



# Emergency Medical Training Services

Emergency Medical Technician – Basic Program Outlines

Outline Topic: ENVIRONMENTAL and DIVING ACCIDENTS

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## DEFINITIONS

- Shivering - no patient should ever shiver in care. Shivering is a useless way to produce heat.

## WAYS TO TRANSFER HEAT

- Conduction - heat transfer from one item to another. Sitting on a cold stone and your butt gets cold.
- Convection - heat transfer from air or water. A drowning is convection. A fan blowing across you is convection.
- Radiation - Humans produce heat. It just radiates from us. If you put 100 people in a tent it will get hot.
- Evaporation - Sweating. The sweat evaporates to cool the body. If a high humidity day the sweat cannot evaporate.
- Respiration - The lungs take core air and blow it in or out.

## HOW TO PREVENT HEAT EXCHANGE

- Remove person from the environment.
- Remove clothing.
- Body activity. Movement.

Hypothermia

- Body temperature less than 95 degrees - officially.
- Mild hypothermia is 95 to 90 degrees.
- Moderate hypothermia is 90 to 85 degrees.
- Severe hypothermia if less than 85 degrees.
- If less than 82 degrees the human is dead.
- You do not have to have a freezing day to be hypothermic. If someone drowns in a pool that is 92 degrees the victim's body temperature will match the water and 92 degrees is less than 95 degrees.

#### WHO IS VULNERABLE TO HEAT RELATED EMERGENCIES

- Elderly - poor circulation, poor nerves, poor metabolism to make energy to produce heat.
- Young - do not have good sweat glands, do not have a lot of blood or muscles to make heat.
- Diseased/weak.
- Diabetics - have problems making energy, poor blood vessels.

#### SIGNS/SYMPTOMS OF HYPOTHERMIA

- Early - epi release, movement to make heat. Goose bumps make valleys in skin to hold heat.
- Transitional period from early to late - shivering.
- Late - slowing pulse, breathing, BP, decreased LOC.

#### WHAT A PERSON MAY GO THRU FROM EARLY TO LATE HYPOTHERMIA.

- Early: Picture a hunter in winter. They stay still sitting on a rock. They start to get cold. They release epi to make heat. They then start to walk around to make heat. They then get goose bumps.
- Transitional - Start to shiver with goose bumps. Body temperature is still dropping so body starts to hibernate like a bear.
- Late: Heart rate slows to conserve, breathing slows to conserve, BP starts to drop. Start doing stupid stuff like take off clothing, seeing things. Mental status drops. Go unresponsive and then freeze.

#### General versus local hypothermia

- General hypothermia is when the entire body temperature has dropped.
- Local hypothermia is nose, ears, toes, face, etc...

#### General Hypothermia

- If mental status is ok - warm ASAP.
- Put warm blankets, warm IV, warm O2, etc...
- Do not give caffeine or alcohol to drink. Other warm fluids are permitted if not nauseated.
- Do not allow to walk around.
- If mental status is decreased ACTIVE WARMING WILL TAKE PLACE AT HOSPITAL. EMS ROLE IS DON'T LET THEM GET WORSE.

- Do passive rewarming - hot packs around person/not on person. warm O2, warm IV, heater on. Remove wet clothing.
- The hospital will do active rewarming. Put warm liquid into stomach, peritoneal area, and take out blood and warm then put back into body. The goal is 1 degree per hour. Any faster the body shuts down. You cannot go from 0 to 60MPH in a car in 1 second.
- THEY ARE NOT DEAD UNTIL THEY ARE WARM, DRY AND DEAD.
- PULSE CHECKS SHOULD LAST AT LEAST 30 SECONDS BEFORE STARTING CPR.
- If severe hypothermia and V-fib present limit to 1 shock until body temperature rises.
- AVOID ROUGH HANDLING. KEEP HORIZONTAL. If you stand them up blood will go down. Their blood vessels are stiff and cannot constrict blood. Rough handling or standing up can put them into V-Fib.

#### LOCAL HYPOTHERMIA

- Frost Nip - red, numbness.
- Frost Bite - Frozen, waxy, white color.
- Remove from weather.
- DO NOT UNTHAW A FROZEN PART IF IT CAN REFREEZE.
- DO NOT MESSAGE A FROZEN PART. IT MAY RUPTURE CELLS THAT HAVE FROZEN.
- Wrap loose, separate fingers/toes, remove jewelry.

- NOTE: this is something you need to know on test but not is very likely to happen in the field. YOU CAN UNTHAW A BODY PART IF: YOU CAN PLACE THE FROZEN PART IN WATER THAT WILL STAY AROUND 105 DEGREES UNTIL COMPLETELY UNTHAWED AND FEELING IS RETURN. What happens when you put frozen pasta into boiling water? The bubbles stop. You need a hot tub to keep the bubbles going - right.

## Hyperthermia

- Watch out for hot days but also normal days with high humidity.
- Temperature of 101 or greater.

## Three types of hyperthermia

- Muscle (heat) cramps are an electrolyte and fluid imbalance. Give water or 50/50 Gatorade if not nauseated. They have electrolytes then need the fluid that the electrolytes swim in. The body is like concentrated CoolAid - add water.
- Heat Exhaustion - Headache, tachycardia, thirst, major sweating. It is like when you cut the grass on a hot summer day and you go inside to an air-conditioned room and sit down. Know you have been sitting for 30 minutes but you are still having major sweating and the heart is still going fast. This is heat exhaustion. Give water (preferred) or 50/50 Gatorade if not nauseated.
- Heat Stroke is the true emergency. You need a body temperature of 104/105 or higher. At 107 degrees the human can only live for 45 seconds to 2 minutes. Remove from heat, remove all clothing. Dump ice

on groin, neck, pelvis to cool fast (or use a sheet dumped in an ice bucket and place over victim). Start to remove when shivering. Over 50% will have a seizure that will not stop until temperature is reduced.

They will be unresponsive and need IV fluid in large amounts. 6 to 10 IV bags to start with.

#### DROWNING versus NEAR DROWNING

- You can be dead with both.
- Near Drowning is when patient drowns but they live at least 24 hours after being removed from the water. So if they die in 2 days it was still a near drowning.
- Drowning is when the patient does not last 24 hours. They pulled them from the water dead or pulled them out alive but later died that day.

#### Rescue

- If you are not trained and do not have the right equipment do not rescue. Safety first.
- Reach, Throw, Row.

#### Treatment concerns on all Drownings

- Spinal injury.
- Hypothermia.
- Hypoxia.

## Treatment dead

- If dead in water as soon as head is out of water start mouth to mouth. Pulse checks last at least 30 seconds. Once out of water start CPR
- Not dead until warm, dry and dead.

## Overall Treatment

- Usually no water in lungs.
- What happens? When a person's face is underwater the vocal cords close. Spasm shut. Once the victim is removed from the water all we have to do is tell the vocal cords they are out. Rescue breath into mouth. Once the air bubbles hit the vocal cords they open. Then the water in the nose, mouth and sinuses drain down. What happens when you drink something down the wrong pipe? You cough. This is what happens on Bay Watch. The fluid is not coming from the stomach or lungs. Just the upper airway.

## DIVING PROBLEMS

- Diving problems in textbooks mean SCUBA DIVING.
- The problem is not how fast they go down it is how fast they come up.
- The bends. As they go down all the pressure of the water makes the cells smaller. If they come up too fast the cells do not have time to slowly return to normal size. As a result they expand too fast.
- Capillaries rupture - rash skin.

- Ear drums rupture.
- Blood shot eyes.
- Aching joints.
- Most important they have a pulmonary embolism. This is a patient to transport on left side.
- They need a hypobaric chamber or they are dead.
- Support ABC.
- This is most common when a person goes and dives below sea level in the morning and then gets on a plane that is above sea level without giving time for the body to adjust.