

20 Questions – May 2015

Summertime Blues

1. What is/are cardinal signs of heat stroke?
2. How does heat stroke differ from heat exhaustion?
3. What are some differences between exertional and classic heat stroke?
4. Who is at risk for classic heatstroke?
5. How do you treat heat stroke?
6. Name some complications of heat stroke.
7. What causes heat cramps?
8. Parents of a young child who was found floating face down in their pool state that since he is now awake and “fine” that they decline treatment. Your response...
9. What is the neurologically intact survival potential for a drowned child arriving in the ED in cardiac arrest?
10. What is the average submersion time (in warm water) beyond which over 90% of victims will die?
11. What are the two main complications of drowning that you will need to recognize and treat during patient care?
12. On July 4th, a Lake Minnetonka partygoer dives in and hits bottom. He surfaces complaining of arm weakness. On exam, his legs are fine, and his grip is weak bilaterally. What is your diagnosis?
13. Trying to get the charcoal to burn down faster, a man adds lighter fluid to the grill. The resulting fireball singes off his eyebrows and cheesy mustache. How likely is airway compromise in this setting, and what is an early sign to watch for?
14. You are in a fishing boat during a storm when your hair stands up on end. What do you do?
15. When do you make an exception to triage rules and provide immediate and full ACLS measures to apenic and pulseless people during a MCI?
16. You are called for syncope. An otherwise healthy, athletic 25yr old is found in 3rd degree AV block. What is the most likely cause?
17. A pet rattlesnake, irritated by the heat, turns on its owner, biting him on the leg. What are some signs of envenomation and what is appropriate field care for snakebite?
18. After being stung by a wasp hidden in a pop can, a 6 year old is in respiratory distress with stridor and lip/tongue swelling. What do you do?
19. Do wasps leave stingers behind? How should you remove a stinger?
20. A five year old fell on the playground and knocked out his front teeth. A physician on the scene has rinsed them off and is attempting to put them back in the sockets. Is this a good idea?

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1. Probably THE cardinal sign that differentiates heat stroke from heat exhaustion is a change in mental status. Any confusion or delirium should be considered heat stroke until proven otherwise, and treated accordingly. An additional helpful sign is ataxia, or a lack of coordination. Temperature, when available, is generally over 105F. Otherwise, lots of signs and symptoms such as dizziness, nausea, chills, etc. are common to both heat exhaustion and heat stroke. Heat exhaustion is fairly benign, heatstroke carries a 15% or higher mortality rate (mortality at 109 degrees – MN Viking Kory Stringer’s temp in training camp prior to his death – is about 90%).
2. In heat exhaustion, the body is still able to regulate temperature, but moderate hyperthermia and dehydration are present. If uncorrected, or if the exertion continues, the temperature will eventually rise high enough to cause the changes of heat stroke. Heat exhaustion is much more common among younger active individuals working outside and quite rare in the elderly. Sweating is present in all cases.
3. In exertional heat stroke, a patient exerting him/herself in a high temperature/humidity area generates tons of heat in a short space of time, overcoming the body’s ability to get rid of it. They often continue to sweat, and may collapse suddenly. Their mortality is higher at a given body temperature than in classic heat stroke, where over days, a patient becomes dehydrated and their core temp rises, often due to a lack of air conditioning/fans in their home, or other factors which make it difficult to get rid of excess heat. Classic heat stroke victims often have underlying cardiac, diabetes, and other diseases which can contribute to their mortality.
4. Athletic participants and patients doing heavy work in hot/humid areas can still get classic heatstroke, but the primary risk groups are patients who have communication/mobility problems and the elderly. Elderly patients, especially in “unsafe” neighborhoods where they don’t open windows, etc. Medications such as tricyclics, antihistamines, antipsychotics, antihypertensives (eg: beta blockers). Skin conditions such as burns (including sunburn!), psoriasis, etc. Also diseases such as cystic fibrosis and heart disease, to name a few.
5. The fastest way to cool a patient is to put them in an ice water bath, or you can mist or otherwise coat them with cool or cold water and keep air moving across them (fan, AC, windows open on the rig, etc.) continuing to keep their body surface wet. (They must be stripped down for this to work of course.) Ice packs to the groin and axillae are a reasonable idea. The faster the temperature went up, the faster you should bring it down – so cool exertional heatstroke as fast as possible – most summer major events (like the Lifetime Fitness triathlon in July) have ice baths available for this purpose.
6. Seizures can be quite common (up to 50-75%), muscle breakdown (rhabdomyolysis), acidosis, coagulation problems, liver and kidney damage, and pulmonary edema are all common.
7. Heat cramps are due to dehydration with hypotonic fluid replacement. Oral or IV fluids containing some sodium will help dramatically. This usually presents during the first few hot days of a heat wave.
8. The child needs observation in the hospital for at least 4-6 hours for signs of pulmonary edema. Pulmonary edema may be delayed by hours. Any patient with a change in mental status, motor status, or observed to be choking water during a near-drowning episode is at high risk, and requires further eval. A low oxygen saturation is usually the first clue of pulmonary edema in these patients.
9. Eight studies document intact survival rates of 15-22% in these patients. Especially in children, err on the side of full resuscitation unless the submersion time is clearly incompatible with life (about 30minutes in warm water and MUCH longer in cold water).
10. 7-10 minutes. Warm water drownings in a lake particularly are difficult as the body is rarely recovered in this period of time
11. Pulmonary edema (correct with intubation and ventilation and be prepared for overwhelming amounts of pink frothy secretions -due to movement of fluid into the lungs and lysis of red blood cells) and metabolic acidosis. Drowning victims should routinely receive sodium bicarb if they are hemodynamically unstable, have rhythm changes, or are in arrest.
12. Central cord syndrome. Hyperextension injuries of the neck can cause the posterior ligaments to buckle into the cord, bruising it. This results in bilateral hand weakness (and often sensory changes in the hands) as sometimes the ONLY signs of injury.

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13. Actually fairly low. Flashover burns rarely produce airway compromise, as opposed to a confined space fire in which these findings would be ominous. Look for oral burns and especially voice changes to gauge the risk of airway injury.
14. PRAY. The reason your hair is standing on end is because of a 'leader stroke' of ions flowing from cloud to ground (lake, boat, fishing rod, you). It will shortly (seconds) be followed by a lightning bolt completing the charge transfer and packing about 20 MILLION volts.
15. When the patients are in arrest due to a lightning strike (ref the US Open at Hazeltine in 1991 when 6 people were struck, putting 3 into cardiac arrest – only 1 died). Patients surviving the initial strike (actually, almost always flashover or side splash injury rather than a direct hit) rarely die, but often patients shocked into asystole by the bolt, or whose respiratory muscles are still paralysed after the bolt will respond to ventilation and standard ACLS, and will have good outcomes. Thus, ignore the screams and moans and deal with the dead first in this case.
16. Lyme disease. This is actually a reasonably common manifestation of secondary Lyme, and is treated with pacing as needed, and ceftriaxone in hospital. Patients usually respond well to antibiotic treatment.
17. Edema, pain, and erythema are early signs. Non-clotting blood from the puncture site is a bad sign and almost guarantees envenomation. Nausea, vomiting, petechiae, blebs, muscular weakness, DIC and shock may be seen in severe cases but this evolves over time. Don't worry about sucking out the poison, that doesn't work. DO try to remove constricting rings, clothes, etc. Splint the extremity at the level of the heart. A cold pack may be placed on the bite site (insulate it with a pillowcase, gauze, or etc.). Antivenom will be given at the hospital. Timber rattlesnake venom (like most pit viper snakes) is tissue toxic and thus produces significant local signs at the bite site, unlike neurotoxic venoms (seen in cobras and other species) which may have no signs at all at the bite site but will then cause progressive paralysis.
18. Mom tells you that the patient weighs about 44lbs (20kg). *Intramuscular* epi 1:1000 at 0.01mg/kg should be given, i.e. 0.2mg IM. Additionally, give benedryl 20mg IV (1mg/kg). If the respiratory symptoms continue, consider additional epinephrine. For hypotension, try a 400cc (20cc/kg) fluid challenge. (In a patient who has an extremity sting, try an ice pack, lower the extremity, and consider a venous tourniquet if it's soon after the bite. Studies show much more effective and absorption IM vs. sub-cutaneous, and also better absorption from the thigh vs. the deltoid muscle.
19. No. Honeybees do, but bumblebees, wasps, and hornets do not leave a stinger. Classically, stinger removal is supposed to be performed by scraping the stinger out rather than pulling out to avoid compressing the venom sac, but based on recent research it seems there is rarely any residual venom in the stinger sac so this likely isn't very important.
20. Nope. Deciduous, or baby teeth are not to be reimplanted, as they may become improperly fused to bone and prevent normal eruption of the adult tooth waiting above. However, if the tooth knocked out is an adult tooth it can be rinsed off (but not scrubbed, as this may damage the cementin on the root) and replaced in the socket, the patient can either hold it there, or bite on a gauze square to keep it in place. If the tooth cannot be placed back in the socket and no balanced saline solution is available (e.g. Hank's balanced saline solution often found in dental kits or normal saline IV solution) milk is a reasonable transport fluid – if you're in a pinch and out on your own the tooth can be tucked into an alert patient's cheek/gum sulcus and held there during transport to a hospital. Do not attempt to replace teeth if there is a tooth fracture, heavy bleeding, an unstable jaw, or any altered mental status that could lead to later extraction of the tooth from a new resting place in the right mainstem bronchus!