Have a plan for malignant hyperthermia

Not long after the March 2008 death of Florida teenager Stephanie Kuleba from malignant hyperthermia (MH), a group of anesthesiologists, emergency physicians, and surgery center officials began talking about how her death could have been prevented.

The result of their research and discussions is proposed guidelines on emergency transfer of patients with suspected malignant hyperthermia.

According to Henry Rosenberg, MD, one of the authors, the reason it took nearly 2 years to draft the guidelines is that the effort included many professionals with diverse specialties. Even so, health care professionals around the country were invited to review and add their comments on the draft. The comment period ended November 15, 2009, and the panel is preparing a final version for release early in 2010.

Guideline for ASCs

Dr Rosenberg is director of medical education and clinical research at St. Barnabas Medical Center in Livingston, New Jersey, and serves as president of the Malignant Hyperthermia Association of the United States (MHAUS).

Because the death took place in an outpatient setting (a physician’s office), the guidelines focus primarily on issues surrounding transport. Outpatient sites are considered more vulnerable to MH because they lack intensive care facilities, often lack equipment to analyze blood gases, and may not have enough trained staff on hand.

The guidelines are directed specifically at ambulatory surgery centers (ASCs), which though they are regulated differently from physician practices, share the same need for reliable transportation arrangements and are increasingly popular choices for elective surgery.

The Ambulatory Surgery Center Association worked with MHAUS to develop the guidelines and, through its Ambulatory Surgery Foundation (ASF), to publish the guidelines and gather comments.

“There was a large spectrum of people who were involved in this,” Dr Rosenberg notes.

Transport: the critical factor

Despite the varied viewpoints of the study panel, it soon became clear that the focus should be on the variable over which they had the least control: the handling of transportation between an ASC and the hospital. While many ASCs are physically near or attached to hospitals, others are distant. When MH strikes, the patient must be taken to a hospital, almost inevitably to intensive care. But conditions vary widely, the panel found, in how a patient gets there.

Among the variations are:

- the distance between an ASC and its designated referral hospital—which could require air transport as well as ground
• the capabilities of the designated hospital—does it have an emergency room and an intensive-care unit (ICU) with staff trained to treat MH?
• the skill level of the emergency medical technicians (EMTs) who respond to the call for transport.

They reviewed the Florida incident as well as other less-publicized incidents from the past, and, Dr Rosenberg says, “We became concerned that there was little information out there for that crucial period where things can go wrong during transportation.”

Dealing with uncertainty

“We couldn’t come out and recommend specific things to do because of the variations,” he says.

Studies indicate that mortality from MH increases by 2 to 4 times when a patient is moved to a hospital from a nonhospital setting. Treatment, especially dantrolene infusion, must begin as soon as symptoms occur, meaning a skilled practitioner must be with the patient during transport.

The panel learned that merely calling 911 does not guarantee arrival of technicians skilled at treating MH. EMTs range in skill from those who can administer oxygen to highly trained specialists who can intubate, defibrillate, and perform other medical procedures.

“From what I understand,” Dr Rosenberg says, “when you call 911, you don’t know what skill level you are going to get. That’s another whole variable.”

He says because MHAUS is a small, voluntary organization, it does not have the resources to examine the transport issue along with its main focus, anesthesiology protocols.

Transport issues

Because of the uncertainty, it is possible that the anesthesiologist will have to make the trip with the patient. The draft guideline has a section on transport that calls for consideration of how to handle the following issues:
• ventilator support
• temperature and cardiopulmonary monitoring
• administration of fluids
• medication, including dantrolene.

The guideline warns: “This may sometimes require participation of the ASC anesthesia staff.”

In any case, the patient should be stabilized before leaving the ASC. The guideline suggests the following indicators:
• declining ETCO₂ (end-tidal carbon dioxide)
• stable or decreasing heart rate without dysrhythmias
• dantrolene infusion has begun
• decreasing temperature
• reduction in any muscular rigidity.

The ASC clinician should be ready to report details of these indicators, noting also whether a Foley catheter is present and the color of the urine.

Good news from the ER

The panel’s research showed that more ER physicians than they expected are familiar with MH. They tend not to have the only known antidote, dantrolene sodium, on hand, but can order it from the pharmacy when a patient arrives. Many use the poster MHAUS distributes with a treatment protocol and its information hotline, 800/644-9737.
“We were pleasantly surprised at how many ED physicians were aware of MH and of how to get in touch with an MH expert through the hotline,” Dr Rosenberg says.

In addition, emergency physicians in general are familiar with treating high temperatures resulting from drug use. In some cases, he notes, patients are transported directly to the ICU of the receiving hospital.

The panel also learned that most US hospitals have dantrolene available, either in the OR or in the pharmacy. However, they also found that while MHAUS, the American Society of Anesthesiologists (ASA), and AORN all have guidelines that stress keeping dantrolene on hand, many do not have the recommended 36 vials. “That’s an important issue,” Dr Rosenberg says.

Some ASCs protest that the drug, at about $70 per vial, with a shelf life of 36 months, is too expensive. Dr Rosenberg counters that “in relation to other expenses, that’s not so much.”

**Flexible rules**

The guidelines are intended to help ASCs develop their own transfer plans, not to dictate any particular protocol, and they have already prompted discussions.

For Arnaldo Valedon, MD, there is no question how he would respond during the transport of a patient after an MH episode: “I’m going with the patient.”

Dr Valedon, an anesthesiologist, is chief of the ASC division for First Colonies Anesthesia Associates (FCAA) in Rockville, Maryland. He also serves on the board of ASF, and served on the panel that developed the guidelines.

FCAA provides anesthesia services to 37 ASCs in Maryland and Virginia. One is Orthopaedic Associates of Central Maryland Ambulatory Surgical Center, where current MH response policy has 2 parts: first, diagnosis and treatment and second, transport.

“We will be using the new protocol developed by MHAUS and the ASC Association,” Dr Valedon says. “It assumes you have already diagnosed MH. Transport will quickly ensue and will be guided by the type of tertiary care available in proximity to that center. Our 37 centers are all pretty close to hospitals,” he adds.

He agrees with Dr Rosenberg that there is no way to control the skill level of responding EMTs and adds that often an ambulance will go to the nearest hospital, not the one that has an agreement with the ASC.

“What we wanted to do with the protocols,” he explains, “is to give flexibility for the provider to make decisions on-site based on the best available information and to accompany the patient during transport. It is not required, but for me personally, I’m going with the patient.”

**Points to consider**

Because of the variations in ASC arrangements and the uncertainty of transport conditions, the guidelines do not list instructions. Rather, they suggest points an ASC should consider in designing its policy. “Due to the variety of state laws and the composition of emergency transport teams, it is not possible to recommend a specific protocol that will serve the transport needs of all ASCs across the country,” states the introduction.
“The important thing,” Dr Valedon says, “is to prepare ahead of time. You should have an agreement with a hospital and know what capability the hospital will have.”

Because of the rarity of MH, few clinicians have first-hand tales to tell about it. For Dr Valedon, his closest brush with the condition came about 12 years ago, during his training at a hospital. It happened to the 12-year-old patient of a fellow physician.

“It turned out very well,” he reports.

The malignant hyperthermia guidelines are available at www.ascassociation.org/mhguidelines.pdf

Key steps in protocol

The proposed guidelines issued by the Ambulatory Surgery Foundation (ASF) and Malignant Hyperthermia Association of the United States (MHAUS) consist of a flow chart with steps for designing an MH protocol for an ASC.

The flow chart begins with the first suspicion of MH and ends when the receiving hospital takes charge of the patient.

The general steps are:

1. Recognize suspected MH—the MHAUS Emergency Therapy poster has the recommended protocol.
3. Initiate emergency transfer plan.
4. Review transfer considerations and capabilities, including receiving hospital capabilities, clinical factors, and transport team capabilities.
5. Implement transfer decisions.
6. Notify receiving hospital and coordinate communication between ASC and hospital physicians.