

Malignant Hyperthermia Crisis



AAGBI Safety Guideline

Successful management of malignant hyperthermia depends upon early diagnosis and treatment; onset can be within minutes of induction or may be insidious. The standard operating procedure below is intended to ease the burden of managing this rare but life threatening emergency.

<h3>1</h3> <h4>Recognition</h4>	<ul style="list-style-type: none">• Unexplained increase in ETCO₂ AND• Unexplained tachycardia AND• Unexplained increase in oxygen requirement (Previous uneventful anaesthesia does not rule out MH)• Temperature changes are a late sign		
<h3>2</h3> <h4>Immediate management</h4>	<ul style="list-style-type: none">• STOP all trigger agents• CALL FOR HELP. Allocate specific tasks (action plan in MH kit)• Install clean breathing system and HYPERVENTILATE with 100% O₂ high flow• Maintain anaesthesia with intravenous agent• ABANDON/FINISH surgery as soon as possible• Muscle relaxation with non-depolarising neuromuscular blocking drug		
<h3>3</h3> <h4>Monitoring & treatment</h4>	<table border="0"><tr><td data-bbox="432 831 1007 1682"><ul style="list-style-type: none">• Give dantrolene• Initiate active cooling avoiding vasoconstriction• TREAT:<ul style="list-style-type: none">• Hyperkalaemia: calcium chloride, glucose/insulin, NaHCO₃⁻• Arrhythmias: magnesium/amiodarone/metoprolol AVOID calcium channel blockers - interaction with dantrolene• Metabolic acidosis: hyperventilate, NaHCO₃⁻• Myoglobinaemia: forced alkaline diuresis (mannitol/furosemide + NaHCO₃⁻); may require renal replacement therapy later• DIC: FFP, cryoprecipitate, platelets• Check plasma CK as soon as able</td><td data-bbox="1007 831 1514 1682"><p>DANTROLENE 2.5mg/kg immediate iv bolus. Repeat 1mg/kg boluses as required to max 10mg/kg</p><p>For a 70kg adult</p><ul style="list-style-type: none">• Initial bolus: 9 vials dantrolene 20mg (each vial mixed with 60ml sterile water)• Further boluses of 4 vials dantrolene 20mg repeated up to 7 times.<p>Continuous monitoring Core & peripheral temperature ETCO₂ SpO₂ ECG Invasive blood pressure CVP</p><p>Repeated bloods ABG U&Es (potassium) FBC (haematocrit/platelets) Coagulation</p></td></tr></table>	<ul style="list-style-type: none">• Give dantrolene• Initiate active cooling avoiding vasoconstriction• TREAT:<ul style="list-style-type: none">• Hyperkalaemia: calcium chloride, glucose/insulin, NaHCO₃⁻• Arrhythmias: magnesium/amiodarone/metoprolol AVOID calcium channel blockers - interaction with dantrolene• Metabolic acidosis: hyperventilate, NaHCO₃⁻• Myoglobinaemia: forced alkaline diuresis (mannitol/furosemide + NaHCO₃⁻); may require renal replacement therapy later• DIC: FFP, cryoprecipitate, platelets• Check plasma CK as soon as able	<p>DANTROLENE 2.5mg/kg immediate iv bolus. Repeat 1mg/kg boluses as required to max 10mg/kg</p> <p>For a 70kg adult</p> <ul style="list-style-type: none">• Initial bolus: 9 vials dantrolene 20mg (each vial mixed with 60ml sterile water)• Further boluses of 4 vials dantrolene 20mg repeated up to 7 times. <p>Continuous monitoring Core & peripheral temperature ETCO₂ SpO₂ ECG Invasive blood pressure CVP</p> <p>Repeated bloods ABG U&Es (potassium) FBC (haematocrit/platelets) Coagulation</p>
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<h3>4</h3> <h4>Follow-up</h4>	<ul style="list-style-type: none">• Continue monitoring on ICU, repeat dantrolene as necessary• Monitor for acute kidney injury and compartment syndrome• Repeat CK• Consider alternative diagnoses (sepsis, pheochromocytoma, thyroid storm, myopathy)• Counsel patient & family members• Refer to MH unit (see contact details below)		

The UK MH Investigation Unit, Academic Unit of Anaesthesia, Clinical Sciences Building, Leeds Teaching Hospitals NHS Trust, Leeds LS9 7TF. **Direct line: 0113 206 5270.** Fax: 0113 206 4140. Emergency Hotline: 07947 609601 (usually available outside office hours). Alternatively, contact Prof P Hopkins, Dr E Watkins or Dr P Gupta through hospital switchboard: 0113 243 3144.

Your nearest MH kit is stored

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.

Malignant Hyperthermia Crisis Task Allocations



AAGBI Safety Guideline

The successful management of a malignant hyperthermia crisis requires multiple simultaneous treatment actions. This is made far easier through effective teamwork and specific task allocation.

1st anaesthetist - commence immediate management (on guideline sheet)

The anaesthetist diagnosing MH or the most senior anaesthetist responding should assume the role of clinical leader once immediate management actions have been undertaken and avoid becoming focused on a single task.

2nd anaesthetist - resuscitation

- Ensure dantrolene is given in correct dose (2.5mg/kg initially then 1mg/kg every 10-15min)
- Commence TIVA
- Management of hyperkalaemia
- Management of arrhythmias
- Management of acidosis
- Renal protection (forced alkaline diuresis)

1st anaesthetic nurse/ODP

- Collect MH kit
- Collect cold saline & insulin
- Set up lines (arterial/CVC)
- Runner for resuscitation drugs/equipment

2nd anaesthetic nurse/ODP (ideally two people)

- Draw up dantrolene as requested by anaesthetist in charge of resuscitation

3rd anaesthetist - lines/investigations

- Site arterial line
- Send bloods for
 - ABG – repeated (approx every 30 min initially)
 - U&Es
 - CK
 - FBC
 - Coagulation screen
 - Cross match
- Central venous access
- Urinary myoglobin
- Monitor core and peripheral temperatures

Surgical team

- Catheterise
- Complete/abandon surgery as soon as feasible
- Undertake cooling manoeuvres