MALIGNANT HYPERTHERMIA	
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1.0 Introduction

Malignant Hyperthermia (MH) is hypermetabolic syndrome triggered by succinylcholine and volatile anesthetic. It is an acute medical emergency. Successful treatment of malignant hyperthermia depends on early diagnosis and aggressive treatment.

2.0 Definition of Standard Operating Procedure

The term **'Standard Operating Procedure'** is a way of carrying out a particular course of action and includes operations, investigations, pharmaceutical treatment, examinations and any other treatment carried out

3.0 Applicable to

To all hospital staff caring for the child pre-operatively, preoperatively and post operatively.

4.0 Objectives of Standard Operating Procedure

In the case of a patient is at risk of Malignant Hyperthermia due to familial history or a muscle condition that may predispose to MH or a sudden unexpected onset of MH, these guidelines support the action to be taken.

5.0 Procedures

Complications associated with Malignant Hyperthermia

Signs and Symptoms

- Sudden Increased rise in end tidal CO2
- Tachycardia
- Pyrexia – temperature increasing 1 degree Celsius every 5 minutes
- Mottling of the skin
- Tachypnea
- Arrhythmias
- Rigidity
- Sweating
- Hypercarbia – leading to respiratory acidosis
- Labile blood pressure
- Reduced renal output leading to renal failure

Equipment

- Oxygen
- Suction
- Monitoring equipment – ECG, Blood Pressure cuff, Oxygen saturation probe
- Intravenous Access

- Airway tray with appropriate intubation equipment
- Braun Infusion Pump
- Source the Malignant Hyperthermia management Kit and cold fluids from the Pharmacy room

The Malignant Hyperthermia (MH) Management Kit includes the following stock

- New Masks with new oxygen tubing
- Dandrolene Sodium (medication reverses effects of MH)
- Water for injection with 60ml syringes
- Cooling Fluids – Sterile Normal Saline stored in bottom of pharmacy fridge.
- Vapour free machine applicable for the patient at risk of MH
- 50ml syringes
- Extension set with valve
- Hydrocortisone, Glucose 50% and mannitol, sodium Bicarbonate and Heparin available
- Selection of needles and syringes
- Blood Gas Syringes

Patients at risk of developing Malignant Hyperthermia will be first on the theatre list – vapour free anaesthetic machine will be set up for the planned patient by the Clinical Engineer. This patient will have Total Intravenous Anesthesia (TIVA) The MH Kit will be accessible. This patient may be recovered in an isolated area of the Recovery Room or as per Anesthetic Consultant.

ACTION	RATIONALE & REFERENCE
A Team approach must ensue	
• Terminate Anaesthetic vapours and give 100% O2 through a vapour free circuit	Since Anaesthetic vapours trigger this condition, vapours must be stopped immediately. 100% O2 will begin to clear the patient of anaesthetic vapours (Berry & Kohns 2016)
• Patient will need to be intubated if not already (AAGBI 2011)	To ensure a patient's airway at all times (Woodhead & Wicker 2005)
• A Muscle relaxant may be required for intubation. Succinylcholine will not be used. Another muscle relaxant will be selected by the anaesthetist	Succinylcholine triggers MH
• Malignant Hyperthermia Kit and Cold Fluids will be sourced immediately	This is imperative to cool the patient aid recovery from MH
• The reserve vapour free machine in the	This ensures no traces of vapour is present

department may replace the anaesthetic machine. Change of circuit will suffice in an emergency situation	
• Rapidly terminate surgery	To allow effective management of MH (Berry & Kohns 2016)
• Prepare the dandrolene by preparing 60 mls of water to the dandrolene sodium powder. Shake well to reconstitute it. Dandrium Sodium dose is 1mg / kg initially and can be increased to 10 mg/ kg (Please refer to OLCHC Hospital Formulary)	Dantrolene reverses the calcium ions within the cells resulting in • Reducing the heart rate • Abolition of arrhythmias • Reducing the body temperature • Reducing the muscle tone AORN 2017
• Cool the patient utilizing cool normal saline bags from the fridge in pharmacy. Place around the patient's head. Cool fluids may be given I.V and also can be used as wound lavage.	To reduce the patient's temperature (Berry & Kohn 2016)
• Assist in obtaining arterial/venous blood gases	This will display signs of respiratory acidosis; potassium, calcium, oxygen and carbon dioxide are also monitored (Berry & Kohn 2016)
• Urinary amount will be monitored for amount and protein	Urine is monitored to ensure renal function is maintained. 0.5 -1 ml / kg
• If surgery must resume, a propofol infusion will be prepared. Total Intravenous Anesthetic (TIVA) will be commenced using infusion pump, 50ml Syringe and extension line	This method will ensure the patient is anaesthetised for the remainder of the surgery and the adverse effects of vapour anaesthetic will be avoided (AORN 2017)
• An ICU bed will be sought, the patient will be transferred to an ICU bed postoperatively for close monitoring for 24hours	ICU will ensure one to one care as this patient has a high risk of MH symptoms reoccurring in the following 24- 48hours (Berry & Kohn 2016)

6.0 Implementation Plan

This document is available to new nursing staff coming to work in the Theatre Department. It is accessible to all staff at all times in the Theatre Conference Room. There is biannual education on this topic to maintain competence and awareness of this condition.

7.0 Evaluation and Audit

The MH Kit is sealed with Tag and checked daily. On a monthly basis, products in the MH kit are checked for expiry dates and contents are checked to be in working order. Every three months medication audit is carried out in the department by the Quality Department which includes the MH Kit.

8.0 References

NMBI Nursing Board and Midwifery of Ireland. (2007) *Guidance to Nurses and Midwives on Medication Management.* Nursing Board and Midwifery of Ireland, Dublin.

AAGBI Association of Anaesthetists of Great Britain & Ireland (2011) *Management of Malignant Hyperthermia* Association of Anaesthetists of Great Britain & Ireland, London.

AORN Association of Perioperative Registered Nurses (2018) *Guidelines for Perioperative Practice* AORN Denver

Philips, Nancymarie *Berry E. & Kohn's M. Operating Room Technique* 13th Ed. Elsevier St Louis,