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| **Case Title** | Malignant Hyperthermia (MH) |
| **Scenario Name** | Post-op Appendectomy |

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| **Learning Objectives -** [**Use action words**](http://ubccpd.ca/sites/ubccpd.ca/files/Accreditation_Learning%20Objectives_%20Verbs.pdf) | |
| **Knowledge:**   1. Recognize signs and symptoms of MH 2. Discuss MH Protocol and MH Cart (location and supplies) | |
| **Skills:**   1. Demonstrate utilization of MH Protocol 2. Practice mixing and administration of Dantrolene 3. Manage critically ill patient | |
| **Attitude/Behaviours:**   1. Demonstrate effective team skills 2. Demonstrate situational awareness 3. Demonstrate graded assertiveness | |
| **Scenario Environment** | |
| **Location** | PAR |
| **Monitors** | Bedside monitor |
| **Props/Equipment** | |  |  | | --- | --- | | * Temperatlure probe * Pulse oximeter * Capnograph * Art line * ET tube * Laryngoscope * Dantrolene * Sterile water | * 60ml syringes * NS * Bicarbonate * Glucose/insulin * Calcium * Defibrillator | |
| **Make-up/Moulage** |  |
| **Potential Distractors** |  |

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| **Case Introduction:** |
| 27 year old male transferred to RIH from NVGH with appendicitis for a surgery consult. Presenting VS: T – 39.5, P – 115, BP 95/40, RR – 20. Pt c/o diffuse abdominal pain, nausea. Ultrasound revealed perforated appendix. To OR within 20 mins of arrival. No surgical complications - irrigation of the peritoneal cavity for purulent drainage. Required neuromuscular blocker for challenging intubation: Laryngeal view - grade 3/Mallampati Class III. Arrives in PAR intubated, sedated. |

| **Patient Parameters** | **Effective Management** | **Notes** |
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| **Phase 1: Arrival to PAR**  **Condition:** Stable. I & V.  **Initial Assessment**   * **Heart Rhythm:** Sinus * **HR:**  80 * **BP:** 110/70 * **RR:** bagging by Anesthesia *(RT to be called and placed on ventilator)* * **SP02:** 99% * **T:** 37 * **CNS:** Sedated * **Chest:** Clear * **GI:** Abd dressing intact – small amount sang shadowing * **GU:** Catheter insitu. Approx 500cc in bag * **Weight:** 110 kg | 1. **Focused history** ( see Notes column) 2. **Management**  * Apply appropriate monitoring   *\*\*Procced to* ***Phase 2: Hypercabia*** *after 2 min* | 1. **Focused history**   **PMHx**   * Healthy   **Meds**   * Abx pre-op and introperatively   **Allergies**   * NKA |
| **Phase 2: Hypercarbia**  **Condition:** Patient becomes hypercarbic and mildly tachycardic  **Physical Examination**   * **Heart Rhythm:**  Sinus * **HR:** 110 * **BP:** 100/70 * **RR:** bagging or ventilator * **SP02:** 97% * **ETCO2:** 55 * **T:** 37 | 1. **Patient Reassessment** (see Notes column) 2. **Management**  * Recognize hypercarbia and tachycardia * Notify anesthesia * Increase FiO2 to 100% * Try to find the casue of hypercabia   + Check ventilator paramters, ETT, and breath sounds * Consider areterial line placement   *\*\*Proceed to* ***Phase 3: Fever*** *after 2 min* | 1. **Patient Reassessment**   **Airway**   * Managed * ET tube placement confirmed   **Breathing**   * CS clear   **Circulation**   * Spontaneous |
| **Phase 3: Fever**  **Condition:** Pt becomes unstable  **Physical Examination**   * **Heart Rhythm:** Sinus tachycardia * **HR:** 125 * **BP:** 85/45 * **RR:** bagging or ventilator * **SP02:** 93 * **ETCO2:** 70 * **T:** 39 | 1. **Patient Reassessment** (see Notes column) 2. **Management**  * Recognize MH – **Call CODE** * Initiate IH MH Protocol – ***\*\*staff to know where to access resources and cart\*\****   + Stop warming *(if in process)*   + Increase minute ventilation, set up capnography   + Intubate *(if not intubated)*   + Assess for rigidity   + Insert esophageal/rectal temperature probe   + Apply ice packs, insert NG/three-way foley   + Arterial Line placement *(if not placed)*   + Call MHAUS hotline   + Administer     - Propofol/narcotic relaxant     - Dantrolene ***\*\*critical action\*\****       * Initial dose – 2.5 mg/kg       * Maintenance dose – 1 mg/kg q6 hours. Ensure dantrolene availability for 36 hours   + ***If*** peaked T waves on ECG, admnister Calcium 🡪 Insulin   + ***If*** cardiac arrhythmia ***and*** no peaked T waves, administer Bicarb   + Order ABG, chemistry, CK, and coagulation studies   + Notify lab and pharmacy of MH patient   + Consult ICU   **Consequences of management**   * *If learners* ***do not*** *start MH treatment within 2 min proceed to* ***Phase 4A: Code*** * *If learners* ***do*** *start MH treatment within 2 min proceed to* ***Phase 4B: Resolution*** | 1. **Patient Reassessment**   **Airway**   * Managed and/or secure   **Breathing**   * CS clear * Rate per ventilator/bagging   **Circulation**   * Spontaeous |
| **Phase 4A: Code**  **Condition:** Unstable, hypotensive witout palpable pulses  **Physical Examination**   * **Heart Rhythm:** VT * **HR:** 151 – *no palpable pulse* * **BP:** 60/30 * **RR:** per bagging or ventilator * **SP02:** 62% * **T:** 39.2 * **ABG:** 7.1/86/100/19 | 1. **Patient Reassessment** (see Notes column) 2. **Management**  * Recognize change in VS and arrhythmia * Attempt to palpate pulses * Begin ACLS algorithm for pulseless VT   + CPR – 2 min cycles   + Check rhytm   + Defibrillation immediately   + Epinephrine q 3-5 min * MH treatment   **Consequences of management**   * *Continue with pulseless VT algorithm until MH treatment initiated, then proceed to* ***Phase 4B: Resolution*** | 1. **Patient Reassessment**   **Airway**   * Managed   **Breathing**   * Rate per ventilation/baggin   **Circulation**   * Compromised |
| **Phase 4B: Resolution**  **Condition:** Stabilizing  **Physical Examination**   * **Heart Rhythm:** Sinus * **HR:** 110 * **BP:** 130/80 * **RR:** per bagging or ventilation * **SP02:** 96% * **ETCO2:** 48 * **T:** 37.7 | 1. **Patient Reassessment** (see Notes column) 2. **Management**  * Verify pulse * Verify SR * Terminate ACLS alorithm | 1. **Patient Reassessment**   **Airway**   * Managed and secured   **Breathing**   * Rate per ventilation/baggin   **Circulation**   * ROSC |

**Insert more lines if more phases required.**

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| **Debriefing Points** |
| * Discuss order of signs in MH * Discuss MH Protocol * Discuss dosage and preparation of Dantrolene * Discuss pulseless VT alogorithm |