

Module on:

**Water Safety:  
An Overview of the Problem of  
Drowning and Useful Interventions.**

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Pediatric and Adolescent Injury Prevention Program**

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Module for Contract No. PH 99-00-0034,  
KCHS, KDPH, ACH  
January 14, 2000

## Table of Contents

I.	Introduction.....	1
II.	The Problem: Epidemiology of Drownings.....	1
III.	Age Specific Safety Interventions to Prevent Drowning Injuries and Death.....	2
	A. Infants.....	2
	B. Preschoolers.....	3
	Swimming Lessons.....	3
	C. School-aged Children.....	4
	D. Adolescents.....	5
	Diving.....	5
	Alcohol.....	5
	E. Adults.....	5
	Life Jackets.....	5
	Responding to an Emergency.....	6
IV.	Etiology of Drowning: Where Drownings Occur and Related Strategies for Prevention.....	6
	A. Lakes and Rivers.....	6
	B. Recreational Water Sports.....	7
	General Precautions.....	7
	Water Skiing.....	7
	Rafting Tubing, Canoeing, and Kayaking.....	7
	Personal Water Craft.....	8
	C. Motor Boating.....	8
	D. Streams, Stream Beds, Drainage Ditches.....	9
	E. Farm Ponds.....	9
	F. Pool Safety.....	10
	G. Hot Tubs and Whirlpools.....	10
V.	Conclusion.....	10
VI.	References.....	11

# Water Safety: Understanding the Problem of Drowning and Useful Interventions

## **VII. Introduction**

Injuries are the leading cause of death for children between the ages of 1 and 18. Drowning is the second leading cause of death for children nationally (Christopher and Gallagher, 1998) and a serious problem for certain areas across the state. Proven interventions based on epidemiological data can reduce these deaths in a community. These interventions meet core public health functions and are a worthwhile priority for public health professionals.

### **Objectives:**

- Discuss the problem of drowning deaths.
- Apply knowledge of age specific interventions to prevent injuries and death.
- Discuss the multiple etiologies of drowning and related interventions that can keep death and injuries from occurring.

## **The Problem: Epidemiology of Drownings.**

*Drowning* is defined as death resulting from an immersion injury within 24 hours of the event. *Near-drowning* is defined as an immersion injury in which the person survives for at least 24 hours (American Academy of Pediatrics, 1997). Children can drown in pools, rivers, bathtubs, toilets and even large buckets of water. To prevent drowning from occurring, more information is needed about the bodies of water involved.

Epidemiological data can help create more effective interventions that can reduce injuries and death. According to the existing data,:

We know that in the United States:

- More than 1400 children and adolescents from birth to 19 years old die of drowning every year. Six hundred are infants and preschoolers and 500 are teenagers (National Safety Council, 1995).

- Twenty percent of children who have near-drowning experiences suffer severe, permanent neurological disability (National Safe Kids, 1997).
- For every 10 drowning deaths, 36 near drownings patients are admitted to the hospital and 140 near drowning victims are treated in emergency departments (Christopher and Gallagher, 1998).

## **Age Specific Safety Interventions to Prevent Injuries and Death.**

### **Infants (0-1 year of age)**

Infants and toddlers are not able to protect themselves from drowning. Children at this age are most at risk of drowning in small amounts of water including bathtubs, large buckets of water, and toilets.

- **Always** provide constant and direct supervision around bathtubs, wading pools, swimming pools, ponds, large buckets of water and any other open standing water. Never leave children unattended around any water source.
- Never leave a young child alone in a bathtub, even for a few seconds. Many bathtub drownings occur when the caregiver leaves a small child alone or with another small child. Children must be watched at all times in the bathtub.
- Do not rely on the use of bathing supporting devices (i.e. bath rings) to keep the child safe. Children must be watched at all times. These devices help support a child but they can tip over with the child in them.
- Keep toilet lids closed. Use a toilet lock to keep small children from opening lids and possibly falling inside the toilet.
- Never leave a small child alone in the bathroom. Devices such as a hook-and-eye latch lock or a doorknob cover can keep children from entering unattended into the bathroom. Reversing the door lock so the lock is placed on the outside can also ensure no entry into bathroom.
- Empty all buckets, pots, and any other large containers after each use. If a large container is being used, never leave children unattended near them. Children who do not yet walk, but who can crawl and then pull up to stand using the bucket may be most at risk. Since the infants' and toddlers head weighs more than the rest of the body, he/she can easily fall into these containers. Large containers that are filled with liquid are heavier and are not as likely to tip over to let the infant or toddler out if they should fall in. This can lead to drownings in only a few inches of water.
- Instruct all baby sitters and other care givers about pool, bathtub, and bucket safety.

## Preschoolers (1-5 years of age)

Swimming pools and hot tubs are water sources that pose the leading drowning risk for this age group. A child can easily slip away from the supervision of a caregiver and fall into the pool and drown within a few seconds. It is safest for people with children under age 5 not to have swimming pools in their yards. The following guidelines are given for pool owners. (These are especially important for those who may have young children living or coming to visit at the residence).

- Install 5 foot isolation fence around all four-sides of the residential swimming pool. This should separate the pool from both the house and the play area of the yard. A properly built fence when used correctly can substantially decrease a young child's risk of drowning. Use the American Academy of Pediatrics (AAP) or the Consumer Product Safety Commission (CPSC) guidelines for appropriate fence dimensions, gates, and gate locks.
- Rigid motorized pool covers are not substitutes for four-sided fencing because pool covers are not likely to be used appropriately and consistently.
- Remove and/or secure steps to aboveground pools whenever they are not in use.
- Pool covers should never be left partially on the water surface. Children can become trapped beneath them.
- **Always** provide constant and direct supervision around bathtubs, wading pools, swimming pools, ponds, large buckets of water and open standing water.
- Supervise preschoolers in the water even if they are wearing flotation devices. Flotation devices do not replace vigilant supervision of small children around or in the water.
- Keep tables and chairs away from pool fences to prevent young children from climbing over the fence and into the pool.
- Keep toys away from the pool area and out of the pool (after use). This keeps young children from being attracted to the area and tempted to reach for them.

### Swimming lessons:

Swimming lessons are widely available and may be advertised as drown proofing classes. The AAP does not recommend them for children under 3 years of age. There are two reasons for this:

- A false sense of security can be developed by the caregiver because they think their child can swim.
- Young children have an increased risk of getting infections from dirty water and getting sick from swallowing too much water.

If a caregiver does want to enroll a child in swimming lessons, it is recommended that a class is chosen where 1) it is not required for the child to put his/her head under water and 2) the caregiver has an opportunity to be involved in the activities. Once the child is ready (usually around age 5), enroll him/her in swimming lessons. Knowing how to

swim can help the child feel comfortable in and around the water and can possibly reduce the risk of injury or death in certain situations.

Note: Teaching a child how to swim DOES NOT mean he or she is safe in the water. Even a child who knows how to swim or float may drown a few feet from safety if he or she gets confused, disoriented or scared. Adult or children should never swim alone.

### **School-aged children (5-12 years of age)**

Many drownings in this age group occur in oceans, lakes, and streams. Ditches, potholes, wells, fishponds and fountains have also been considered to be water hazards. Safe swimming is key for this age group. The following are important swimming safety rules.

- Never let children swim alone. Adult supervision is always necessary.
- Teach children to swim once they are ready (beginning about 5 years old). This can give them the skills needed to swim and dive safely. Knowing how to swim DOES NOT replace the need for supervision.
- Never allow children to push or hold another person under water.
- Do not allow children to call out for help in fun. This should only be done in a true emergency.
- Young children and older children who do not know how to swim should not use blow up flotation devices (water wings, rafts, etc.) in water above their waist. These same devices should never be used in place of life jackets.
- Diving should be performed cautiously in supervised areas that are deemed safe by an adult who knows the depth and condition of the water.
- Teach children to stay calm and tread water or float on their back in the event of drifting too far from shore. Keeping hands under the surface of the water allows for better body position, balance and floating.
- Teach children to **always** use life jackets when boating, water skiing or playing in a river or stream.
- Never swim when there is lightning. Stop swimming (or any other recreational activity on or in the water) as soon as you hear or see a storm.
- Be sure that the individual who supervises children is capable of swimming, obtaining emergency help, and can perform CPR.
- Children should know the drowning risk associated with the cold season. They should be taught not to walk, skate, and/or ride on weak or thawing ice.

## **Adolescents (12-18 years old)**

This age group may engage in riskier behavior and has a normal but potentially hazardous sense of immortality. Swimming in unsupervised areas, use of alcohol and other drugs, overconfidence in swimming ability, group dynamics and not understanding water currents or depths all can contribute to the risk of serious injury and death. Education about these dangers is important to ensure safe behavior choices.

**Diving** - can cause serious injuries to the spinal cord and brain, and may lead to death. Most of the injuries are the result of diving into a shallow area water or from hitting the diving board when coming down after springing upward. Education about this area is crucial for this age group.

- Never swim or dive while intoxicated.
- Always check the depth of the water. Go into the water feet first when entering for the first time.
- Never dive into an above ground pool. The majority of above ground pools are not deep enough.
- Never dive through inner tubes or other toys.

**Alcohol**—Alcohol is a commonly used substance by this age group. This drug impairs judgement, coordination and balance needed while swimming, diving and playing water sports. Drinking alcohol or using other drugs can also lead individuals to become more reckless. Education on the dangers of using alcohol while swimming and supervision of this age group are important safety interventions.

## **Adults**

Caregivers are responsible for the welfare of children. With proper education on the potential risks of drowning and the needed intervention that can prevent them from occurring, caregivers can better safeguard against these tragedies. Additional topic areas which adults should know about include:

### **Life jackets**

- Adults should ALWAYS ensure that children wear a Coast Guard-approved life jacket when on boats and around or on large bodies of water.
- Make sure that the jacket is the right size for the child. The jacket should be snug and worn as directed. All straps should be routed and buckled properly.
- Teach children how to put on their life jacket.
- Blow-up devices (water rings, rafts, etc.) should never be used in place of life jackets.
- Some states have established life jacket loaner programs at or near the recreational water source. Programs like this are a good public health intervention. For more

information call the Washington State Drowning Prevention Project as (206) 527-5797.

**Responding to an emergency**—Adults should know how to respond in an emergency. Knowing CPR can be a life saving practice. All adults and teenagers should be encouraged to take a CPR class. In the event of a water emergency, the American Redcross recommends the **CHECK- CALL-CARE** method: **CHECK** the scene to ensure that it is safe, **CALL** 9-1-1 or your local emergency number, and **CARE** for the person until help arrives.

#### **In the event of a drowning**

- Remove the victim from the water, Have someone call 9-1-1.
- Check consciousness and breathing.
- If the victim is not breathing, open the airway and attempt rescue breathing.
- If air still does not go in, give abdominal thrust (Heimlich maneuver) to children and adults in order to clear the airway.
- Once the airway is clear, provide rescue breathing or CPR as needed.  
(The American Redcross, 1997)
- Since many victims of submersion in cold water have been successfully revived, do not stop CPR on anyone who has fallen in cold water.
- All near-drowning victims need to be medically evaluated at a hospital.
- Even if resuscitated prior to transport, all true near-drowning victims need to be hospitalized overnight for observation of potential swelling of the brain and development of breathing problems.

## **Etiology of Drowning: Where drownings occur and related interventions to keep them from happening**

**Lakes and Rivers:** These are often sources of recreation for children, adolescents and adults. To ensure water safety these general guidelines are given:

- Select an area that has good water quality. Water pollution can cause health problems for swimmers. In murky water, hidden underwater objects are difficult to see and can cause serious injury.
- Select a swimming area that is calm and free of strong currents. Under water geography, (including deep drop offs), and natural water flow can create currents that are dangerous even for advanced swimmers. Swimming in a lifeguard-supervised area will generally decrease these dangers plus help will be available in the event of an emergency.
- If caught in a current, do not panic. Swim in the direction of the water and gently and gradually swim toward the bank. Never try to fight the current.

- Avoid swimming in overgrown lakes and waterways. Entanglement in the overgrowth is possible. Chance meetings with dangerous water snakes are more likely to occur in these areas.
- Never swim under a dock or raft. Look before jumping off of these devices. Ensure that the water is deep enough before entering headfirst.
- Following age specific safety precautions (See earlier sections).
- The major protective strategy on lakes and rivers is life jackets and knowing how to swim.
- Another issue around rivers is falling in from adjacent rocky or steep banks. Wet rocks are slippery and children need to be supervised and advised and to keep away.
- People canoeing or kayaking on rivers with current need to be cautious with respect to the conditions, their ability, and power of the flowing water. No one should boat alone.

## **Recreational Water Sports:**

### **General Precautions:**

- Always wear a Coast Guard-approved life jacket.
- Knowing how to swim is one of the best ways to stay safe in and around the water. Although it does not make a person safe from the possibility of drowning, it can significantly increase the chances of survival in certain situations.
- Water can conduct electricity and pose a serious threat in the event of a lightning strike. All recreational activities on or in the water should cease at the first sign of a storm. Also, heavy rains can make certain areas more dangerous.
- Do not do these sports at night or in restricted areas. This can significantly increase the risk of harm.
- Alcohol and recreational sports are a dangerous combination. Judgement, coordination and balance are impaired by alcohol and can increase risk of injury or death.

### **Water Skiing:**

- Always turn the boat motor completely off when approaching a fallen skier or when the skier is approaching the boat.
- Have an extra person aboard to watch the skier. Have and use proper hand signals so the skier can communicate with the boat operator.
- Ensure that all equipment is in good shape.
- Both the skier and boat operator should employ common sense and courtesy.

### **Rafting, Tubing, Canoeing and Kayaking:**

- Do not exceed recommended number of passengers for raft's flotation.

- Avoid rafting after a heavy rain. Small rapids may become extremely strong and be above the experience level of the rafter.
- When rafting with a tour company, make sure the guides are qualified. Check with the local chamber of commerce. Match difficulty of rapids with experience of rafters.
- Careful consideration should be used when selecting rafting and tubing sites. Some rapids are extremely dangerous and even the most experienced rafters can potentially drown.
- Always wear a Coast Guard-approved life jacket on a stretch of river with continuous waves. This will help keep a head above water enough to breathe.
- If you fall out, always float with feet up pointed downstream. Do not attempt to stand up in the middle of a flowing stream. A foot entrapment in strong current can cause drowning even in relatively shallow water.
- NEVER go over a dam. The continuous wave formed below prevents escape.

### **Personal Water Craft (PWC) Safety:**

**Laws--**Ky law states that anyone under the age of 12 can not operate a watercraft with 10 horse power or greater. Children age 12-17 years old need to complete a watercraft-certifying course or be accompanied by another certified person or an individual over the age of 18 years.

- New riders need education on how to handle the PWC. Inexperience can be dangerous. Proper driving instruction, supervision and education on the basic rules of the road for waterways are important. (Sources of this information include the watercraft manufacturer's safety booklet, states boating regulations and/or water certifying course).
- Extreme caution should be used around swimmers, surfers, and other boats. Avoid passing close to other boats and jumping wakes. (This behavior is extremely dangerous).
- PWC's should be operated with common sense and courtesy. Obey all traffic patterns, no-wake and speed zones, and basic rules. Watercraft engines should be on low speed until away from shore, docks and swimmers.
- Individuals should not operate a single PWC by itself. It is best to travel in-groups of two or three PWC's. Having a "buddy" along can help out in the case of an emergency. Surrounding PWC's can pose an additional risk of collision. Careful attention and safe driving is necessary to ensure optimal safety.

### **Motor Boating**

- Always wear a Coast Guard-approved life jacket. There is no time to put one on before the unexpected event where you may need it.
- Learning to swim is one of the best ways to stay safe in and around the water. Although it does not make a person safe from drowning, it can significantly increase

the chances of survival if an emergency should happen. People who do not know how to swim should not go on boats.

- Water can conduct electricity and pose a serious threat in the event of a lightning strike. All recreational activities on or in the water should cease at the first sign of a storm. Also, heavy rains can make certain areas more dangerous.
- Extra caution is warranted for driving boats at night. Boats should be equipped with lights. Lack of good vision can significantly increase the risk of harm.
- Alcohol and recreational sports are a dangerous combination. Judgement, coordination and balance are impaired by alcohol and can increase risk of injury or death.
- New boat drivers need to be extremely cautious. Inexperience can be dangerous. Proper driving instruction, supervision and education on the basic rules of the road for waterways are important. (Sources of this information include the watercraft manufacturer's safety booklet and/or states boating regulations). Boat Safety classes are available and strongly encouraged.

### **Streams, Stream Beds, Drainage Ditches:**

These places can seem very benign at first but become life threatening places after a heavy rain. In some parts of Kentucky, where terrain is steep and flash flooding is frequent, run-off water rises quickly and can become a raging river that even the strongest swimmer can not handle. Debris in the current can further compound the dangers. Educating children and adults about these potential dangers is necessary. Particular caution should be given to these areas after a heavy rain. These places should not be considered places for swimming and/or playing. Children need to be educated but also closely supervised at times of high risk, as they are drawn to them by interest and curiosity. Such areas should be separated by fencing from other areas where children gather routinely (i.e. school, parks, etc.). In streams below electric company dams, children and people fishing need to be aware of the potential for sudden dam releases with rapidly rising water. Sometimes there are warning whistles available to notify near by people.

### **Farm Ponds**

Ponds are a common occurrence on Kentucky's farmland. These farms often have small children living close by. Caregivers need to be vigilant in watching young children around these sources of water, especially at times of planting or harvesting where access may increase while supervision decreases. Caregivers should also educate older children about the dangers of walking on frozen over ponds.

## **Pool Safety**

Home pools are a common source of recreation for a family but can bring tragedy if proper precautions are not taken. To ensure that accidental drownings do not occur, it is important to follow these guidelines on page 3. In addition:

- Keep Rescue equipment (such as a shepherd's hook or life preserver) and a telephone by the pool.
- Adults in homes with swimming pools should learn adult and child CPR and keep their skills current.
- Because Ky has had repeated drownings in which the house side of a pool was unfenced or gates did not lock, these two aspects of pool safety are worth stressing in the community.

## **Hot Tubs and Whirlpools:**

Drowning is a potential hazard for hot tubs, spas and whirlpools. The victims have been either young children under the age of 5 or adults who drowned as a result of the heat, usually because they have taken sedative drugs or alcohol (or were diabetic). A major issue here may be fencing. These bodies of water need to be treated like pools. Proper isolation fencing and supervision should be used. Adolescents need to be taught the dangers of using alcohol while in hot tubs and whirlpools.

## **Conclusion**

The epidemiology of drowning is diverse in Kentucky, making it difficult to recommend a single preventative strategy. However, knowledge of the relevant factors in a given locale will make it feasible to suggest the best combination of preventative strategies resulting in decreased drowning risk.

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