Malignant Hyperthermia (MH) & Patient Management

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Malignant Hyperthermia (MH) & Patient Management

1. Overview

1.1 Purpose
To outline clinical management of malignant hyperthermia susceptible patients and patients who may be having a malignant hyperthermia crisis.
It is the responsibility of all staff members to care for these patients.

IN AN EMERGENCY use the red Stanford Emergency Manual and call for MH Box

1.2 Scope
All staff working in the Surgical Unit.

1.3 Definitions

The following terms are used within this guideline

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CK</td>
<td>Creatinine kinase</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>ETT</td>
<td>Endotracheal Tube</td>
</tr>
<tr>
<td>ESC</td>
<td>Elective surgical centre</td>
</tr>
<tr>
<td>HCA</td>
<td>Healthcare Assistant</td>
</tr>
<tr>
<td>IVCT</td>
<td>In vitro contracture test</td>
</tr>
<tr>
<td>MH</td>
<td>Malignant Hyperthermia</td>
</tr>
<tr>
<td>MHS</td>
<td>Malignant Hyperthermia Susceptible</td>
</tr>
<tr>
<td>PACU</td>
<td>Post Anaesthetic Care Unit</td>
</tr>
<tr>
<td>ANZCA</td>
<td>Australian and New Zealand College of Anaesthetists</td>
</tr>
</tbody>
</table>

Malignant hyperthermia (MH) is a rare genetic condition characterised by a severe hypermetabolic state and rigidity of the skeletal muscles when susceptible individuals are exposed to the triggering agents: inhalational anaesthetics or suxamethonium. MH may occur in any patient given triggering agents, including patients who have previously had uneventful general anaesthesia. MH may occur at any time during or after anaesthesia. Up to 25% of patients relapse in the first 24 hours.

2. The MH Susceptible (MHS) Patient

Patients with any of the following should be treated as susceptible
- Previous malignant hyperthermia reaction
- Positive in vitro contracture test (IVCT) on muscle biopsy
- Positive genetic test for MH
- An IVCT has not been done and:
  - Relative has positive IVCT or
  - Patient (with MHS relative) has negative DNA result or
  - Genetic/biological relative with clinical MH reaction

Patients whom it is not necessary to treat as susceptible
- Negative IVCT
- Patient’s parent from MH susceptible side of the family has had a negative IVCT and there is no evidence of MH in the other parent’s family
Malignant Hyperthermia (MH) & Patient Management

Patients who have been tested for MH but are uncertain of their MH status
- For elective cases where there is greater than 24 hours to obtain information, email MHenquiry@midcentraldhb.govt.nz
- For acute or after hours cases, contact the Palmerston North Hospital Duty Anaesthetic Technician (06 3508500 for theatres, then ask for duty technician) to access information from the MH testing database or the Palmerston North Duty Anaesthetist (027 8385913)

### 3. Elective Management of the MHS Patient

#### 3.1 Pre-Operative Management

- MHS patients should be ideally identified in pre-admission clinic and the procedure planned only for where there are adequate staff members and facilities to manage a MH crisis.
- The patient should be first on the operating list.
- Add “Susceptible to Malignant Hyperthermia” Alert to Operating List
- Advise anaesthetist, nursing team leader, technician leader and surgeon
- Prepare the anaesthetic workstation using method a) or b) below

a) Preparing the anaesthetic workstation using Vapor Clean Charcoal Filters – this is the preferred method

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove all vaporisers and suxamethonium from the operating room.</td>
</tr>
<tr>
<td>2</td>
<td>Set oxygen flow to &gt;10L/min and run the ventilator for 90 seconds with a 2L test lung.</td>
</tr>
<tr>
<td>3</td>
<td>Change the circuit tubing, reservoir bag, gas analysis line and soda lime canister whilst maintaining flushing at &gt;10L/min.</td>
</tr>
<tr>
<td>4</td>
<td>Place a Vapor Clean filter on the inspiratory port and the second filter on the expiratory port of the anaesthetic machine. (Charcoal filters are kept in the MH box and Technician work room). A new set of filters in a flushed machine will last 12 hours (<a href="http://www.dynasthetics.com/">http://www.dynasthetics.com/</a>)</td>
</tr>
<tr>
<td>5</td>
<td>Perform Level 3 anaesthetic machine check using a new test lung</td>
</tr>
<tr>
<td>6</td>
<td>Maintain fresh gas flow of &gt;10L/min for 90 minutes after commencement of anaesthesia. After 90min of anaesthesia you can reduce fresh gas flow to 3L/min.</td>
</tr>
<tr>
<td>7</td>
<td>Use a new facemask, mechanical filter and new supraglottic airway if reusable.</td>
</tr>
</tbody>
</table>
b) Preparing the Anaesthetic workstation if Vapor Clean Charcoal Filters are not available

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>3</td>
<td>Perform Level 3 anaesthetic machine check using a new test lung</td>
</tr>
<tr>
<td>4</td>
<td>Set oxygen flow to &gt;10L/min and flush machine (Datex Ohmeda Aisys) for 90 minutes through the circuit using the test lung, including the ventilator and carbon dioxide absorber in the circuit (MHANZ Guidelines).</td>
</tr>
<tr>
<td>5</td>
<td>Use a new facemask, mechanical filter and new supraglottic airway if reusable.</td>
</tr>
<tr>
<td>6</td>
<td>Maintain fresh gas flow throughout the case at 10L/minute</td>
</tr>
</tbody>
</table>

3.2 Intraoperative Management

- Standard ANZCA intraoperative monitoring including end-tidal CO2
- Monitor temperature continuously
- Large bore IV cannula
- Dantrolene must be immediately available

**Drugs that MUST be avoided with MHS patients**

- Suxamethonium
- All volatile inhalational agents including desflurane, sevoflurane, isoflurane, methoxyflurane (Penthrx), halothane

3.3 Post-operative Management

**PACU**

- Standard monitoring as per ANZCA guidelines including PACU discharge criteria
- Do not need to be isolated from other patients in PACU
- Take temperature on arrival and just before leaving PACU. If > 37.5°C contact the theatre anaesthetist and the Anaesthetic Coordinator
- There is no requirement to keep the patient in PACU for longer than usual

**Ward**

- Temperature and heart rate every hour for 4 hours and then every 4 hours. If temperature is unexpectedly > 37.5°C contact the Anaesthetic Coordinator

**Outpatient:**

- Discharge of ambulatory patients may be possible. The minimum stay is 4 hours and must meet minimum ANZCA requirements for day stay procedures (ANZCA document PS15)
- There must be no evidence of temperature rise or other signs of malignant hyperthermia, either intra-operatively or postoperatively
- The patient must be given clear instructions and a contact number to the anaesthetic department
4. MH Susceptibility and pregnancy

- This applies to MHS pregnant women and infants of MHS fathers, since the offspring of MHS fathers are also at risk of MH
- The patient should be under care of a specialist obstetrician and be referred antenatally to a specialist anaesthetist
- Labour has not been documented to trigger a malignant hyperthermia crisis
- Anaesthetic management:
  - The on duty anaesthetist, anaesthetic technician leader, paediatrician must be notified of the admission
  - Baseline blood tests: Full blood count, renal profile, CK
  - Antacid prophylaxis particularly important due to higher risk of aspiration without the use of suxamethonium
  - Regional anaesthesia preferred, therefore plan for epidural early in labour
  - Ecbolics or uterotonics, vasopressors, adrenaline, local anaesthetics all not contraindicated
  - If temperature > 38.5°C or sustained tachycardia > 120 during elective or emergency caesarean section, an arterial line should be placed for measurement of serial arterial blood gases
  - If general anaesthetic is required, follow guidelines in section 3, for elective management of MHS patients, using charcoal filters and avoiding triggering agents

5. Decision to treat suspected MH crisis

**Diagnosis:** if in doubt, treat. The single most useful investigation is an arterial blood gas.

**Not all symptoms need to be present and not all** occur in this order.

- Early: prolonged masseter spasm, raised end tidal carbon dioxide, tachypnoea during spontaneous ventilation, tachycardia, cardiac arrhythmias – particularly ventricular ectopic beats
- Developing: rapid temperature rise (0.5°C per 15 minutes), respiratory and later metabolic acidosis, hyperkalaemia, profuse sweating, cardiovascular instability, decreased oxygen saturation, skin mottling, generalised musculature rigidity unresponsive to muscle relaxant
- Late: cola coloured urine (myoglobinuria), generalised muscle aches in awake patient, grossly raised serum CK, coagulopathy, cardiac arrest

**Differential Diagnosis:**

Inadequate anaesthesia/ machine malfunction/ sepsis or infection/ thyroid storm/ serotonin syndrome/ neuroleptic malignant syndrome/ intracerebral infection or haemorrhage/ inadvertent overheating/ phaeochromocytoma/ recreational drug use (amphetamines)

6. Emergency treatment of suspected MH Crisis

**This document is not suitable for use during an MH Crisis**

**IN AN EMERGENCY use the red Stanford Emergency Manual and call for MH Box**
6.1 Initial Management

- In most cases the most senior anaesthetist present should coordinate crisis management and use the task cards in the MH box.
- Declaring an MH crisis, calling for help and sending for the MH box should be prioritised.
- While awaiting the MH box, a reader should work through the red Stanford Emergency Manual located in each theatre until the MH box arrives.
- The MH Crisis Initial Management card (Appendix 1) located in the MH box outlines the initial tasks.

6.2 When the MH Box arrives

- The leader (or reader) should use the Initial Management Card (Appendix 1) and the large Overview Card in the MH Box (Appendix 2).
- The coloured task cards in the box (Appendices 3 – 13) should be distributed to staff members who confirm they can complete the task and close the loop with the leader when the tasks are completed. There are 3 dantrolene preparation cards reflecting that Dantrolene administration is the priority.
- Team members should prompt the leader to recap regularly: patient condition, treatment completed or in progress, plans and priorities, invite team input.

7. MH Box Location and Checks

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore Hospital</td>
<td>PACU 1</td>
</tr>
<tr>
<td>Waitakere Hospital</td>
<td>PACU 1</td>
</tr>
<tr>
<td>Elective Surgical Centre</td>
<td>Theatre Corridor – next to ice freezer</td>
</tr>
</tbody>
</table>

Checking the MH Boxes monthly and restocking after use is the responsibility of the nurses allocated by the Charge Nurse Manager in those locations.

A record book for this check should be kept outside the box.

**Monthly Check:**
1. Open the MH Box
2. Ensure contents are as per Appendix 14 and within expiry date
3. Check refrigerator contains 2 bags of sodium chloride 0.9% s 1000ml and 1 vial of Actrapid insulin and they are within the expiry date
4. Sign record book provided

Expired stock must be returned to Pharmacy as it is kept in case of emergency. On request, Pharmacy will also provide expired stock for reconstitution practice.
8. Screening after suspected MH event

Screening of the patient and family following a suspected or confirmed case is the responsibility of the anaesthetist. Referral for IVCT or DNA testing can be sent using the following form:

https://malignanthyperthermia.formstack.com/forms/malignant_hyperthermia_referral_form

- **New Zealand**: Department of Anaesthesia, Palmerston North Hospital. 64-6-356-9169
- **New South Wales**: Department of Anaesthesia, Westmead Children’s Hospital. 61-2-9845-0000
- **Victoria**: Department of Anaesthesia, Royal Melbourne Hospital. 61-3-9342-7000
- **Western Australia**: Department of Anaesthesia, Royal Perth Hospital. 61-8-9224-1038

9. Disclaimer

This guideline was produced for the benefit of healthcare practitioners involved in providing care for patients suspected of MH susceptibility. No guideline can cover all variations required for specific circumstances. It is intended to aid the clinical management of MH susceptible patients, and should not be used to replace sound clinical reasoning and decision making. It is the responsibility of health care practitioners using this guideline to adapt it for safe use and recognise the need for specialist help.
Appendix 1: MH Crisis Initial Management Card

**MH CRISIS INITIAL MANAGEMENT**

In most cases the most senior anaesthetist present should coordinate crisis management and we recommend the use of the task cards if the situation is appropriate

1. Declare Emergency (complete or abandon surgery)
2. Call for HELP
3. Send for the MH box and refrigerated supplies
4. Turn off volatile agent and remove vaporisers from the anaesthetic workstation (substituting IV anaesthesia maintenance if required)
5. Hyperventilate with 100% oxygen and high fresh gas flows (>15 litres/minute)
6. Do not waste time changing the anaesthesia machine or circuit
7. Distribute the task cards: the MH box contains individual task cards to help manage an MH crisis. Give each available staff member a card (or two) and ask them to complete the instructions.
8. There are multiple high priority tasks but:

   **Dantrolene administration is the priority**
## Appendix 2: Leader’s Overview card

<table>
<thead>
<tr>
<th>Anaesthetist 1 - Resuscitation</th>
<th>Anaesthesia Assistant</th>
<th>Dantrolene</th>
<th>Anaesthetist 2 - Lines and investigations</th>
<th>Cooling</th>
<th>Logistics</th>
<th>Surgical Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dantrolene 2.5mg/kg every 10-15 minutes</td>
<td>Collect MH box</td>
<td>20mg/vial</td>
<td>Arterial Line</td>
<td>Collect ICE</td>
<td>Call for:</td>
<td>Complete or abandon surgery</td>
</tr>
<tr>
<td>Total intravenous anaesthesia (TIVA)</td>
<td>Arterial line set-up</td>
<td>2.5mg/kg every 10-15 minutes</td>
<td>Frequent blood tests: ABG, U&amp;E, CK</td>
<td>Collect refrigerated IV fluids and insulin</td>
<td>Additional anaesthetists</td>
<td></td>
</tr>
<tr>
<td>Hyperkalaemia management</td>
<td>Central line setup</td>
<td>Reconstitute with 60mls sterile water</td>
<td>Coagulation profile, Urine Myoglobin</td>
<td>Collect defibrillator</td>
<td>Additional dantrolene</td>
<td></td>
</tr>
<tr>
<td>Arrhythmia management</td>
<td>Restock resuscitation and TIVA drugs</td>
<td>Central venous line</td>
<td></td>
<td>Cover all exposed parts with ICE</td>
<td>Arrange transfer to ICU and call for ICU bed</td>
<td></td>
</tr>
<tr>
<td>Renal Protection</td>
<td></td>
<td>Anaesthetic record</td>
<td></td>
<td></td>
<td>Expose patient to aid cooling</td>
<td></td>
</tr>
</tbody>
</table>
Malignant Hyperthermia (MH) & Patient Management

Appendix 3: Anaesthetist- Resuscitation card

ANAESTHETIST 1: RESUSCITATION

DANTROLENE
2.5mg/kg every 10-15 minutes IV until signs of hypermetabolism (acidosis, pyrexia, muscle rigidity) are resolving
Do not delay dantrolene to insert a central line

MAINTENANCE OF ANAESTHESIA
Consider Propofol maintenance +/- benzodiazepine
Intubate to support hyperventilation (dantrolene is a muscle relaxant)

HYPERKALAEMIA MANAGEMENT
Hyperventilation
Insulin 0.15 units/kg + 0.5 ml/kg 50% dextrose as rapid infusion (10 units insulin in 50 ml 50% dextrose) in adults
Calcium Chloride (CaCl₂) – 0.1 ml/kg OR Calcium Gluconate (10%) 0.3 ml/kg

ARRHYTHMIA MANAGEMENT
Amiodarone: 3mg/kg slow IV
Lignocaine: 1mg/kg IV

ACIDOSIS MANAGEMENT
Dantrolene (treats primary cause)
Hyperventilation
Consider 0.5-1 mmol/kg sodium bicarbonate if pH <7.2 (8.4% is 1mmol/ml)

RENAI PROTECTION
Maintain urine output > 2ml/kg/hr by
Maintaining intravascular volume – normal saline
Mannitol – there is 3 g mannitol/vial of dantrolene

INOTROPIC SUPPORT
Epinephrine/norepinephrine infusions prn

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ANAESTHESIA ASSISTANT

ONCE THE MH BOX AND REFRIGERATED SUPPLIES ARE IN THE OPERATING THEATRE

Lay contents out on trolley

Prepare arterial line equipment and assist anaesthetist to insert arterial line

Assist with dantrolene mixing

Ensure adequate stocks of resuscitation drugs are maintained

Assist with TIVA management

Set up central venous line equipment and assist anaesthetist to insert central line

Ensure volatile agent has been removed from the operating room

Change soda lime when required

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**Appendix 5: Dantrolene preparation card**

**DANTROLENE RECONSTITUTION**

THIS IS THE HIGHEST PRIORITY
MIXING DANTROLENE CAN BE TIME CONSUMING
USE AS MANY PEOPLE AS ARE AVAILABLE
REPEAT DOSE EVERY 10-15 MINUTES UNTIL SYMPTOMS RESOLVE

HERE IS ONE METHOD

1) Dantrolene must be mixed ONLY with STERILE WATER

2) 60 mls water for each 20mg vial from bag or bottle

3) Remove metal vial cap or flip off cap

4) Inject 30ml of water

5) Hold syringe vertically, allow air in vial to escape, inject remaining 30mls water

6) Hold together firmly or disconnect and shake to mix

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>10Kg</th>
<th>20Kg</th>
<th>30Kg</th>
<th>40Kg</th>
<th>50Kg</th>
<th>60Kg</th>
<th>70Kg</th>
<th>80Kg</th>
<th>90Kg</th>
<th>100Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMPULES FOR INITIAL DOSE</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>

Revised August 2018

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This information is correct at date of issue. Always check on Waitemata DHB Controlled Documents site that this is the most recent version.
ANAESTHETIST 2: LINES/INVESTIGATIONS

ENSURE TEMPERATURE PROBE INSERTED

INSERT ARTERIAL LINE
Check arterial blood gases frequently
Notify coordinating anaesthetist of changes

Pay particular attention to:
Acidosis
Hyperkalaemia
PaCO₂
Blood glucose

INSERT CENTRAL VENOUS LINE WHEN/IF APPROPRIATE

SEND LABORATORY BLOODS
Urea and electrolytes
Creatinine Kinase
Coagulation screen

URINE
Once urinary catheter is inserted, send urine sample for myoglobin
Maintain urine output at > 2ml/kg/hr

ANAESTHETIC RECORD
Ensure an accurate anaesthetic record is being kept
Document times, temperatures, drugs and monitor recordings
Document blood test results
Document presence of masseter spasm and/or rigidity, colour of urine, excessive bleeding, time to administer dantrolene etc.

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COOLING

AMBIENT TEMPERATURE
Reduce operating theatre thermostat to lowest setting

IV FLUIDS
Collect 2 litres of Normal Saline (for intravenous infusion) and actrapid insulin from refrigerator located:

PACU 1 FRIDGE

ICE
Bring bags of ice from the ice machine located:

PACU 1 PUMP ROOM FREEZER
Collect additional ICE from ADU

Assist packing all exposed body parts with ice bags

DEFIBRILLATOR
Collect defibrillator located

OT CORRIDOR OPPOSITE PACU

**Consider using cooling blanket from ICU**

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Malignant Hyperthermia (MH) & Patient Management

Appendix 8 Cooling Card- Waitakere Hospital

COOLING

AMBIENT TEMPERATURE
Reduce operating theatre thermostat to lowest setting

IV FLUIDS
Collect 2 litres of Normal Saline (for intravenous infusion) and actrapid insulin from refrigerator located:

PACU 1 MH FRIDGE (Next to pyxis)

ICE

Bring bags of ice from the ice machine located:

PACU 1 MH Freezer (Next to Pyxis)
Pre-op chest freezer (Opposite Family Lounge)

Collect additional ICE from Z service station, Lincoln Rd Ph:

Assist packing all exposed body parts with ice bags

DEFIBRILLATOR
Collect defibrillator located

PACU 1 Adult Emergency Trolley

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COOLING

AMBIENT TEMPERATURE
Reduce operating theatre thermostat to lowest setting

IV FLUIDS
Collect 2 litres of Normal Saline (for intravenous infusion) and actrapid insulin from refrigerator located:

PACU 1

ICE

Bring bags of ice from the ice machine located:

ESC THEATRE CORRIDOR
Collect additional Ice from Ice machine flower bay Cullen ward

Assist packing all exposed body parts with ice bags

DEFIBRILLATOR
Collect defibrillator located

PACU 1

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Malignant Hyperthermia (MH) & Patient Management

Appendix 10. Logistics card - North Shore Hospital

LOGISTICS

CALL FOR ADDITIONAL SUPPORT
Ideally two specialist anaesthetists should be involved
Call senior surgeon if required to complete surgery rapidly

MOBILISE OFF-SITE DANTROLENE
At least 24 ampoules should be kept on site for immediate management
Further dantrolene stocks are held at:
- Hospital 1 stocks ___ vials
- Hospital name and contact details
  - ESC extension 49606 Theatre co-ordinator mobile: 021533217
- After hours NSH DNM: 021784241
  - Hospital 2 stocks ___ vials
  - Hospital name and contact details
    - Waitakere Ext 46005 Mobile ACCN PACU: 021419494
    - After hours WTK DNM: 021679693
    - Southern Cross Hospital reception Ph. 092544444 After hours-09925 4013

Organise urgent transfer of additional stocks of dantrolene
Consider air transport, ambulance and police escort to expedite delivery

LIAISE WITH INTENSIVE CARE FOR PATIENT TRANSFER
All patients should be monitored post operatively in an intensive care environment. Ongoing use of dantrolene will require assisted ventilation as dantrolene is a muscle relaxant
Up to 25% of patients relapse in the first 24 hours

ASSIST WITH DANTROLENE MIXING

Revised August 2018
Appendix 11. Logistics card- Waitakere Hospital

LOGISTICS

CALL FOR ADDITIONAL SUPPORT
Ideally two specialist anaesthetists should be involved
Call senior surgeon if required to complete surgery rapidly

MOBILISE OFF-SITE DANTROLENE
At least 24 ampoules should be kept on site for immediate management
Further dantrolene stocks are held at:

Hospital 1 stocks 24 vials
Hospital name and contact details
ESC extension 49606 Theatre co-ordinator mobile: 021533217
After hours NSH DNM: 021784241

Hospital 2 stocks 24 vials
Hospital name and contact details
NSH extension 42641/42991
After hours 42997/43535 NSH DNM: 021784241

Organise urgent transfer of additional stocks of dantrolene
Consider air transport, ambulance and police escort to expedite delivery

LIAISE WITH INTENSIVE CARE FOR PATIENT TRANSFER
All patients should be monitored post operatively in an intensive care environment.
Ongoing use of dantrolene will require assisted ventilation as dantrolene is a muscle relaxant
Up to 25% of patients relapse in the first 24 hours

ASSIST WITH DANTROLENE MIXING

Revised August 2018
LOGISTICS

CALL FOR ADDITIONAL SUPPORT
Ideally two specialist anaesthetists should be involved
Call senior surgeon if required to complete surgery rapidly

MOBILISE OFF-SITE DANTROLENE
At least 24 ampoules should be kept on site for immediate management
Further dantrolene stocks are held at:

Hospital 1 stocks vials 24
Hospital name and contact details

NSH extension 42641/42991
After hours 42997/43535 NSH DNM: 021784241

Hospital 2 stocks vials 36
Hospital name and contact details

Waitakere Ext 46005 Mobile ACCN PACU: 021419494
After hours WTK DNM: 021679693

Organise urgent transfer of additional stocks of dantrolene
Consider air transport, ambulance and police escort to expedite delivery

LIAISE WITH INTENSIVE CARE FOR PATIENT TRANSFER
All patients should be monitored post operatively in an intensive care environment. Ongoing use of dantrolene will require assisted ventilation as dantrolene is a muscle relaxant
Up to 25% of patients relapse in the first 24 hours

ASSIST WITH DANTROLENE MIXING

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SURGICAL TEAM

SURGERY
Complete or abandon surgery as soon as possible
Call for senior help if required to complete surgery more quickly

HELP COOL PATIENT
Expose all parts of the patient outside immediate sterile field
If abdomen open, consider washout with normal saline at 4°C
Assist with packing all exposed body parts with ice bags

URINARY CATHETER
Set up and insert urinary catheter at earliest convenience

ASSIST WITH DANTROLENE MIXING

Revised August 2018
### Appendix 14. Contents of MH Box

#### Contents of MH Box

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1</td>
<td>Drugs</td>
<td><strong>The contents of the MH Box must be clearly displayed on the lid and include the last review date</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| 14.1     | Documents | - This page  
- MH Crisis Initial Management Card  
- Leader’s Overview Card  
- Coloured task cards x9 including 3x Dantrolene Preparation cards  
- List of dantrolene supplies at other sites  
- MH & Patient Management Guidelines |
| 14.1     | Dantrolene sodium 20mg | - 24 vials in North Shore Hospital  
- 24 vials in Elective Surgery Centre  
- 36 vials in Waitakere Hospital |
| 14.1     | Dantrolene preparation | - 10x TWO-FER NEEDLE 16G SHORT PURPLE  
- 2x luer spikes  
- 2x Sterile water for injection 1 L bags (labelled “not for IV infusion”)  
- 10x 60 mL syringes |
| 14.1     | Drugs | - 1x sodium bicarbonate 8.4% 100 mL vial (1mmol/ml)  
- 1x Dextrose 50% 90 mL vial  
- 2x lignocaine 1% 5 mL ampoules  
- 2x amiodarone 150 mg/3ml ampoules |
| 14.1     | Initial investigations | - 5x arterial blood gas syringes  
- 5x biohazard bags  
- 1x urine sample pot  
- 6x Vacutainer blood tubes – 2x red, 2x blue, 2x purple  
- 5x urgent lab request forms |
| 14.1     | Charcoal Filters | - 1x Vapor Clean Charcoal Filters 2-pack |
| 14.1     | Refrigerated supplies | - Actrapid Insulin 100u/ml 10ml vial  
- 2x Normal Saline 1000ml bags |
Appendix 15. Supply Management of Dantrolene

15.1 Obtaining extra Dantrolene

Contact:
- Inform Pharmacy of stock depletion Ext 42626
- Contact On Call Pharmacist (via operator) if after hours.

<table>
<thead>
<tr>
<th>Site</th>
<th>Contact</th>
<th>Number Held</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Shore Hospital – Theatres</td>
<td>43535 – Theatre Co-coordinator</td>
<td>24</td>
</tr>
</tbody>
</table>
| Waitakere Hospital          | In Hours: 837 6622/839 000 PACU Nurse: 46005  
                              | DNM: 021 679 693  
                              | CNM: 021 812 354  
                              | After Hours: DNM 021 679 693 | 36       |
| Elective Surgical Centre    | In Hours: 021 533 832 or ext. 49606 for PACU Coordinator  
                              | After Hours: 021 533 917 Ward Coordinator | 24       |
| Greater Auckland            | See list                              | See list located in MH box PACU1 |

Contact information to be checked 6 monthly and updates by PACU CN or allocated staff member

References