

# 2024 Malignant Hyperthermia for Practitioners

# Guidelines and the Management of Malignant Hyperthermia for Practitioners 2024

## Objectives

**Upon Completion of this Module, the participant will be able to:**

1. Define Malignant Hyperthermia
2. Recall facts about Malignant Hyperthermia
3. Discuss Management of Malignant Hyperthermia
4. State the role of the Practitioner in patient care for Malignant Hyperthermia
5. Identify the locations of the malignant hyperthermia carts in your facility
6. Discuss the contents of the Malignant Hyperthermia carts

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## Malignant Hyperthermia Hotline & Website

- 24-HOUR HOTLINE FOR MALIGNANT HYPERTHERMIA EMERGENCIES
  - ◇ 1-800-644-9737
- WEBSITE
  - ◇ WWW.MHAUS.ORG

## Triggering Agents

- Succinylcholine
- Potent Volatile Anesthetics
  - ◇ ISOFLURANE
  - ◇ DESFLURANE
  - ◇ HALOTHANE
- Safe Medication for patients with Malignant Hyperthermia
  - ◇ NITROUS OXIDE
  - ◇ PROPOFOL, ETOMIDATE, KETAMINE

## Patient Signs and Symptoms

- UNEXPLAINED MUSCLE RIGIDITY
- TACHYCARDIA OR CARDIAC ARRHYTHMIA
- TACHYPNEA
- CHANGES IN SKIN COLOR FROM FLUSHED TO MOTTLED OR CYANOTIC
- ACIDOSIS (RESPIRATORY AND METABOLIC)
- HYPERKALEMIA
- ELEVATED TEMPERATURE AS HIGH AS 108°F (45.5C)

## Specific Symptoms

### **Early Signs of Malignant Hyperthermia:**

- INCREASED CO2 PRODUCTION
  - ◇ ELEVATED END TIDAL CO2
- Tachycardia

### **Late Sign of Malignant Hyperthermia:**

- MARKED TEMPERATURE ELEVATION

### **Other Signs of Malignant Hyperthermia:**

- MUSCLE RIGIDITY
  - ◇ MASSETER MUSCLE = JAW
- RHABDOMYOLYSIS
  - ◇ RELEASE OF MYOGLOBIN AS MUSCLE BREAKS DOWN

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## Management in the Operating/Procedural Room

- Notify All staff to halt the procedure as soon as possible:
  - ◊ Discontinue all volatile Anesthetic agents and succinylcholine once Malignant Hyperthermia is suspected
  - ◊ **If the surgery can be halted**
    - The surgeon will close the surgical wound if possible
    - If closure is not possible, pack the wound with saline-soaked surgical towels and lap sponges.
    - Documentation of number o towels and sponges used to pack the wound should be made in the intraoperative note.
  - ◊ **If the surgery must be continued**
    - Maintain general anesthesia with IV non-triggering anesthetics (e.g. IV sedatives, amnestics, and non-depolarizing neuromuscular blockers as needed)
- Change all rubber devices on the anesthesia devices
- Anesthesia agents are absorbed into the rubber
- Change filters on the anesthesia machine

## Initial Actions

- Hyperventilate with 100% Oxygen to meet metabolic demands during the crisis period
- DANTRIUM (DANTROLENE SODIUM) is available in the Malignant Hyperthermia Cart and pharmacy (ICU, GE, ER, and OB stock minimal amounts in the Omnicell)
- The OR Charge Nurse will notify the MHAUS Hotline and will stay on the phone with an experienced MHAUS Provider for additional provider advice and support until the patient is stabilized

**KNOW WHERE DANTROLENE IS KEPT FOR YOUR AREA**

## COLD

### ACRONYM TO REMEMBER INITIAL ACTIONS

- C** = CANCEL ANESTHESIA AND STOP THE AGENT
- O** = OXYGENATION OF THE PATIENT
- L** = LIQUIDS-HYDRATE AND GIVE DANTROLENE
- D** = DYSRHYTHMIAS TREAT DYSRHYTHMIAS

## DANTORLENE

- Is used for Malignant Hyperthermia crises
- A skeletal muscle relaxant
- Inhibits calcium release from the sarcoplasmic reticulum and is used to revers the effects of Malignant Hyperthermia
- Stored in 20ml vials at room temperature in Malignant Hyperthermia carts and Pharmacy
- 60ml of preservative-free sterile water is required to reconstitute the medication

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## Dantrolene Dosing

- DANTROLENE 2.5 MG/KG RAPID IV PUSH AND REPEATED CONTINUOUSLY UNTIL SYMPTOMS SUBSIDE OR REACH 10 MG/KG
- THE DOSE IS NOT ADJUSTED FOR RENAL OR HEPATIC
- POST MALIGNANT HYPERTHERMIA EVENT
- MAY REQUIRE IV ADMINISTRATION FOR 24-48 HOURS POST EVENT
- MAY REQUIRE PO AFTER ADDITIONALLY AFTER FIRST 24 TO 48 HOURS

## Reconstitution of Dantrolene

- UTILIZE SPIKE AND 60 ML SYRINGE TO RECONSTITUTE DANTROLENE
- ADD 60 ML OF PRESERVATIVE-FREE BACTERIOSTATIC STERILE WATER
- VIGOROUSLY SHAKE VIAL UNTIL SOLUTION IS CLEAR
- ADMINISTER IV PUSH
- PLACE USED VIALS ON THE TABLE OR COUNTER TO AID IN KEEPING TRACK OF THE AMOUNT ADMINISTERED

## Malignant Hyperthermia Carts

- **LOCATIONS:**
  - ◊ GBH OR: MH Cart located at the OR desk.
  - ◊ BH MAIN OR: MH Cart located in the East Core and 1 cart in the West Core of the OR.
- **CART CONTAINS:**
  - ◊ DANTROLENE
  - ◊ BACTERIOSTATIC PRESERVATIVE-FREE STERILE WATER
  - ◊ IV FLUIDS
  - ◊ SYRINGES, IV SPIKES, STOPCOCKS, CONNECTORS, LAB TUBES
  - ◊ WEIGHT CHARTS, MALIGNANT HYPERTHERMIA TREATMENT ALGORITHM CHARTS
  - ◊ NG TUBES, URINARY CATHETERS

## Cooling the Patient

- INFUSION OF ICED SALINE AS RAPIDLY AS 1 LITER PER 10 MINUTES FOR 30 MINUTES MAY BE REQUIRED. DO NOT USE LACTATED RINGERS AS IT MAY CONTRIBUTE TO ACIDOSIS
- SURFACE COOLING: COOLING BLANKET, ICE PACKS TO AXILLA, GROIN, NECK
- LAVAGE OF STOMACH, BLADDER AND/OR RECTUM WITH LARGE QUANTITIES OF COLD SALINE
- COOLING PROCEDURES SHOULD DISCONTINUE WHEN THE PATIENT'S TEMPERATURE REACHED 100.4°F (38°C)

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## Interventions

- DO NOT TREAT DYSRHYTHMIAS WITH CALCIUM CHANNEL BLOCKING AGENTS (CARDIZEM DILTIAZEM)
- CALCIUM CHANNEL BLOCKERS MAY CAUSE HYPERKALEMIA OR CARDIAC ARREST IN THE PRESENCE OF DANTROLENE
- MAY USE LIDOCAINE OR AMIODARONE
- CORRECT ACIDOSIS WITH BICARB BASED ON ABG RESULTS
- SEVERE RESPIRATORY AND METABOLIC ACIDOSIS OCCURS DURING THE CRISIS
- **REQUIRES ICU MONITORING**
  - ◇ ARTERIAL LINE
  - ◇ VITAL SIGNS
- **CORE AND PERIPHERAL TEMPERATURE**
  - ◇ BLOOD PRESSURE
  - ◇ PULSE RATE
  - ◇ RESPIRATORY RATE
  - ◇ ETCO2
  - ◇ SPO2
- **URINARY CATHETER FOR ACCURATE I&O**
  - ◇ MAINTAIN OPTIMAL RENAL FUNCTION
  - ◇ MANNITOL AND LASIX TO ENSURE DIURESIS AND TO PROTECT KIDNEYS
- **D50 AND REGULAR INSULIN**
  - ◇ GLUCOSE FOR METABOLISM
  - ◇ REDUCE HYPERKALEMIA BY DRIVING K BACK INTO CELLS
- **CALCIUM CHLORIDE**
  - ◇ TO TREAT HYPERKALEMIA
- **IF DIC IS PRESENT**
  - ◇ MAY REQUIRE FRESH FROZEN PLASMA, CRYOPRECIPITATE, AND PLATELETS

## Patient and Family Education

- **EDUCATION ABOUT MALIGNANT HYPERTHERMIAGENETIC PREDISPOSITION**
  - ◇ INFORM HEALTHCARE PROVIDERS OF THE CONDITION WITH EACH VISIT
- **SIDE EFFECTS OF DANTROLENE**
  - ◇ NAUSEA, DIARRHEA, DOUBLE VISION, LIGHT HEADEDNESS, AND MUSCLE WEAKNESS
- **PROVIDE INFORMATION ON MALIGNANT HYPERTHERMIA AND THE MALIGNANT HYPERTHERMIA ASSOCIATION OF THE UNITED STATES**
- **SUGGEST IDENTIFICATION MEDICAL ALERT BANDS**

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## Practitioner Orders for Nursing Care of the Malignant Hyperthermia Patient

### MHAUS ACRONYM

**M** = MONITOR ELECTROLYTES

**H** = HYPERKALEMIA ADMINISTER INSULIN AND DEXTROSE

**A** = ACIDOSIS ADMINISTER BICARB

**U** = URINE MONITOR HOURLY URINE OUTPUT

**S** = SIGNIFICANT OTHER MHAUS COUNSELING AND TEACHING

### Malignant Hyperthermia Response Laminated Cards on all Carts

- **ASSESSMENT - IDENTIFY SIGNS AND SYMPTOMS**
- **CALL FOR HELP**
- **DANTROLENE ADMINISTRATION**
- **TREATMENT OF ACIDOSIS AND DYSRHYTHMIAS**
- **MAINTAIN OPTIMAL ORGAN PERFUSION**

### PEARLS of Malignant Hyperthermia Response

- **MALIGNANT HYPERTHERMIA RARE MEDICAL EMERGENCY**
- **THE MAJOR TRIGGER IS SUCCINYLCHOLINE**
- **INITIAL ACTION COLD: (CANCEL ANESTHESIA GASES, OXYGENATE, LIQUIDS FLUIDS, AND DANTROLENE**
- **EDUCATE PATIENT AND FAMILY**
- **EDUCATE TEAM**
  - ◇ **HOLD EDUCATION DAYS AND DRILLS**

### REFERENCES

- ASSOCIATION OF PERIOPERATIVE REGISTERED NURSES (AORN).
- BHC POLICY: MALIGNANT HYPERTHERMIA
- MALIGNANT HYPERTHERMIA ASSOCIATION OF THE UNITED STATES. WEBSITE: [HTTP://WWW.MHAUS.ORG](http://www.mhaus.org)