The Deadliest Diagnosis: Drowning
Annmarie Keck, RN, BSN, EMT-B
Clinical Outreach Educator
Northwest MedStar

Old Definitions
• Near drowning: is suffocation in water that does not result in death; it does result in hypoxia due to aspiration or laryngospasm
  – Sequelae of hypoxia may include: brain damage and multiple organ failure
  – Treatment is supportive, including reversal of cardiac and respiratory arrest, hypoxia, hypoventilation and hypothermia.
• Drowning: fatal suffocation in water

New Definition
• “Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid.”
  -World Health Organization

2002 World Congress on Drowning

Don’t become a victim
• Step 1: Rescue
  and scene safety

Incidence
• 2007- 3,443 fatal unintentional drownings in the United States
  – 7th most common cause of death
• MALES: 3.7 times more likely than females
• CHILDREN: 1 to 4 years old who died from an unintentional injury, almost 50% died from drowning.
  – Fatal drowning remains the second-leading cause of unintentional injury-related death for children ages 1 to 14 years

CDC Unintentional Drowning: Fact Sheet

Treatment: A & B
• Rescuers should provide CPR, particularly rescue breathing, as soon as an unresponsive submersion victim is removed from the water (Class I)
• When rescuing a drowning victim of any age, it is reasonable for the lone healthcare provider to give 5 cycles (about 2 minutes) of CPR before leaving the victim to activate the EMS system.
• Mouth-to-mouth ventilation in the water may be helpful when administered by a trained rescuer (Class IIb).
**Treatment: C**

- Chest compressions are difficult to perform in water; they may not be effective and they could potentially cause harm to both the rescuer and the victim.
- Maneuvers to relieve foreign-body airway obstruction (FBAO) are not recommended for drowning victims because such maneuvers are not necessary and they can cause injury, vomiting, aspiration, and delay of CPR.

**Spinal Precautions?**

- Spinal cord injury is rare among fatal drowning victims
  - Victims with obvious clinical signs of injury, alcohol intoxication, or a history of diving into shallow water
  - Health care providers may consider stabilization and possible immobilization of the cervical and thoracic spine for these victims

**BLS AHA updates**

- CAB instead of ABC
  - “Look, Listen & Feel” takes too long
  - Compressions still 30:2 for healthcare providers
  - Untrained rescuers will be told to do non-stop hands-only compressions until EMS arrives
  - Compression depth at least 2 inches
- Cric pressure not recommended as part of BLS

**Case Study #1**

- 35 M Fisherman
- Fell out of boat into icy salt water
- Immersion time 10 minutes, no survival suit

**Case Study #1**

- Rescue/Scene Safety
- Assessment
- Resuscitation
- Stabilization
- Transport
A canine study of cold water drowning in fresh versus salt water

- Fresh water drowning, aspiration produced an average increase in body weight of 16.5%. Vascular volume remained at viable levels.
- Cold salt water drowning, average body weight increased by only 6%, with hemoconcentration and a shrinkage of vascular volume.

Critical Care Medicine. 1995 Dec;23(12):2029-37

Cold Water vs Warm Water

- Hypothermia can also be protective
  - Stimulating the diving reflex
  - Slowing the heartbeat
  - Constricting the peripheral arteries
  - Shunting oxygenated blood away from the extremities and the gut to the heart and brain
  - Decreases the O2 needs of tissues

The diving reflex and the overall clinically protective effects of cold water are usually greatest in young children.

Surviving intact

- Briefer duration of submersion
- Colder water temperature
- Younger age
- Absence of underlying medical conditions, secondary trauma, and aspiration of particulate matter or chemicals
- Most importantly, more rapid institution of resuscitation.

Survival may be possible in cold water submersion that lasts > 1 h, especially among children; thus, even patients with prolonged submersion are vigorously resuscitated.

Predicting Survival

- Apnea
- Bradycardia
- GCS < 5
- Glucose level > or = 300 mg%
- Submersion time > 10 minutes

All were associated with poor prognosis and serious injury.


Case Study #2

- 5yo F pulled out of a pool by lifeguards
- Blue and with agonal resp, 6 bpm
- Lifeguard is performing abdominal thrusts

Great Save!

Patient awoke and turned pink following one rescue breath
Transported to the hospital with Mom by ALS
Observed for 2 days
Dorothy for Halloween
Where do kids drown?

- pools, hot tubs, natural water settings, and, among infants and toddlers, in toilets, bathtubs, buckets of water, and cleaning fluids.
- Everywhere!

Prevention better than CPR

Recent data show that a third as many children under age 5 (an average of about 115 annually) drown from other hazards around the home as drown in pools. Many of these deaths are associated with common household products.

- **Bathtubs**
  - Some of these bathtub drowning deaths happened when children were in bath seats or rings
- **5-gallon buckets**
  - pose a serious threat to toddlers
  - tall, straight sides combined with their stability make it nearly impossible for top-heavy infants to free themselves when they topple in headfirst.
- **Toilets**
  - The typical scenario involves a child under 3-years-old falling headfirst into the toilet.
- **Spas and Hot Tubs**
  - A solar cover can hide the child.

**Prevention Tips**

- NEVER leave a baby alone in a bathtub even for a second. Always keep baby in arm's reach.
- NEVER leave young children alone or with young siblings in a bathtub even if you are using a bath seat or ring.
- Keep the toilet lid down, and keep young children out of the bathroom when unsupervised. Consider placing a latch on the bathroom door out of reach of young children.
- Be sure all containers that contain liquids are emptied immediately after use. Do not leave empty containers in yards or around the house where they may accumulate water and attract young children.
- Always secure the safety cover on your spa or hot tub.
- Learn CPR (cardiopulmonary resuscitation) - it can be a lifesaver.

**Question #1**

Fatal drowning remains the second leading cause of death in children.

A. True
B. False

**Question #2**

What should be your most important concern when considering a water rescue?

A. Water temp
B. Scene safety
C. Salt vs. Fresh water
D. Calling MedStar

**Question #3**

What finding should concern you the most in a rescued drowning patient?

A. Missing for 30 minutes
B. Agonal respiration
C. Temp 95 degrees F
D. 65 years old
Question # 4
When treating a patient following a salt water submersion the most important intervention to do first is?

A. C-A-B  
B. Initiate rescue breathing  
C. Treat electrolyte imbalances  
D. Treat for fungal infection

Question # 5
What character from the Wizard of Oz did your patient from Case Study #2 dress up as for the Halloween following her drowning?

A. The Cowardly Lion  
B. Oz  
C. The Wicked Witch of the West  
D. Dorothy

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wcsocrow@yahoo.com

For providing our Secret Question prize

Questions/Comments?
Contact: Carolyn Stovall
509-242-4264  
1-866-630-4033  
stovalc@inhs.org  
Fax: 509-232-8344