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N202: Advanced Concepts of Nursing

Emergency Report Project

03/21/23

**Etiology/Pathophysiology – Hypothermia and Frostbite**

- Hypothermia is the lowering of core body temperature to less than 95F(<35C). The body loses more heat than it can produce. Heat is generated by cellular metabolism, primarily the heart, and liver, which is lost through the skin or lungs by evaporation, radiation, conduction, or convention
- The normal physiologic response to cold is initiated by sensitive neurons in the skin, impulses are sent to the hypothalamus resulting in shivering and piloerection
- Caused by drugs, extensive burns, metabolic disorders (hypothyroidism), stroke, repeated cold exposure, and sepsis. At-risk population – the very young, the very old, black men and women, inadequate clothing/shelter, and low body fat
- Mild hypothermia relatively normal clinical appearance. Alert, the mental status may be altered. Ataxia, clumsiness, slowed response to stimuli, and dysarthria is common. *Temperature 90-95F*
- Moderate hypothermia progressive decrease in the level of consciousness, pulse, respirations, and cardiac output. Increased risk for ventricular tachycardia. Shivering has ceased. *Temperature 82.4-90F*
- Severe hypothermia absence of reflexes and pain response, decrease cerebral blood flow, and increased risk for ventricular fibrillation and asystole. *Temperature 75-82.4F*

- Frostbite is a condition characterized by tissue damage after exposure to freezing temperatures to mainly the hands and feet but may also include other areas of the body such as ears, nose, chin, cheeks, and genitals.
- 4 phases – pre-freeze, freeze and thaw, vascular stasis, and ischemic phase.

- Pre-freeze phase is the tissues cooling causing vasoconstriction and ischemia.

- Freeze and thaw phase is the formation of intracellular and extracellular ice crystals causing cell membrane damage resulting in electrolyte shift, dehydration, and cell death.

- Vascular stasis phase blood vessels fluctuate between dilation and constriction causing blood to leak from the vessel or coagulate

- Ischemic phase, inflammatory mediators are released during the rewarming causing additional vasoconstriction and platelet aggregation and worsening ischemia occurs.

- Superficial frostbite is a first or second-degree causing partial or full-thickness skin injury.

- Deep frostbite is a third or fourth degree extending into the muscle, bone, and tendon.

- The phrase " Never dead until warm and dead" means patients who are severely hypothermic often appear dead with fixed and dilated pupils and stiff extremities and once they are rewarmed there is a chance for survival. In the event of a medical condition or trauma the survival rate after rewarming a hypothermic patient is not likely. Hence, they aren't confirmed dead until they are warmed and still appear dead.

**On-Scene Treatment**

- Evaluate and support the airway, breathing, and circulation.
- CPR should be initiated for those who sustain cardiac arrest for at least 5 minutes, no longer than 10 minutes.
- Remove wet clothing if indicated and initiate external passive rewarming.
- External passive rewarming is covering the patient with blankets or another form of insulation.
- The recommended rate of rewarming is between 0.5 and 2 degrees C/hour.
- Avoid rubbing frostbitten areas

**ED Treatment**

- The extremity involved is placed into warm water (100-108F) for 30 minutes.
- first-line treatment of crystalloid fluids for hypotension during rewarming
- administration of vasopressors
- Passive external rewarming with blankets
- Active external rewarming involves the external application of heating pads, warmed blankets, and radiant heat
- Active internal warming increases the core temperature by warming the heart before the extremities, such as humidified oxygen, gastric lavage, and warmed fluids.
- Pre-thaw- volume replacement with crystalloid at 104F (40C) to decrease blood viscosity.
- Thawing by immersion in water, rewarming should be continued until erythema is noted on the distal end about 15-30minutes
- Rewarm frostbitten areas after the hypothermic patient is stabilized. Tetanus prophylaxis and aggressive treatment for potential infection
- Wound care and enhance tissue viability
- Anticoagulation therapy within 24 hours due to the high risk of blood clots and prostacyclin therapy within 48hours for severe frostbite

**ED Nurse Role**

- Isotonic fluid resuscitation
- Address the pain during the rewarming process
- Esophageal thermometer for core temperature
- Monitor vital signs and electrolytes – especially potassium
- Monitor for complications of rewarming – hypotension, dysrhythmias, and deterioration. Atrial fibrillation is common during the rewarming but self-limiting
- Careful handling/avoid jostling during a hypothermic state—may precipitate ventricular fibrillation

**Discharge/Prevention Instructions**

- Wear protective clothing, hats, eye, and face protection, mittens, and gloves
- Keep the affected areas clean dry and always covered. Applying emollients to exposed skin
- Adequate calorie intake and hydration
- Avoid smoking and alcohol —slows healing
- Raise the affected parts to lower swelling
- Vasodilators for increased blood flow, NSAID for pain and swelling, anticoagulation for blood clots

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