INITIAL EVALUATION

Assess signs and symptoms of MH:

**Early signs and symptoms:**
- Tachycardia/tachypnea
- Abrupt increase in end tidal carbon dioxide (ETCO₂)
- Muscle rigidity/masseter muscle rigidity
- Hyperthermia (temperature > 38.8°C)
- Mixed respiratory/metabolic acidosis
- Hyperkalemia
- Hypotension
- Rhabdomyolysis (i.e. myalgia, elevated creatinine kinase and blood myoglobin levels)
- Cardiac arrhythmias
- Hypoxia
- Profuse sweating
- Mottling of the skin

**Late signs and symptoms:**
- Acute renal/circulatory failure
- Dark colored urine due to myoglobinuria
- Disseminated intravascular coagulation
- Rhabdomyolysis (i.e. myalgia, elevated creatinine kinase and blood myoglobin levels)
- Hyperkalemia
- Hyperthermia (temperature > 38.8°C)
- Hypotension
- Cardiac arrhythmias

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MH confirmed?

**If MH suspected, page Anesthesia¹ and notify Pharmacy² STAT**
- Bring MH cart² to bedside

**MH team lead (anesthesiologist)³** assembles crisis team
- Assigns roles to MH team members
- Assists with drawing arterial blood gases (ABGs) as needed
- Calls MH hotline (1-800-644-9737)

**For acute phase treatment, see Page 2**

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MH cart locations:

**Main building**
- Main OR in Pod B across OR 18 (G5.3638) (Badge access only)
- Main IR near G3.3301A
- G5 PACU behind the bay/room 59
- P3.3028 (Access code only)

**Houston Area Locations (HALs)**
- The Woodlands PACU
- West Houston PACU

**Mays building**
- ACB1.1269
- Anesthesia storage room ACB4.2517

**Proton Therapy Center**
- Next to crash cart near PTCB 2075

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¹ See Appendix A for Contact Information

² MH cart locations:

³ MH team lead (anesthesiologist)

⁴ Patients < 18 years old, contact Pediatric Intensive Care Services (PICS) at 713-745-0570 or Charge RN at 713-483-8143
- If patients are 18 – 21 years old and Pediatric is the primary service, contact PICS at 713-745-0570 or Charge RN at 713-483-8143
- Patients ≥ 18 years old, contact Adult Intensive Care Unit (ICU) at 713-792-1101 or ICU Triage at 281-851-0979

⁵ Call 911 to have the patient transported via EMS to nearest emergency center

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Department of Clinical Effectiveness V3

Approved by the Executive Committee of the Medical Staff on 07/21/2020
Malignant Hyperthermia (MH)

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson’s specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient’s care. This algorithm should not be used to treat pregnant women.

ACUTE PHASE TREATMENT

Cooling team member:
- Initiates cooling process only if patient’s temperature exceeds 39°C
- Brings cold IV normal saline (NS) bags and ice
  - Packs IV NS bags in ice for infusion
  - Prepares ice packs
- Surface cooling measures:
  - Ice packs to body surfaces
  - Cooling blankets set temperature at 32°C, if available
- Internal cooling measures:
  - Nasogastric (NG) tube for stomach lavage using cold NS
  - Indwelling foley catheter for irrigation using cold NS
  - Peritoneal lavage with cold NS to cavity
- Continuously monitors patient’s temperature
- Discontinue cooling measures when temperature < 38°C

Dantrolene Sodium (Ryanodex) team member:
- Administers dantrolene sodium 2.5 mg/kg IV push
  - Reconstitute each vial by adding 5 mL of sterile water for injection (without a bacteriostatic agent), shake vial for over 10 seconds to ensure an orange-colored uniform suspension, and visually inspect the vial for particulate matter and discoloration prior to administration
  - Subsequent doses of 1 mg/kg IV push can be given per Anesthesia request based upon clinical symptoms and/or lab results

Medication team member:
- Assists with preparation and administration of dantrolene sodium and other medications
- Ventilation team member:
  - Ventilates with 100% oxygen
  - Adds activated charcoal filter to the ventilation circuit
- Primary nurse:
  - Maintains documentation of all medications administered, procedures performed and continued patient assessment
  - Infuses cold NS intravenously
  - Inserts NG tube for cold NS lavage
  - Inserts foley catheter for cold NS irrigation
  - Assists MH team leader
  - Draws labs: ABGs, basic metabolic panel (BMP) with total calcium, creatine kinase, urine myoglobin, coagulation studies (PT/PTT/INR), and additional labs as clinically indicated
  - Performed ongoing evaluation for signs and symptoms of MH (see Page 1)
  - Transfer patient to a higher level of care:
    - Notify ICU regarding transfer
    - HALs will require a transfer to another facility
  - Complete a safety intelligence (SI) report
  - Report to Malignant Hyperthermia Association of the United States (MHAUS)
    - Call MH hotline (1-800-644-9737)
  - Provide patient education regarding MH and future precautions

Note: Cumulative doses of 10 to 30 mg/kg may be needed.

1 Applicable to OR only
2 Patients < 18 years old, contact Pediatric Intensive Care Services (PICS) at 713-745-0570 or Charge RN at 713-483-8143
3 If patients are 18 – 21 years old and Pediatric is the primary service, contact PICS at 713-745-0570 or Charge RN at 713-483-8143
4 If patients ≥ 18 years old, contact Adult Intensive Care Unit (ICU) at 713-792-1101 or ICU Triage at 281-851-0979
5 Call 911 to have the patient transported via EMS to nearest emergency center

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Malignant Hyperthermia (MH)

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APPENDIX A: Contact Information

<table>
<thead>
<tr>
<th>Location</th>
<th>Information</th>
<th>Contact number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anesthesia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anesthesia control room</td>
<td>Monday - Friday 6:00 AM – 9:00 PM</td>
<td>713-792-2524 (phone)</td>
</tr>
<tr>
<td>Anesthesia airway pager</td>
<td>After hours 9:00 PM – 6:00 AM and weekends coverage</td>
<td>713-404-2946 (pager)</td>
</tr>
<tr>
<td>ACB Anesthesia</td>
<td></td>
<td>713-834-6520 (phone)</td>
</tr>
<tr>
<td>Proton Therapy Center</td>
<td>Please contact the Anesthesiologist assigned for the day</td>
<td>713-792-2524 (phone)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>713-563-8961 (phone)</td>
</tr>
<tr>
<td><strong>Anesthesia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAL – The Woodlands</td>
<td>Please contact the Anesthesiologist assigned for the day</td>
<td>832-657-2505 (phone)</td>
</tr>
<tr>
<td>HAL – West Houston</td>
<td></td>
<td>281-467-5328 (phone)</td>
</tr>
<tr>
<td><strong>Main OR Pharmacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monday - Friday 6:00 AM – 11:30 PM</td>
<td>713-794-1258 (phone)</td>
</tr>
<tr>
<td></td>
<td>After hours coverage 11:30 PM – 6:00 AM</td>
<td>713-404-2946 (pager)</td>
</tr>
<tr>
<td><strong>ACB OR Pharmacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monday - Friday 6:00 AM – 7:00 PM</td>
<td>713-563-8242 (phone)</td>
</tr>
<tr>
<td></td>
<td>For coverage between 7:00 PM – 10:00 PM call ATC Pharmacy</td>
<td>713-745-1010 (phone)</td>
</tr>
<tr>
<td></td>
<td>After hours coverage 10:00 PM – 6:00 AM</td>
<td>713-404-2946 (pager)</td>
</tr>
<tr>
<td><strong>The Woodlands Pharmacy</strong></td>
<td>Please contact the Pharmacist assigned for the day</td>
<td>936-446-5034 (phone)</td>
</tr>
<tr>
<td><strong>West Houston Pharmacy</strong></td>
<td>Please contact the Pharmacist assigned for the day</td>
<td>281-646-4341 (phone)</td>
</tr>
</tbody>
</table>
SUGGESTED READINGS


Herlich, A. (personal communication, March 12, 2020)


This practice consensus algorithm is based on majority expert opinion of Malignant Hyperthermia work group at the University of Texas MD Anderson Cancer Center for the patient population. These experts include:

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