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\* **PROTOCOL** \*  
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**PACU/OR/OB**  
(Scope)

**TITLE:                   MANAGING A PATIENT WITH MALIGNANT HYPOTHERMIA (MH)**

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**PURPOSE:**            To outline steps for the emergency treatment of malignant hypothermia.

**SUPPORTIVE  
DATA:**

1. MH is a life threatening pharmacogenetic disorder triggered by the administration of commonly used volatile anesthetics(halothane, enflurane, isoflurane, desflurane, and sevoflurane), the depolarizing muscle relaxant succinylcholine, or both.
2. MH is suspected when an unanticipated increase (i.e. doubling or tripling) of end-tidal CO2 occurs.
3. Unexpected tachycardia, tachypnea, and jaw muscle rigidity (masseter spasm) are also common signs of MH that follow the CO2 increase.
4. Body rigidity is a specific sign of MH and attempts to evaluate muscle rigidity should be made if MH is suspected.
5. Temperature elevation is a late sign of MH.
6. Rhabdomyolysis does occur. This is when muscle is damaged and cells are disrupted, the intracellular constituents begin to leak into the blood stream. This includes creatine kinase, myoglobin and the electrolyte potassium. This breakdown may be manifested by muscle pain and in extreme cases dark or cola colored urine. Sudden unexpected cardiac arrest is due to sudden rapid rhabdomyolysis not MH.

**EQUIPMENT LIST:**

1. Patient stretcher
2. Hypothermia blanket and machine kept in OR storage room
3. Code cart and emergency drug box(inside drawer): **There no longer exists a "malignant hypothermia cart"**.
4. Dantrolene Sodium is in the Pyxis but you will need to alert Pharmacy as soon as you suspect MH because they will need to bring more drugs to unit immediately.
5. Pyxis
  - a. Sodium Bicarbonate
  - b. 50% Dextrose
  - c. Insulin
  - d. IV solutions
6. Ice machine, bucket of ice or ice chest
7. NG Tubes
8. Foley catheter tray
9. Enema Bag
10. Irrigating solutions
11. Potassium may be ordered from Pharmacy STAT

**CONTENT:****PROCEDURE STEPS**

1. Discontinue Anesthesia and all triggering agents.
2. Terminate surgery if possible or continue surgery with safe anesthetic agents.
3. Hyperventilate the patient with 100% O<sub>2</sub> at high gas flows of at least 10L/min.
4. Ensure equipment listed is at the patient bedside.
5. If Hypothermia is present:
  - a. Place patient on hypothermic blanket and begin cooling process, as per doctor's order.
  - b. Use bags of ice at axillary, groin, and head. Consider wet towels as well.
  - c. Insert rectal probe for continuous monitoring of core body temperature.
  - d. Start another IV and begin infusing iced normal saline (do not use lactated ringers), as per doctor's order. May need to repeat more than once if patient remains hypothermic.
  - e. Consider iced saline lavage of the bladder, rectum, stomach, or any open body cavities, as per MD.
  - f. Cease cooling efforts when temperature has fallen to 38C.
6. Call MH Hotline : **1-800-644-9737**  
**1-315-464-7079**
7. Immediately give Dantrolene sodium (Dantrium)IV as per mg/kg recommendations.
8. Obtain ABG's to monitor for metabolic acidosis. Usual treatment is with bicarbonate IV.
9. If cardiac arrhythmias present, consider standard anti-arrhythmic agents.

**KEY POINTS:**

- Anesthesiologist will diagnose this condition and be in charge of treatment of patient.
- When possible, transport patient to PACU. A code may need be called to ensure enough personnel are present to assist.
- It is not necessary to change any anesthesia equipment i.e., endotracheal tubes or ventilator tubing.
- It is necessary to start the cooling process while Dantrolene is prepared by another nurse. Monitor closely as body temperature begins to drop to avoid hypothermia.
- May need more than one nurse to reconstitute medication quickly.
- Cardiac arrhythmias usually resolve with correction of acidosis and hyperkalemia. **Do not give calcium channel blockers because they may cause hyperkalemia and subsequent cardiac collapse.**

10. Treat hyperkalemia with glucose, insulin, and calcium. Persistent hypokalemia may be treated with monitoring of serum K level and avoid parenteral K if possible.
11. Maintain urine output above 2cc/kg/hr by hydration and diuretics. Consider insertion of arterial line and central venous line for quick access for monitoring lab values
12. Continuously monitor core body temperature, ABG's, urine output, potassium and calcium values, coagulation, CKs, and serum and urine myoglobin. Anesthesiologist will need to discuss MH crisis management with the receiving physician.
13. Transfer the patient to ICU when stable and monitor the patient for at least 24 hours for recurrence of MH and other late complications. Avoiding future crisis is paramount to patient education as well as genetic links.
14. Counsel the patient and family about MH and further precautions. Refer the patient to the 24-hour hotline for MH at 1-800-MH-HYPER.

**DOCUMENTATION:**

1. Record all medications and patients response to them on PACU record.
2. Record all treatments given and patients' response to them on PACU record.
3. If a Dr. Heartwell or Rapid Response Team was called, complete the appropriate flow sheet.

**Reference:** "Drugs, Equipment, & Dantrolene – Managing MH." Malignant Hyperthermia Association of the United States. Online brochure 2002

Peri Anesthesia Nursin Core Curriculum. Preoperative, Phase I and Phase II PACU Nursing  
(Saunders) 2004. Quinn, Donna and Schick, Lois p 458 – 463

"Clinical Update-Managing MH." Malignant Hyperthermia Association of the United States. Online brochure 2005.

"ABCs of Managing Malignant Hyperthermia." Malignant Hyperthermia Association of the United States. Online brochure 2006.