



Welcome!

Welcome to our Simulation Newsletter!

This month, we want to discuss the Main OR/PACU malignant hyperthermia (MH) simulations we did this month.

MH is a low-frequency

high-acuity event. Practicing for it is an excellent way to be prepared for it. (If that sounds obvious, we agree! Let's go do some practice.)

Our journal article gives some information on MH as

well as talking about simulations of it.

Please send us your feedback! *Our contact information is in the top left corner of the second page.*

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Why Simulate Malignant Hyperthermia?

As we said above, malignant hyperthermia is a low-frequency high-acuity event. It is a genetic disorder in which certain medications such as anesthesia gases and succinylcholine can cause an uncontrolled release of calcium from skeletal muscle cells. The calcium causes the skeletal muscles to continuously contract, using up oxygen

and releasing carbon dioxide and heat. MH can cause multiple problems, up to and including ventricular fibrillation and death.

The best treatment for it is to avoid it in the first place by not giving the trigger medications to someone who might have the genetic disorder, but we don't always know who has

it.

Treatment for it is complex, involves a lot of people, and has many moving parts.

A CBL about this, while useful, isn't enough. Team members need to practice making all the parts work together smoothly. Simulation lets us practice that coordination.

What Needs to Be Simulated?

In MH, the anesthesia gas is frequently the culprit. So, the anesthesiologist/CRNA has a lot of things to do: stop the gas, switch to a non-triggering anesthesia, replace the vent circuit, and ventilate the patient with 100% oxygen.

The surgeon needs to emergently close as soon as possible. That can be tricky if they're in the middle of a complicated surgery.

Nursing staff need to begin reconstituting Dantrolene and/or Ryanodex. Dantro-

lene is ferociously hard to dissolve. Several nurses need to be involved, as the initial dose for a 70 kg patient is almost nine vials of Dantrolene. Nurses may also be giving IV fluids and sodium bicarbonate.

Surgical techs will be working to cool the patient using cooling blankets and ice packs. The patient's temperature will soar and needs to be brought down.

In addition, someone on the team needs to call the Malignant Hyperthermia

Association of the US (MHAUS) hotline. MHAUS can help walk the team through the event.

All of this needs to be simulated simultaneously. It's a big, fun challenge for us and requires at minimum two simulationists. We even simulate the MHAUS hotline — the participants will actually call a preset phone number and "talk to MHAUS".

Steps of a Simulation:

- Goals
- Creation
- Preparation
- Running the Simulation
 - Briefing
 - Run
 - Debriefing
- Reset
- Assessment

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Our newsletter repository:

<https://www.medicalcenter.virginia.edu/medsa/simulation-newsletters>

Pictures!



A PACU simulation, and one of the few without Mike Miller as the CRNA. One syringe of Dantrolene is being handed in. A code cart is on the left and the OR's MH cart is on the right.



An OR simulation, with a person portraying a surgeon in green on the left. Most of the team members are around the OR's MH cart, preparing Dantrolene. You can see ice packs and frozen saline bags on the manikin.

How Did We Do This in the OR/PACU?

The OR and PACU have staggered start times for their staffs, which actually worked to our advantage.

We started in the OR at 0800 with one big simulation. We then moved to PACU and did four rounds of the simulation in two hours. We then went back to the OR at 1100 for one more simulation. Fifty people participated across all of them!

Specific people such as the anesthesia techs were “on call”, so that the participants could actually contact people by Vocera as they would in a real case. We want to give the anesthesia techs a shoutout for being at all the simulations!

What Were the Results?

Lots of things went well in the simulations! The teamwork was excellent. We asked the anesthesiologist/CRNA to not be the first person to say “malignant hyperthermia” so that another team member would have to bring it up, which they did.

Mixing up the Dantrolene is always a challenge. It comes in vials, 20 mg in 60 mL once reconstituted with sterile water. Knowing where the sterile water is in the MH cart was a challenge. 60 mL syringes are now in short supply, so the team had to be able to use 30 mL syringes and count doses by half-syringe.

Finding ice also is a challenge. Most areas are not set up to produce a large amount of ice quickly, though the OR does have that capability. They also were creative, using cooling blankets and evaporative mist sprays with fans to cool the patient.

In PACU, it was hard to find a phone near the patient for the MHAUS call.

The MH cart had resources that some people didn't know about.

One of the biggest takeaways from this is communication. The anesthesiologist/CRNA, who is the usual Team Lead, has many tasks of their own to perform at the same time multiple other things need to happen. There were discussions about the importance of bringing in more anesthesiologists and possibly having the OR charge nurse organize the non-anesthesia tasks.

Journal Article

Our article this month describes an OR MH simulation program. The article is: Dirksen, S. J. H., et al. (2013). Developing Effective Drills in Preparation for a Malignant Hyperthermia Crisis. *AORN Journal* 97(3), 330-352. The following link should access the article from an UVa computer: <https://www-sciencedirect-com.proxy1.library.virginia.edu/science/article/pii/S000120921201349X> and click on “View PDF”.

Shoutout!

We want to thank Mike Miller CRNA for being the CRNA for most of the simulations! He was in four hours of back-to-back simulations, being careful not to say malignant hyperthermia first, and then being excellent as the Team Lead in organizing the response.