Deadly and Near-Deadly Drownings

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QUESTIONS

1. A 2-year-old is pulled from an icy pond and transferred in full cardiopulmonary arrest to your facility. The single most important factor influencing survival is:

- **A.** immediate defibrillation.
- **B.** immediate cardioversion.
- **C.** immediate rewarming of victim to at least 86°F (30°C).
- **D.** immediate administration of medication

2. An 18-month-old drowning victim arrives via emergency medical service (EMS) with cardiopulmonary resuscitation (CPR) in progress. Law enforcement officials, an EMS supervisor, and hospital risk management staff are already in the emergency department when the parents arrive and ask to come to the bedside. If space is limited in the resuscitation area, the priority should be given to:

- **A.** law-enforcement officials, to protect the chain of custody with regard to clothing and other items of evidence.
- **B.** the EMS supervisor, to fully and contemporaneously document the outcome of the call.
- **C.** hospital risk-management staff to protect the facility against spurious and/or fraudulent medical malpractice allegations.
- **D.** the parents of the child.

3. In children who present directly to the Pediatric Emergency Department in full cardiopulmonary arrest, the primary factors that should guide the decision to discontinue resuscitation efforts include:

- **A.** the previous medical and family history.
- **B.** the availability of law enforcement, child protective services, and a medical examiner.
- **C.** the need to avoid stressful situations.
- **D.** the mechanism, duration, and prearrival treatment rendered.

4. Therapeutic hypothermia has recently evolved as a postcardiac arrest treatment in both adults with cardiac arrest and newborns after birth asphyxia. Which of the following best explains the rationale(s) for therapeutic hypothermia as a postcardiac arrest treatment?

- **A.** Therapeutic hypothermia is protective by decreasing cerebral oxygen demand and minimizing the adverse effects of ischemic-reperfusion injury.
- **B.** Therapeutic hypothermia increases the therapeutic effect of antiarrhythmics, thus decreasing the chance of further life-threatening arrhythmias.
- **C.** Therapeutic hypothermia decreases blood pressure, thus decreasing preload and providing better cellular perfusion.
- **D.** Therapeutic hypothermia is neuroprotective by increasing cerebral oxygen demand.

5. Cases of young children surviving submersion in cold water are thought to be related to the mammalian or diving reflex. Which of the following sets of conditions are considered to be part of this reflex that results after being submerged in icy cold water?

- **A.** Peripheral vasoconstriction, decreased heart rate, decreased cardiac output, and decreased cerebral oxygen demand
- **B.** Peripheral vasodilation, decreased heart rate, decreased cardiac output, increased cerebral oxygen availability
- **C.** Peripheral vasoconstriction, decreased heart rate, increased cardiac output, decreased cerebral oxygen demand
- **D.** Peripheral vasodilation, decreased heart rate, decreased cardiac output, increased cerebral oxygen demand

ANSWERS

1. Correct answer: C

Immediate and continuing attempts at rewarming are the single most important factors influencing survival for out-of-hospital

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These online review questions offer emergency nurses an opportunity to test their knowledge about their practice.

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arrest involving cold-water submersion. Rewarming the patient to at least 86.0°F (30°C) is recommended before abandonment of CPR because the heart may be unresponsive to resuscitative efforts until a warmer core temperature is achieved. Defibrillation and antiarrhythmia agents will most likely not be effective on the hypothermic patient until they are warmed to at least 86°F (30°C), as the heart is simply way too cold. Defibrillation is only indicated if the patient's cardiac rhythm is ventricular fibrillation and should be preceded and immediately followed by high quality CPR. Cardioversion works great for kids in supraventricular tachycardia (SVT) but is not indicated for a patient in cardiopulmonary arrest. Remember, with cold-water drowning, "You're not dead until you're warm and dead!"[1-5]

2. Correct answer: D

The Emergency Nurses Association (ENA) and the American Association of Critical Care Nurses (AACN) both endorse and support the option of allowing family at the bedside during pediatric resuscitation. Research confirms the benefits of allowing family presence, as it decreases the family's anxiety and depression and allows for more constructive grief behavior. If possible, a dedicated staff member should stay with the family, providing explanations, answering questions, and giving regular updates. Physical space in the resuscitation area needs to be adequate for the code team, but limitations in space should not be used as an excuse to have family members wait outside of the resuscitation room. The family's emotional state needs to be continuously assessed; screaming, hysterical, and/or out-of-control families may distract the staff working to resuscitate this patient. It is important to differentiate between expected expressions of grief (sobbing, crying loudly, clinging to each other or the family support staff member) and true interference with the team. Although risk-management and EMS supervisory personnel may be helpful in some circumstances, their immediate presence is generally not required. Also, there is no indication that law-enforcement authorities would be involved at this point.[1-5]

3. Correct answer: D

Neither previous history nor the availability of law enforcement, child protective services, or a medical examiner should be considerations in the termination of resuscitation efforts. Think about what is the longest you have attempted to resuscitate a child. Was it 15 minutes…45 minutes…1 hour and 45 minutes? It's a child, and we understand that there will be so much emotion tied into a pediatric resuscitation. Even if you get the child back to a point of a spontaneous heart beat, that's only half the story. Getting a heart beating again, especially in a child, does not always equate with getting a functional brain back as well. Cases of cold-water near-drowning may be a completely different story, but those rarely occur. Really, really cold water (it must be ICY water) can have a neuroprotective effect, and occasionally these patients have good outcomes even after prolonged exposure and subsequent resuscitation. The recent American Heart Association Pediatric Advanced Life Support (PALS) guidelines continue to state that there is no specific single criterion studied that predicts outcome with sufficient accuracy to guide practitioners as to exactly when to terminate resuscitative efforts in children. This is especially the case for in-hospital cardiac arrest. Many factors, including all the others listed above, must be taken into consideration when deciding to terminate resuscitation.[1-5]

4. Correct answer: A

Intentional reduction of body temperature can reduce cerebral and myocardial oxygen demands by up to 40%. Therapeutic hypothermia also minimizes the effects of ischemia-reperfusion injury. Hypothermia *decreases* the therapeutic effects of antiarrhythmics; therefore, lidocaine and amiodarone can be *less effective* in the presence of hypothermia. This technique has been used in the neonatal intensive care unit (ICU) setting for many years for hypoxic-ischemic encephalopathy and, more recently, in cases of adult cardiac arrest as well. Although it is estimated that approximately 16,000 children suffer cardiac arrests each year, until recently, therapeutic hypothermia has not been well studied in children or infants after cardiac arrest. A few individual hospitals have found that therapeutic hypothermia was feasible but requires additional research. The ongoing Therapeutic Hypothermia After Pediatric Cardiac Arrest (THAPCA) trials were among the first to address the effectiveness of therapeutic hypothermia in pediatric patients on a large-scale basis. Bottom line: The jury is still out when it comes to therapeutic hypothermia versus maintenance of normothermia (targeted temperature management) in pediatric patients postcardiac arrest.[1-5]

5. Correct answer: A

Massive peripheral vasoconstriction, not vasodilatation, kicks in to keep what oxygen is present where it really needs to be: the brain. The mammalian or diving reflex is summarized as your body quickly throwing itself into a hibernation-like state and everything slowing way down. Hypothermia appears to also be a crucial factor in survival. Remember: People drowning in water not cold enough to be icy are just cold and dead. Researchers are

still trying to determine exactly how it is that we know of miraculous cases of children under the icy-cold water for way too long who survive and neurologically intact as well.[1-5]

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