transport. If he does not respond to oxygen, begin assisted bag-mask ventilation. Check effectiveness of ventilation by observing for chest rise and an improvement in the PAT, heart rate, perfusion, and BP.

In rare situations, chest compressions for bradycardia are necessary. If the heart rate is below 60 beats per minute, *and* the child shows signs of poor systemic perfusion after oxygenation and assisted ventilation, begin chest compressions.

Advanced Life Support

Drug Therapy for Symptomatic Bradycardia

Oxygenation and ventilation are the primary treatments for bradycardia. If the heart rate does not rise in response to assisted ventilation, in most cases administer epinephrine as the first-line drug at 1:10,000, 0.01 mg/kg IV or IO, or 0.1 mL/kg, every 3 to 5 minutes. If there is increased vagal tone (or poisoning by cholinergic drugs or agents such as organophosphates) or an **atrioventricular heart block**, administer **atropine**, 0.02 mg/kg IV or IO (minimum dose 0.1 mg) after epinephrine. When the child has a known reason for cholinergic-mediated bradycardia, such as congenial heart block, give atropine and monitor the response. Can repeat the atropine dose as needed.

Before administering vasopressor drugs, always assess for mechanical problems with oxygen delivery and ventilation. Check for disconnected oxygen tubing, poor mask seal, airway obstruction, inadequate chest rise, endotracheal tube blockage, or **malposition**. Other causes of bradycardia from hypoxia or **ischemia** are pneumothorax, hypovolemia, **cardiomyopathy**, poisoning, or increased **intracranial** pressure.

When oxygenation, ventilation, and drug therapy for bradycardia fail, and the child remains in shock or cardiac arrest, consider electrical cardiac pacing of the heart.

Endotracheal Administration of Drugs

If neither IV nor IO access is available for giving drugs during resuscitation, the endotracheal route is an alternative for at least four pediatric drugs: (LEAN) **lidocaine**, epinephrine, atropine, **naloxone**. While endotracheal drugs are probably not as effective as medications delivered by the IV or IO routes, endotracheal delivery is appropriate in the critical patient until IV or IO access is established. Use the technique for endotracheal drug delivery described in Endotracheal Tube Drug Instillation, Procedure 19.

When administering epinephrine through an endotracheal tube to a child who has no vascular or IO access, give epinephrine at the higher concentration of 1:1000, and use the higher dose of 0.1 mg/kg (0.1 mL/kg). Note that this is the same total volume of epinephrine as the IV/IO dose, because the tenfold dose has ten times the concentration of 1:10,000.

Blip

Be extremely careful with IV epinephrine and double check doses and preparation!

Tachycardia

Tachycardia may be a nonspecific sign of fear, anxiety, pain, or fever and may not represent serious injury or illness. Tachycardia may also be a sign of a life-threatening problem such as hypoxia, cardiac abnormality, or hypovolemia. **Sinus tachycardia** is the most common dysrhythmia in children, and treatment is generally limited to fluid administration, supplemental oxygen, and transport.

Assessment of the Child with Tachycardia

Tachycardia must be assessed in conjunction with the PAT and ABCDEs. Always ask about a history of congenital heart disease and check for midline chest scars from cardiac surgery.

There are two characteristics in the child's rhythm strip to measure and use as a basis for treatment, along with the perfusion assessment: (1) the heart rate/min and (2) the width of the QRS complex. First, establish an accurate heart rate electronically from the rhythm strip. As in the assessment of bradycardia, interpret the heart rate based on knowledge of the normal range for age (see Table 2-3). Second, establish the width of the QRS from the rhythm strip. If the QRS complex is < 0.08 sec (< 2 standard boxes on the rhythm strip), consider the child to have a narrow complex tachycardia. If the width is > 0.08 sec (> 2 standard boxes on the rhythm strip), consider the child to have a wide complex tachycardia.

Table 4-6 distinguishes a narrow complex sinus tachycardia from narrow complex supraventricular tachycardia (SVT) and wide complex ventricular tachycardia (VT).

Specific Treatment of Tachycardia

If the child presents with tachycardia, determine the appropriate treatment by establishing perfusion status, and by assessing the rhythm strip for heart rate and QRS duration.

Narrow Complex Tachycardia If the child has a narrow QRS tachycardia (< 0.08 seconds), P waves are present, and the heart rate is variable and less than 220 beats/min in an infant or less than 180 beats/min in a child, the cause is usually sinus tachycardia (**Figure 4-8**) from non-cardiac conditions (e.g., hypoxia, hypovolemia, hypothermia, hypoglycemia, metabolic abnormalities, toxins, fear, pain, or serious trauma to the chest). No specific cardiac medical management of the sinus tachycardia is needed. Instead, treat with fluids, oxygen, splinting, analgesia, or sedation as indicated by the associated condition. If there is no change in heart rate after treatment, consider other etiologies, such as SVT.

Advanced Life Support

Specific Treatment of SVT If the QRS is less than 0.08 seconds, P waves are absent or abnormal, the rate is not variable and is greater than 220 beats/min in an infant or greater than 180 beats/min in a child, consider SVT as the likely etiology. If the child has no previous history of SVT, and the patient is stable, provide oxygen and transport to the ED. Delaying specific treatment for SVT until hospital arrival will permit the hospital staff to confirm SVT, and to run a continuous EKG while actively managing the dysrhythmia. A patient with a confirmed diagnosis of SVT may need long-term treatment with cardiac medications.

If the patient has a prior history of SVT, and is stable, consider a vagal maneuver first.

Figure 4-8 ECG of sinus tachycardia.

Table 4-6 Features of Sinus Tachycardia, SVT, and VT

	History	Heart Rate	Variability	QRS Interval	Assessment	Possible Treatments
Sinus tachycardia	Fever Volume loss Hypoxia Pain Increased activity or exercise	< 220 beats/min (infant) < 180 beats/min (child)	Yes	Narrow < 0.08 sec	Hypovolemia Hypoxia Painful injury	Fluids Oxygen Splinting Analgesia/sedation
Supraventricular tachycardia	Congential heart disease Known SVT Nonspecific symptoms (e.g., poor feeding, fussiness)	> 220 beats/min (often 240–300 beats/min) > 180 beats/min (child)	No	Narrow < 0.08 sec	CHF may be present	Vagal maneuvers (ice to face) Adenosine Synchronized electrical countershock
Ventricular tachycardia	Serious systemic illness	> 150 beats/min	Yes	Wide > 0.08 sec	CHF may be present	Synchronized electrical countershock Lidocaine Amiodarone

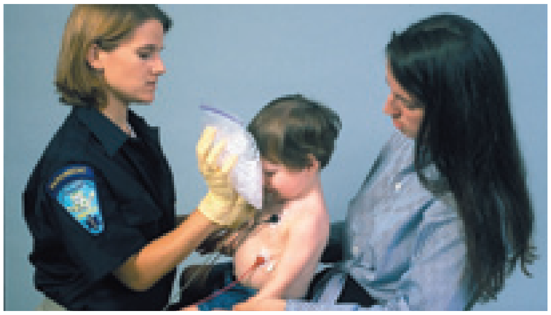

Figure 4-9 Placing a bag of ice on a child's face elicits the "diving reflex" and may convert SVT to sinus rhythm.

Ice to the face (if available) evokes the "diving reflex" and is an effective management tool for SVT in infants and toddlers. Place crushed ice in a plastic bag, glove, or washcloth and apply firmly over the mid-face (cheeks and bridge of nose) for approximately 15 seconds, until the rhythm changes or the patient's condition dictates immediate cessation of the procedure (**Figure 4-9**). Do not occlude the nose (to allow breathing) and provide constant reassurance to the parent and child. Avoid ocular pressure (pressure on the eyeballs) as a method of vagal stimulation in a child. Only attempt a vagal maneuver once.

If the patient with narrow complex tachycardia has signs of poor perfusion and hemodynamic compromise (abnormal PAT, poor pulse quality, abnormal CRT and skin temperature, hypotension) and the heart rate does not convert to sinus rhythm after one attempt at vagal stimulation, give adenosine at 0.1 mg/kg up to a maximum first dose of 6 mg rapid IV or IO push and follow immediately with a 2 to 5 mL bolus of normal saline. Double the dose to 0.2 mg/kg, if the rhythm does not convert after the first dose of adenosine (maximum second dose = 12 mg). The IO administration of adenosine may be less effective than IV because of the slightly slower delivery of the drug bolus to the heart. Be prepared to treat the untoward effects of adenosine; it is a very potent cardiac drug. If given properly, it is usually effective in the treatment of SVT. Brief runs of bradycardia or even several seconds of asystole commonly occur with adenosine administration, but sustained or fatal dysrhythmias (e.g., asystole, ventricular tachycardia, and ventricular fibrillation) are rare. Monitor the child closely and have resuscitative drugs as well as a defibrillator within reach.

> **Tip**
>
> Prehospital personnel must be prepared to treat the adverse drug effects of all cardiac medications, even if the indication, dose, and route of delivery are correct.

If a child with suspected SVT is in shock or is unconscious, administer adenosine prior to electrical countershock if vascular access is possible within 90 seconds or three attempts. If there is no vascular access, and the child is unconscious, immediately administer synchronized electrical countershock at 0.5 to 1.0 joules(J)/kg as a starting electrical dose. If the initial shock is ineffective, double to 2 J/kg. If the child is in shock but still conscious and has vascular access, administer sedation if possible before delivering the electrical countershock. Do not delay electrical therapy for sedation. If electrical therapy fails to convert the child to sinus rhythm, consider using other anti-dysrhythmic drugs, such as amiodarone (5 mg/kg over 20–60 min) or procainamide (15 mg/kg over 30–60 min) as per local EMS system guidelines. Do not give amiodarone and procainamide together.

Wide Complex Tachycardia If the patient is conscious, and has adequate perfusion, a heart rate of greater than 150 beats/min and a QRS interval of greater than 0.08 seconds, he is probably in stable ventricular tachycardia (VT). Sinus tachycardia with a conduction abnormality (bundle branch block) may look like VT, but usually occurs in a child with a history of heart disease or cardiac surgery. Likewise, SVT with aberrant conduction can result in a wide complex rhythm. In all such stable cases with wide complex tachycardias, provide oxygen and transport the patient to an appropriate ED, with close cardiac monitoring and equipment for electrical countershock immediately available.

Advanced Life Support

If the child has VT, treat with synchronized electrical countershock (0.5 to 1 J/kg). If it does not delay cardioversion, try a dose of adenosine first to determine if the rhythm is SVT with aberrant conduction. If a second shock (2 J/kg) is unsuccessful, or if the tachycardia recurs quickly, consider antidysrhythmic drugs, such as amiodarone (5 mg/kg over 20–60 min) or procainamide (15 mg/kg over 30–60 min) per local EMS system guidelines. Do not give amiodarone and procainamide together.

If the child has VT and shock, without pulses, treat as pulseless arrest.

Automatic External Defibrillator (AED)

Cardiac arrest in children is usually the result of profound hypoxia or shock, which leads to **asystole**—the most frequent rhythm of pediatric cardiac arrest. **Ventricular fibrillation** (VF), however, does occur in pediatrics. The typical VF case is a child out of the infant age group who has had a witnessed collapse. Etiologies for VF arrest in children include **myocarditis**, an infection of the heart muscle, the "long QT syndrome," a congenital cardiac conduction problem, and **idiopathic hypertrophic subaortic stenosis**, an anatomic abnormality of the aortic valve. One other special circumstance for VF arrest is **commotio cordis**, which develops usually in a young athlete who is struck in the chest by a ball, stick, or other blunt object.

Perform rapid assessment for VF on all unresponsive children and administer defibrillation if VF is present on the cardiac monitor. Be especially vigilant for VF when the child is older and has suffered a witnessed collapse. There is no demonstrated benefit to defibrillation of asystole, and this procedure will only delay the key interventions of oxygenation, ventilation, and chest compressions.

The AED (**Figure 4-10**) allows early recognition of VF and rapid defibrillation. The American Heart Association currently recommends the use of an AED for treatment of VF in children of all ages, including younger children over 1 year of age. The US Food and Drug Administration has cleared several AEDs for use in children younger than 8 years of age. These devices have been shown to accurately identify VF and VT in young children and are also accurate in identifying pediatric rhythms that do not require defibrillation. When used with a designated pediatric pad-cable system, these AEDs deliver an energy dose that is smaller than that delivered with adult pads. AEDs may be used with CPR

Figure 4-10 An AED.

Blip

Most tachycardia in children is a response to non-cardiac stimuli (fever, fear, pain) and does not require dysrhythmia treatment.

Controversy

Ice to the face for SVT is a controversial field procedure. It has not been evaluated for efficacy or safety in the out-of-hospital setting, especially in children.

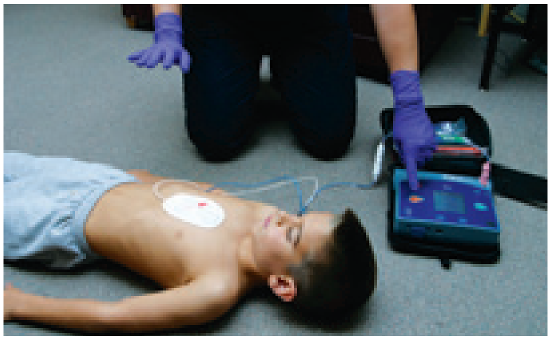

Figure 4-11 Using the AED with CPR in unresponsive children.

for treatment of prehospital cardiac arrest (victims who are unresponsive, with no breathing and no signs of circulation) in children 1 to 8 years of age.

Use a pediatric AED or pediatric AED pads if available, but an adult AED can be used on a child. For an unwitnessed collapse perform 5 cycles of CPR to ensure the problem is not respiratory in nature, before using the AED. For a witnessed collapse use the AED as soon as possible. Studies show that even school-age children with no prior experience or education in defibrillation can successfully operate an AED. **Figure 4-11** illustrates the recommended method of combining the AED with CPR in unresponsive children.

Summary of Dysrhythmias

Unlike adults, primary cardiac rhythm disturbances are rare in children. Bradycardia almost always reflects profound hypoxia and should be considered a pre-arrest rhythm. Tachycardia is most commonly a sinus rhythm, but may represent SVT or VT. While children can develop sinus tachycardia greater than 200 beats/min, do a careful evaluation for hypovolemia and hypoxia, and other treatable cause, and then treat the identified causes. Assume all rates over 220 beats/min in infants or over 180 beats/min in children, and all wide complex (QRS > 0.08 sec) tachycardias are primary cardiac dysrhythmias. The stable patient may need only general supportive care, regardless of cardiac rhythm. Symptomatic ventricular dysrhythmias may require drug therapy with amiodarone or proacainamide, and cardioversion or defibrillation. The AED is an important adjunct for prehospital professionals in unresponsive children with VF.

Tip

AEDs can be used on anyone. Preferably use a pediatric AED, but an adult AED can be used. Perform 1 minute of CPR on infants and children, to ensure the problem is not respiratory in nature, before using the AED.

Cardiac Arrest

Causes

In contrast to adults, pediatric cardiac arrest is almost always a secondary event, the result of profound hypoxia or shock. Cardiac arrest in children usually follows a primary respiratory arrest, often from respiratory failure originating from common conditions such as pneumonia, bronchiolitis or asthma. Myocardial infarction and a cardiac dysrhythmia, frequent causes of cardiac arrest in adults, are extremely unusual in young children.

The primary age group for pediatric cardiac arrest is infancy, when sudden infant death syndrome (SIDS), infection, or inflicted injury precipitates respiratory failure. In toddlers and school-aged children, however, the causes of cardiac arrest change. In this older age group, the most likely causes are hemorrhagic shock and blunt trauma from either vehicle-related injuries or falls.

Survival from cardiac arrest depends on several factors: time before the start of basic life support (BLS), time to advanced life support (ALS), and presenting rhythm. The shorter the "downtime" before BLS, the better the outcome. Among ALS interventions,

Tip

The only intervention associated with survival in pediatric asystolic cardiac arrest is time to airway and breathing support.

the one that is associated with survival in pediatric asystolic arrest is time to airway and breathing support. As in adults, pediatric patients who present to EMS personnel in ventricular fibrillation are more likely to survive than children who present in asystole, as long as there is access to early defibrillation.

Assessment in Cardiac Arrest

A child in cardiac arrest is unresponsive, apneic, and pulseless. The cardiac monitor will show a cardiac arrest rhythm: asystole, pulseless electrical activity, VT or VF, or rarely SVT. Asystole is the most frequent rhythm. SVT and VT are rare causes of cardiac arrest.

Asystole reflects profound hypoxia and ischemia. Pulseless electrical activity may represent a variety of ischemic, hypoxic, hypothermic, and traumatic insults. Some pulseless electrical activity may arise from low-flow states with blood pressures too low to record in the out-of-hospital setting. VF occurs in children usually older than 2 years from a variety of conditions, including myocarditis, congenital anomalies, poisoning, electrocution, or hypoxia.

Chest Compressions

The American Heart Association recommends chest compressions as a key procedure in basic life support for pediatric and adult cardiac arrest. The technique for delivering chest compressions differs for adults, children, and infants, by the number of rescuers required, the placement of hands and fingers, rates of ventilation, and rates and depth of chest compressions. For a step-by-step explanation of this procedure, see Cardiopulmonary Resuscitation, Procedure 17.

Length-Based Drug Dosage

Treatment of infants and children in the out-of-hospital setting is difficult because children of different ages require different sizes of equipment, different doses of medications, and different amounts of fluids (**Figure 4-12**). Length is a good index for drug dosing and equipment sizing during resuscitations. From a measured patient length, either a computerized resuscitation software program or a color-coded tape can provide correct doses and equipment sizes. Computerized programs offer a wider range of drugs and additional safety features. The color-coded tape is easy to use but has limited drug information. For a step-by-step explanation of this procedure, see Length-Based Equipment Sizing and Drug Dosing, Procedure 2.

Presenting Cardiac Arrest Rhythm and Treatment

Priorities in the treatment of cardiac arrest are early airway management, oxygenation, and ventilation (usually via bag-mask or an endotracheal tube), chest compressions, and electrical countershock/defibrillation (if indicated). The presenting cardiac rhythm is a major determinant of the treatment of cardiac arrest. When the child is pulseless and apneic, the treatment of asystole and **pulseless electrical activity** (PEA) are the same.

Advanced Life Support

This includes multiple epinephrine doses at 0.01 mg/kg IV or IO, along with management of the airway, oxygenation and ventilation, and chest compressions.

In contrast, if the child has VT or VF as the presenting rhythm, the treatment includes electrical therapy and antidysrhythmia drugs. Perform initial defibrillation with 2 J/kg, resume CPR, then 4 J/kg, resume CPR, give epinephrine, repeat defibrillation at 4 J/kg, resume CPR, then administer drug treatment with: amiodarone, 5 mg/kg IV or IO; or lidocaine, 1 mg/kg bolus IV or IO. Use a pattern of CPR–shock–CPR plus drug–shock–CPR plus drug–shock.

Survival from pediatric cardiac arrest requires good BLS care. IV or IO needle insertion and medication delivery are helpful but not primary determinants of survival. Endotracheal tube insertion offers no known benefit to survival. In addition, "high dose" epinephrine has shown no increased survival when used in cardiac arrest. It may be considered in exceptional circumstances such as beta-blocker overdose.

The Transport Decision: Stay or Go

Deciding which pediatric cardiac arrest patients require hospital transport is another important controversy. Of all children in out-of-hospital cardiac arrest, only 3% to 5% will survive. Predictors of survival include type of presenting rhythm and early return of spontaneous circulation (<5 min) after BLS on scene. Survival from pulseless VT/VF is about 15%, versus about 3% for asystole. If children in cardiac arrest fail out-of-hospital resuscitation with BLS and ALS, they will not survive unless there is a special circumstance. Patients who are victims of hypothermia or drowning, or who have ingested massive amounts of sedative-hypnotic drugs (e.g., barbiturates) may have a greater chance of survival after prolonged resuscitation, and deserve extended treatment before death is declared.

Tip

Prehospital cardiac arrest treatment requires good BLS skills.

Figure 4-13 Skilled communication with the caregivers and family is imperative after the death of a child.

In some cases, field resuscitation attempts can be stopped before transport if permitted by local EMS death-in-the-field policies. While survival in unwitnessed out-of-hospital cardiac arrest is rare, prehospital professionals may be uncomfortable in discontinuing resuscitative efforts in children. When resuscitation is terminated, skillful communication with the child's caregivers is critical (**Figure 4-13**), as explained in Chapter 11. *Never leave a family member on scene with the deceased child without appropriate supportive personnel.* A system to provide supportive care to the caregivers must be in place if EMS policy permits discontinuation of resuscitative efforts in the field. These services might be provided by social services personnel, pastoral care, or grief counselors.

Cardiac arrest in children is associated with high provider stress. Critical incident stress debriefing may be helpful for prehospital professionals after such a tragedy.

Blip

Never leave a family member on scene with the deceased child without appropriate supportive care.

Summary of Cardiac Arrest

Pediatric cardiac arrest is an uncommon event. Survival is unlikely, and asystole has the worst prognosis. VT/VF usually occurs in older children and has higher survival. Meticulous attention to airway, oxygenation, ventilation, chest compressions, and early defibrillation, when appropriate, will improve success. In all cases of pediatric cardiac arrest, grief counseling for the caregivers and critical incident stress debriefing for the prehospital professionals are extremely helpful.

Drowning

Drowning is suffocation after submersion in water. Drowning is the second leading cause of unintentional death in children between the ages of 1 and 4 years, and the third leading cause of death due to unintentional injury in children under 14 years (**Figure 4-14**). Unfortunately, drowning is not limited to the summer months. In warmer climates it occurs year-round, and in cooler climates it may occur due to submersion in lakes, buckets, hot tubs, and bathtubs.

Figure 4-14 Drowning is the second leading cause of unintentional death in children between the ages of 1 and 4 years.

Prevention

The best management for near-drowning is prevention. The installation of four-sided fencing prevents up to 90% of childhood residential swimming pool drownings and near-drownings. Eighty-five percent of boating-related drownings are preventable by wearing personal flotation devices.

Treatment

Early recognition of cardiac arrest and immediate bystander CPR has an important association with survival from severe submersion injuries. ALS care has an unproven benefit.

First remove the patient from the water and check for breathing and pulse. If the child is pulseless, open the airway and begin rescue breathing and chest compressions. Protect the cervical spine if there is potential head or neck trauma. Perform airway management, oxygenation, ventilation, and chest compression and follow protocols for drug therapy and electrical countershock depending upon presenting cardiac rhythm.

If the child has a pulse, open the airway and ensure appropriate oxygenation and ventilation, usually with a bag-mask device. Obtain IV or IO access and transport. Provide drug therapy, and rarely electrical countershock, as indicated for shock or dysrythmias.

Hypothermia

Hypothermia is an emergency resulting from exposure to cold temperatures. It most often occurs in association with submersion, but may be the result of prolonged exposure to cold ambient environment. When a child in cardiac arrest is also a cold water submersion victim, survival is improved even if the presenting rhythm is asystole.

Treatment of Hypothermia

Remove clothing and prevent further heat loss by covering the head and body. If the patient is conscious, alert, and shivering, place warm packs in the axillae and groin, being careful not to cause burns. With profound hypothermia,

Case Study 3

You are dispatched to the location of an unresponsive 2-year-old boy recently removed from a swimming pool. Estimated downtime is unknown, but the parents are on scene and state that the child had been missing for over 30 minutes. The parents initiated CPR immediately. Upon arrival you find the child to be cool, blue, apneic, and pulseless.

1. What is the most important intervention for this patient to improve his chance for survival?
2. Should the child be actively re-warmed?

aggressive rewarming in the field may do more harm than good. Not only may the hypothermic state be protective of brain function, but rapid rewarming can induce dysrhythmias. *In general, be extremely cautious using drug therapy if the child has suspected hypothermia.*

Do not rewarm frozen extremities until later in the hospital phase of the resuscitation because rewarming may worsen prognosis. Finally, do not pronounce the severely hypothermic patient dead in the field. Transport and continue resuscitation.

Tip

The hypothermic state is possibly protective of brain function. Rapid rewarming can introduce dysrhythmias unique to hypothermia.

Blip

If the child is unconscious, aggressive rewarming may do more harm than good.

Case Study Answers

Case Study 1 page 77

This child has septic or distributive shock. He has decompensated shock with hypotension. The rash is an ominous sign and aggressive treatment will be necessary to save the child's life. The appropriate first interventions are oxygen and bag-mask ventilation.

Attempt IV or IO access on scene once and give a 20 mL/kg crystalloid fluid bolus as fast as possible. Then transport and deliver 20 mL/kg fluid boluses to a maximum of 60 mL/kg while en route to the ED. Consider giving a vasopressor agent, either dopamine, dobutamine, or epinephrine, if perfusion remains poor after fluid administration and the transport time is long. Endotracheal intubation may be necessary.

This case also requires universal precautions to protect the prehospital professionals as this child has a serious communicable disease. Direct specific questions about exposures and prophylactic treatment to your infection control personnel.

Case Study 2 page 91

This cardiac arrest appears to reflect a primary cardiac event. While prompt CPR is imperative, so is a "quick look" at the cardiac rhythm. This child was in ventricular fibrillation due to a previously undiagnosed disorder known as "prolonged QT syndrome." Survivors from this disease often give a history of "blackouts" associated with exercise and stress. Other family members may also be affected by the same disorder. A look back at the family history can uncover unexplained deaths of relatives at young ages.

The initial treatment for children in ventricular fibrillation—as in adults—is rapid defibrillation. With the increasing availability of AEDs, many of these children will receive rapid recognition and defibrillation by bystanders. The AED is indicated this child.

Case Study 3 page 101

After removal from the water, provide bag-mask ventilation with 100% oxygen. Rushing to intubate this child, before providing effective bag-mask ventilation with 100% oxygen, may result in worsened hypoxia and hypercarbia. Most drownings cause airway spasm with little or no water entering the lungs, so bag-mask may be effective. The best anatomic location for palpating a pulse in a 2-year-old child is over the brachial artery, which is located just proximal to the elbow and medially to the bicep muscle.

Rewarming severely hypothermic patients may do more harm than good. Not only may the hypothermic state be protective of brain function, but rapid rewarming can introduce dysrhythmias. In general, withhold drug therapy if the anticipated core temperature is below 30°C.