RBU

Transfer to NBC
On-call burn nurse to fax 'acceptance' of referral back to referring consultant and RBU consultant

New Call
On-call burn nurse and NBC consultant contact referring consultant and RBU consultant about acceptance within two hours of receipt of faxed referral

Transfer to Middlemore Hospital ICU. On-call burn nurse to fax 'acceptance' of referral back to referring consultant and RBU consultant
Appendix 3: National Burn Service Referral Form

No burn patient can be transferred to the National Burn Centre or Starship without the involvement of their regional burn unit. This important step cannot be bypassed.

Referral criteria for regional burn unit
- Burns greater than 10% total body surface area (TBSA) or 5% in a child
- Burns of special areas, eg, the face, hands, feet, genitalia, perineum, and major joints
- Full thickness burns greater than 5% TBSA
- Electrical burns (including lightning injury)
- Chemical burns
- Burn injury with inhalation injury
- Circumferential burns of the limbs or chest
- Burns at the extremes of age, ie, young children and the elderly
- Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery or affect mortality
- Any patient with burns and concomitant trauma (eg, fractures) in which the burn injury poses the greater immediate risk of morbidity or mortality

Burn patient arrives
- complete trauma ABC (if required)
- complete first aid cooling (if not done)

Patient meets criteria for discussion
+ transfer to a regional burn unit/plastic surgery unit

Fax referral to regional burn unit and discuss case with on-call plastic surgery registrar
- Email photos to RBU

Fax and phone referral to: Please tick applicable box below

<table>
<thead>
<tr>
<th>Fax and phone referral to</th>
<th>Please tick applicable box below</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christchurch Hospital</td>
<td>Ph: [ ] (03) 364 0640 (please ask for on-call plastic surgery registrar)</td>
</tr>
<tr>
<td></td>
<td>Fax: [ ] (03) 364 0456 (Department of Plastic Surgery)</td>
</tr>
<tr>
<td>Hutt Hospital</td>
<td>Ph: [ ] (04) 566 6999 (please ask for on-call plastic surgery registrar)</td>
</tr>
<tr>
<td></td>
<td>Fax: [ ] (04) 570 9239 (Plastic and Burn Ward)</td>
</tr>
<tr>
<td></td>
<td>Email photos: <a href="mailto:referrals_plastics@huttvalleydhb.org.nz">referrals_plastics@huttvalleydhb.org.nz</a></td>
</tr>
<tr>
<td>Waikato Hospital</td>
<td>Ph: [ ] (07) 839 8899 (please ask for on-call plastic surgery registrar)</td>
</tr>
<tr>
<td></td>
<td>Fax: [ ] (07) 839 8725 (Plastic Surgery Booking Clerk Office)</td>
</tr>
<tr>
<td>National Burn Centre</td>
<td>Ph: [ ] (09) 276 0000 (please ask for on-call plastic surgery registrar)</td>
</tr>
<tr>
<td>Middlemore Hospital</td>
<td>Fax: [ ] (09) 276 0114</td>
</tr>
<tr>
<td></td>
<td>Email photos: <a href="mailto:plasticreferrals@middlemore.co.nz">plasticreferrals@middlemore.co.nz</a></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:oncallburnsnurse@middlemore.co.nz">oncallburnsnurse@middlemore.co.nz</a></td>
</tr>
</tbody>
</table>

Fax from:
| Designation: |
| Date: |
| Number of pages: 3 |
Initial Treating Dr: ____________________________ Ph: ______________________
Designation: __________________________________ Fax: ______________________

Injury Details:
Time/Date of Injury: ___________________________ ACC 45 No. ______________________
Arrival Date/Time at Hospital: ____________________________

How Accident Happened:
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Burn occurred in confined space? Yes ☐ No ☐
Was there an explosion? Yes ☐ No ☐

Past Medical History: ______________________________________________________________

Daily Alcohol Intake: _________________________________________________________________

Current Medications: _________________________________________________________________

Allergies: Yes/No: __________________________________________________________________

Discuss between which consultants?
RBU SMO: ____________________________ NBC SMO: ____________________________

Discussion (pls circle): Transfer to NBC ☐ RBU ☐ Other ____________________________

Reason not transferred to NHC:

<table>
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<th>Transfer Checklist:</th>
<th>Yes</th>
<th>No</th>
<th>n/a</th>
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<tr>
<td>Intubated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus toxoid given</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Naso-gastric tube</td>
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<tr>
<td>Oxygen</td>
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<td>Escharotomies</td>
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<tr>
<td>Uretheral catheter</td>
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<td>Venous access</td>
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<tr>
<td>Blood gases</td>
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<tr>
<td>Urea: electrolytes, full blood count</td>
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<tr>
<td>Urinalysis</td>
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<td></td>
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<tr>
<td>Jewellery removed</td>
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<tr>
<td>Baseline data attached</td>
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<tr>
<td>Fluid Balance Chart attached</td>
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<tr>
<td>Burns Chart attached (Lund &amp; Browder)</td>
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<tr>
<td>X-rays and notes (copies) sent</td>
<td></td>
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</table>
National Health Emergency Plan: Multiple Complex Burn Action Plan

Lund and Browder Burn Chart
Areas Burned

Size of Burn (% body surface area):

Partial Thickness
Full Thickness

<table>
<thead>
<tr>
<th>Area</th>
<th>Age 0</th>
<th>1</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>Adult</th>
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</thead>
<tbody>
<tr>
<td>A = 1/2 of head</td>
<td>9 1/2</td>
<td>8 1/2</td>
<td>6 1/2</td>
<td>5 1/2</td>
<td>4 1/2</td>
<td>3 1/2</td>
</tr>
<tr>
<td>B = 1/2 of one thigh</td>
<td>2 1/4</td>
<td>3 1/4</td>
<td>4</td>
<td>4 1/4</td>
<td>4 1/2</td>
<td>4 1/4</td>
</tr>
<tr>
<td>C = 1/2 of one leg</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/4</td>
<td>3</td>
<td>3 1/4</td>
<td>3 1/2</td>
</tr>
</tbody>
</table>

Patient Weight: _________ kg

Fluid Replacement Guide
First 24 hours
3–4 mL x kg x % burn
- Crystalloid (eg, Plasmalyte, Lactated Ringers)
  Do not include simple erythema.

Give approximately half in first 8 hours from time of burn, half in next 16 hours

For children add maintenance fluids
- use Dextrose Saline:
  Up to 10kg: 4 mL/kg/hr
  + from 10–20kg: 2 mL/kg/hr
  + each kg >20kg: 1 mL/kg/hr

NB: This formula is a guideline only and does not replace clinical judgement. Adjustment may be necessary to maintain urine output.

Wound Management

Please consult with regional burn unit for advice prior to applying any wound care product.

Monitoring

Urine output
Adults: 0.5 mL/kg/hr
Children: 1 mL/kg/hr

(haemoglobinuria / myoglobinuria
⇒ 1–2 mL/kg/hr)

NB: This formula is a guideline only and does not replace clinical judgement. Adjustment may be necessary to maintain urine output.

<table>
<thead>
<tr>
<th>Time (hourly)</th>
<th>Rate fluid in/hr</th>
<th>Urine out/hr</th>
</tr>
</thead>
</table>

File Name: W:\National Burn Centre\Models of Care\NBC Referrals\NBC Referral Form for NZ revised 240111 v13.doc
Last Updated: 24 January 2011
Version: 2.1
Review Date: June 2011
Appendix 4: Suggested Pathways of Burn Care

1) Fluid resuscitation pathway

AIM – minimal amount of fluid required to maintain adequate urine output

Fluid Resuscitation

- children with burn injury greater than 10% TBSA (exclude erythema) AND add maintenance
- adults with a burn injury greater than 15% TBSA (exclude erythema)
- any patient who cannot tolerate enteral resuscitation

NB: Start enteral feeding and subtract this amount from intravenous (IV) resuscitation fluid

Increase naso-gastric (NG) feeds by 10–20 mL/hour and subtract amount from IV resuscitation to maintain same TOTAL mL/hour

Tolerating NG/naso-jejunal feeds?

Yes

No

Decrease* NG feeds by 10–20 mL/hour and add amount from IV resuscitation to maintain same TOTAL mL/hour

Hourly urine output at goal?

- 0.5 mL/kg adult
- 1.0 mL/kg child
- 1–2 mL/kg if haemochromagenses present

No – Less than goal

Variance greater than 50 percent of goal?

Yes

Decrease infusion rate by 20%

No

Decrease infusion rate by 40%

Yes

No

Greater than goal

Increase infusion rate by 20% and bolus 20 mL/kg

Increase infusion rate by 20%

*Decrease in tolerance of NG feeds is an early sign of sepsis.
2) Burn wound management pathway

Primary and secondary survey
- treat life-threatening injuries

Complete first aid
- 20 minutes, tepid running water
- up to 3 hours post burn

Assessment
- burn size (see Lund and Browder chart)
- burn depth

Referral criteria for RBU
- burns greater than 10% TBSA adult, greater than 5% TBSA child
- full thickness burns greater than 5% TBSA
- special area (face, hands, feet, genitalia, perineum or major joints)
- electrical burns
- chemical burns
- associated inhalation injury
- circumferential burns of the limbs or chest
- burns at the extremes of age (children or elderly)
- pre-existing medical conditions that could complicate management, prolong recovery or affect mortality
- associated trauma
- suspected non-accidental injury

RBUs
Auckland region:
Counties Manukau DHB
Ph: (09) 276 0000
(ask for on-call plastic surgery registrar)
Fax: (09) 276 0114

Waikato region:
Waikato DHB
Ph: (07) 839 8899
(ask for on-call plastic surgery registrar)
Fax: (07) 839 8725

Wellington region:
Hutt Valley DHB
Ph: (04) 566 6999
(ask for on-call plastic surgery registrar)
Fax: (04) 570 9239

Christchurch region:
Canterbury DHB
Ph: (03) 364 0640
(ask for on-call plastic surgery registrar)
Fax: (03) 364 0456

NB: Referral to the NBC is via one of the RBUs only

Epidermal
- should heal

Superficial/mid-dermal
- should heal within 14 days

Deep dermal/full thickness
- will probably require surgery

Moisturising cream

- Antimicrobial dressing/specialist dressing
- Blister and oedema management
- Pain relief

Day Three: reassessment

Intact skin?

Yes

Healed. Continue moisturiser and sunblock

Healed, Continue moisturiser and sunblock. Consider scar and rehabilitation needs

No

Burn depth progression?

Yes

Consider surgery

No

Change to moist wound healing product if possible, otherwise continue with antimicrobial dressing.

Reassess every 3–5 days. Monitor for signs of wound infection or sepsis

Likely healed less than three weeks post burn?

Yes

Healed

Consider surgery

No

Healed, Continue moisturiser and sunblock

Change to moist wound healing product if possible, otherwise continue with antimicrobial dressing.

Yes

Surgery

No
3) Surgical burn care pathway

- **Comfort care?**
  - No: Comfort care pathway
  - Yes: Comfort care pathway

- **Patient stable?**
  - No: Benefits from delay? Yes: Re-look in 24 to 48 hours
  - Yes: Operate

**Benefits from delay?**
- Yes: Re-look in 24 to 48 hours
- No: Comfort care pathway

**Pain. Excise burn and cover. Priorities are:**
- line sites
- tracheostomy sites
- hands and elbows

**Sure of burn depth?**
- No: Sure of burn depth? Yes: Operate
- Yes: Full thickness/ deep dermal?

**Full thickness/ deep dermal?**
- No: Sure of burn depth? Yes: Operate
- Yes: Excise – either all or in sections

**Confident about wound bed?**
- No: Patient still stable post debridement?
  - No: Patient still stable post debridement?
    - No: Graft areas possible. Priorities are:
      - line sites
      - tracheostomy sites
      - hands and elbows
    - Yes: Sufficient donor sites available?
      - Yes: Auto-graft
      - No: Consider rundown/test shave + /– Acticoat

**Consider:**
- Biobrane or Aquacel Ag or Acticoat absorbent if superficial dermal

**Operate**

**Sure of burn depth?**
- Yes: Full thickness/ deep dermal?
- No: Sure of burn depth?

**Full thickness/ deep dermal?**
- Yes: Excise – either all or in sections
- No: Sure of burn depth?

**Confident about wound bed?**
- No: Patient still stable post debridement?
  - No: Graft areas possible. Priorities are:
    - line sites
    - tracheostomy sites
    - hands and elbows
  - Yes: Sufficient donor sites available?
    - Yes: Auto-graft
    - No: Consider rundown/test shave + /– Acticoat

**Consider:**
- Biobrane or Aquacel Ag or Acticoat absorbent if superficial dermal

**Operate**

**Sure of burn depth?**
- Yes: Full thickness/ deep dermal?
- No: Sure of burn depth?

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**Operate**

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- Yes: Full thickness/ deep dermal?
- No: Sure of burn depth?

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    - hands and elbows
  - Yes: Sufficient donor sites available?
    - Yes: Auto-graft
    - No: Consider rundown/test shave + /– Acticoat

**Consider:**
- Biobrane or Aquacel Ag or Acticoat absorbent if superficial dermal

**Operate**
4) Pathway for follow-up of patients discharged from National Burn Centre

Patient discharged from NBC following collaboration between NBC and RBU, with multi-disciplinary discharge summary

Transferred to RBU as inpatient

Review by RBU multi-disciplinary team. Community support and follow-up arrangements based on assessment and NBC discharge summary

Medical/surgical follow-up in plastics clinic by regional plastics consultant

Send follow-up reports to NBC at:
- one month
- six months
- one year post discharge from NBC

Follow-up by NBC at request of regional plastics consultant
## Appendix 5: Burn Care Requirements

<table>
<thead>
<tr>
<th>TBSA size</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–9%</td>
<td>Theatre time (minutes):</td>
<td>139.34</td>
<td>14.42</td>
<td>5.06</td>
</tr>
<tr>
<td></td>
<td>Number of theatre visits:</td>
<td>1.32</td>
<td>0.18</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Nursing time (hours):</td>
<td>8.14</td>
<td>3.36</td>
<td>1.02</td>
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<tr>
<td></td>
<td>Physical therapy (PT) time (minutes):</td>
<td>41</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Occupational therapy (OT) time (minutes):</td>
<td>33</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>10–19%</td>
<td>Theatre time (minutes):</td>
<td>111.12</td>
<td>34.78</td>
<td>5.94</td>
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<tr>
<td></td>
<td>Number of theatre visits:</td>
<td>2.08</td>
<td>0.35</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Nursing time (hours):</td>
<td>30</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>PT time (minutes):</td>
<td>46</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>OT time (minutes):</td>
<td>58</td>
<td>49</td>
<td>32</td>
</tr>
<tr>
<td>20–29%</td>
<td>Theatre time (minutes):</td>
<td>282.88</td>
<td>114.8</td>
<td>47.3</td>
</tr>
<tr>
<td></td>
<td>Number of theatre visits:</td>
<td>1.73</td>
<td>0.88</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>Nursing time (hours):</td>
<td>110</td>
<td>56</td>
<td>30</td>
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<tr>
<td></td>
<td>PT time (minutes):</td>
<td>248</td>
<td>208</td>
<td>200</td>
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<tr>
<td></td>
<td>OT time (minutes):</td>
<td>80</td>
<td>98</td>
<td>80</td>
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<tr>
<td>30–39%</td>
<td>Theatre time (minutes):</td>
<td>400.47</td>
<td>295.2</td>
<td>193.33</td>
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<td>Number of theatre visits:</td>
<td>2.4</td>
<td>1.86</td>
<td>1.54</td>
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<tr>
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<td>Nursing time (hours):</td>
<td>146</td>
<td>103</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>PT time (minutes):</td>
<td>316</td>
<td>347</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>OT therapy time (minutes):</td>
<td>118</td>
<td>81</td>
<td>138</td>
</tr>
<tr>
<td>40–49%</td>
<td>Theatre time (minutes):</td>
<td>640.25</td>
<td>425.42</td>
<td>303.5</td>
</tr>
<tr>
<td></td>
<td>Number of theatre visits:</td>
<td>3.17</td>
<td>2.58</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Nursing time (hours):</td>
<td>179</td>
<td>171</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>PT time (minutes):</td>
<td>268</td>
<td>310</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>OT time (minutes):</td>
<td>106</td>
<td>155</td>
<td>126</td>
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<tr>
<td>50–59%</td>
<td>Theatre time (minutes):</td>
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<td>429</td>
<td>276.6</td>
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<tr>
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<td>Number of theatre visits:</td>
<td>2.8</td>
<td>2</td>
<td>1.8</td>
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<tr>
<td></td>
<td>Nursing time (hours):</td>
<td>176</td>
<td>180</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>PT time (minutes):</td>
<td>357</td>
<td>367</td>
<td>432</td>
</tr>
<tr>
<td></td>
<td>OT time (minutes):</td>
<td>165</td>
<td>160</td>
<td>183</td>
</tr>
<tr>
<td>&gt;60%</td>
<td>Theatre time (minutes):</td>
<td>861.42</td>
<td>371.83</td>
<td>302</td>
</tr>
<tr>
<td></td>
<td>Number of theatre visits:</td>
<td>3.16</td>
<td>2.33</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Nursing time (hours):</td>
<td>144</td>
<td>105</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>PT time (minutes):</td>
<td>232</td>
<td>229</td>
<td>235</td>
</tr>
<tr>
<td></td>
<td>OT time (minutes):</td>
<td>98</td>
<td>95</td>
<td>81</td>
</tr>
</tbody>
</table>

Note: Figures are per patient.