Wilderness Medical Society issues official guidelines for prevention and treatment of drowning

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Drowning is a global threat to human health. Each year, more than 372,000 people die as a result of drowning, with many of those deaths being preventable by simple water safety measures. In order to arm professionals with the most up-to-date clinical protocols, the Wilderness Medical Society (WMS) has issued a new set of practice guidelines for both the treatment and prevention of drowning, published in the society's official journal, *Wilderness and Environmental Medicine*.

On average, drowning is responsible for 10 deaths per day in the United States and over 3,800 deaths annually. These numbers, provided by the Centers for Disease Control and Prevention, exclude deaths occurring from floods and other natural disasters. Sadly, the highest risk age group for drowning is children 1 to 4 years old in residential pools. Drowning deaths are also 48% more likely to occur on a weekend and 53% of all male and 26% of all female drowning deaths occur in natural bodies of water such as oceans, lakes, rivers, ponds, and streams.

In order to gather the latest and most accurate information to inform the creation of the new guidelines, the WMS assembled a team of doctors with extensive clinical and research experience in drowning prevention, education, and training, as well as practical wilderness medical knowledge. Using both the available literature on drowning and their own clinical expertise, the team of physicians graded evidence according to the American College of Chest Physicians criteria. The result of their

efforts is a comprehensive and current guide for the treatment and prevention of drowning.

With the release of these comprehensive guidelines, the WMS hopes practitioners and other rescue personnel will be equipped with the most recent information to effectively treat and counsel patients. "Drowning is a process defined by hypoxemia, with outcomes ranging from no morbidity to severe morbidity, and eventually death," explained lead author Andrew C. Schmidt, DO, MPH, Assistant Professor of Emergency Medicine, University of Florida College of Medicine, Jacksonville, and Director of Lifeguards Without Borders.

The new recommendations are grouped by categories: initial resuscitation, postresuscitation management, disposition in the wilderness, disposition in the ER, prevention, and special situations. For each category, the panel has provided specific guidelines for many different circumstances and scenarios.

These in-depth recommendations offer clinicians and rescue personnel the most accurate and thorough evaluation of the different techniques and protocols around drowning. Key takeaways for each category include:

Rescue of a Drowning Patient

- Only those with formal water rescue training should attempt in-water rescues.
- People without formal water rescue training should avoid entering the water and should instead try to reach the drowning person with a rope or pole, throw the person a floatation device, or reach the person by boat. The mantra "Reach, Throw, Row. Don't Go" can be a helpful way to remember the best ways to help a drowning person.

- If a vehicle is submerging, the best time to escape is immediately after it enters the water during the initial floating phase. This is contrary to many depictions in popular culture in which people wait until the car is fully submerged to try and escape.
- In-water resuscitation should only be attempted by rescuers with adequate training in the procedure and when conditions allow for safely preforming the associated tasks.

Initial Resuscitation

- Hypothermia, which is commonly associated with drowning, should be treated aggressively with active and passive measures.
- It is critical to interrupt the drowning process as quickly as possible. Establishing an airway and providing oxygen should be the priorities in the initial resuscitation of a drowning patient.
- Oxygen should be delivered at the highest concentration available based on patient tolerance and available resources.
- If available, an automated external defibrillator should be used during resuscitation.
- The Heimlich maneuver is NOT recommended at this time for the resuscitation of a drowning patient.
- Spinal immobilization should be considered in patients with evidence of spinal injury; however, immobilization should not take priority over initial resuscitation.

Postresuscitation Management

- Mechanical ventilation should follow acute respiratory distress syndrome (ARDS) protocols.
- Initial chest radiographs may be useful in tracking changes in patient condition, but not for determining prognosis. Routine use of neuroimaging in an awake and alert drowning patient is not

recommended, unless there is a change in clinical status.

- Routine complete blood count or electrolyte testing is not recommended, but arterial blood gas testing may be used for patients who exhibit signs of hypoxemia or respiratory distress in order to guide respiratory interventions.
- Due to a lack of data and evidence, the use of routine antibiotics and corticosteroids is not recommended when treating drowning patients, unless there are extenuating clinical circumstances that demand their use.
- Current literature shows that therapeutic hypothermia may offer some benefits to drowning patients; however, there is not enough evidence to either support or discourage its use.

Disposition in the Wilderness

- A large retrospective study found that patients who experienced a drowning event but had no other symptoms other than a mild cough and did not have abnormal lung sounds had 0% mortality.
- Clinical deterioration usually occurs within the first four to eight hours for patients presenting with mild symptoms. Lung sounds, oxygen saturation, and blood pressure should be monitored during this time.
- Hypoxemia, abnormal lung sounds, severe cough, frothy sputum, or foamy material in the airway; depressed mentation; or hypotension warrant evacuation to advanced medical care as long as the risks of the evacuation do not outweigh the potential benefit.
- Current evidence suggests that if a patient is submerged for more than 30 minutes in water warmer than 6°C (43°F) or more than 90 minutes in water colder than 6°C (43°F), there is minimal chance of the patient surviving the event neurologically intact.

Disposition in the Emergency Department

- Investigators conclude that patients can be safely discharged if normalized and there was no deterioration in respiratory function after four to eight hours of observation on room air in the ED.

Drowning Prevention

- Patients with coronary artery disease, prolonged QT syndrome, seizure disorders, or other medical and physical impairments are at increased risk for drowning and should be counseled about steps to mitigate that risk.
- People who choose to participate in activities around water should have at minimum the ability to maintain a floating position, tread water, and make forward progress for a distance of at least 25 meters (82 feet).
- Properly fitted lifejackets that meet regulatory specifications should be available to everyone when boating or engaging in any water sports.
- Alcohol and other intoxicating substances should be avoided before and during water activities.
- Any group operating in or near aquatic environments should consider water safety during the planning and execution of excursions, including hiring personnel with technical rescue training.

Special Situations

- In cold water, clothing should remain on, unless it hampers buoyancy.
- Swimming or treading water should be limited to minimize heat loss, unless it is decided the only chance for rescue is to swim to

safety.

- After the initial shock of a cold water entry, once a person is able to obtain his or her bearings, he or she may have far less than 10 minutes of effective swimming, and up to one hour of consciousness before succumbing to hypothermia.
- If a person must stay immersed in cold water, the HELP position should be maintained with the help of a lifejacket or other flotation device. In the event of a group immersion, the huddle formation may be helpful to keep participants warm and together.
- If a delayed rescue is expected, it is best to try and attach oneself to buoyant objects or to a surface out of the water in order to remain afloat after losing consciousness.

"As with other injuries encountered in the wilderness environment, the best treatment for drowning is prevention," emphasized Dr. Schmidt. "When prevention fails, or circumstance leads to the drowning process, then the most important aspect of treatment is to reverse cerebral hypoxia by providing oxygen to the brain by whatever means available."

More information: Andrew C. Schmidt et al, Wilderness Medical Society Practice Guidelines for the Prevention and Treatment of Drowning, *Wilderness & Environmental Medicine* (2016). DOI: 10.1016/j.wem.2015.12.019

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