

FATAL AND NON-FATAL DROWNING

DEFINITION: Drowning is defined as death due to submersion (and usually suffocation) in water or other fluids. Near drowning is the term used when recovery, at least temporarily, occurs following submersion injury. Ten to 15 percent of drownings occur without aspiration of water or gastric contents. Some near drowning victims have recurrence of respiratory symptoms 3-4 hours or less after initial episode.

PATHOPHYSIOLOGY: The major physiological consequences of near drowning are hypoxia, acidosis, and **pulmonary edema**.

- Hypoxia results from the lack of air exchange from the damage caused by the inhalation of fluid. Often there is a combined respiratory metabolic acidosis.
- Pulmonary edema occurs in up to 75% of near drowning cases. Aspiration of hypertonic seawater (approximately 3% sodium chloride) is associated with a shift of intravascular fluid into the alveoli. Fresh water aspiration causes pulmonary edema by injuring the alveolar capillary membrane and removing surfactant(s), allowing protein rich plasma to enter the alveolar space.

Drowning may be associated with other injuries, i.e. spinal cord damage (diving), air embolism (scuba diving) or **hypothermia**; and it may occur as a complication of alcohol or other drug ingestion, **hypoglycemia**, or **seizures**.

SCENE ASSESSMENT: If rescue needed, notify Spokane County Sheriff's Office immediately to activate the Dive Rescue Team. **DO NOT** enter the water to attempt to rescue a drowning victim unless you are qualified in water rescue. Think of your own safety first - we don't need more victims.

INITIAL TREATMENT: Once the victim has been reached, effective respiratory support should be the primary goal. An open airway and BVM ventilation should be started as soon as these techniques can be performed safely. Attempts to drain water from the breathing passages by any means other than postural drainage or suction are not necessary or advisable and may

increase the risk of vomiting and aspiration. Any foreign body should be removed using appropriate procedures.

As soon as the victim is in a stable position, the carotid pulse should be checked. The pulse may be hard to detect because of vasoconstriction or depression of the cardiac output of the victim. If no pulse, begin chest compressions.

ALS MEASURES: The initial goal of ALS is to secure and enhance the airway through **endotracheal intubation** and suction. Take spinal precautions throughout the rescue attempt, if necessary. The highest concentration of **O₂** should be delivered. Establish a large bore IV of LR/NS with appropriate infusion rates. Monitor the cardiac rhythm and treat **arrhythmias** appropriately. Obtain core temperature during transport as the patient may be hypothermic. Use of **sodium bicarbonate (NaHCO₃)** is not recommended. Treat for hypothermia.

All victims of near drowning, no matter how mild the episode appears to have been, should be taken to the hospital (not the doctor's office) for evaluation and observation. Patients who go on to develop delayed symptoms (secondary drowning) usually display signs of respiratory distress within the first 4 hours. These patients should be admitted to the hospital for further observation and treatment.