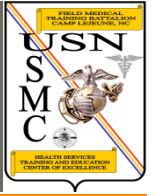




ENVIRONMENTAL COLD INJURIES





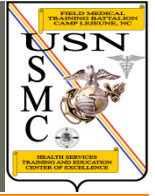
OVERVIEW



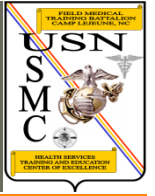
- Risk Factors
- Types of Cold Injuries
- Stages of Hypothermia
- Treatment of Hypothermia
- Preventive Measures



LEARNING OBJECTIVES

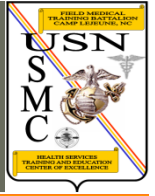


Please Read Your Terminal and Enabling Learning Objectives





BACKGROUND



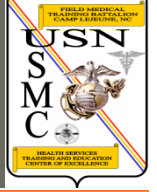
- Hannibal lost over 20,000 men crossing the Alps
- Napoleon's retreat from Russia
- Trench foot during World War I
- 13,970 US deaths from 1978 - 1998 from hypothermia



BACKGROUND



- Cold injuries are:
 - Tissue injuries produced by exposure to cold
 - Dependent upon duration of exposure, humidity, wind, altitude, clothing, medical conditions, and individual behaviors
 - Can occur at nonfreezing and freezing temperatures



RISK FACTORS

RISK FACTORS

- Fatigue
 - Slow metabolic rate
 - Inability to increase activity
 - May cause apathy leading to neglect of cold weather protection principles



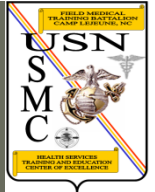


RISK FACTORS



- Age/Rank
 - Military personnel from 17-25 yrs of age
 - Front line troops who experience the most exposure
 - Higher ranks have more experience, less exposure and are receptive to training





RISK FACTORS

- Nutrition
 - Poor nutrition or incomplete meals contribute to cold injuries
 - Eat a well balanced diet





RISK FACTORS



- Discipline/Training/Experience
 - Well disciplined/trained personnel are better able to care for themselves:
 - Personal hygiene
 - Care of feet
 - Changing clothes
 - Practicing protection principles



RISK FACTORS



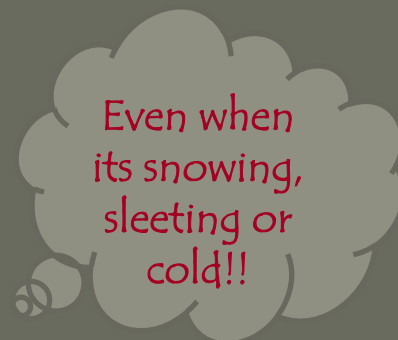
- Race/Geographic origin
 - Dark skinned individuals are more susceptible to cold related injuries
 - Greater susceptibility of pigmented cells to freeze compared to non-pigmented cells
 - Personnel from warmer regions are also more susceptible



RISK FACTORS

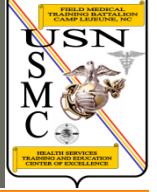


- Dehydration
 - Occurs easily in cold environments with increased activity
 - Proper fluid hydration is necessary

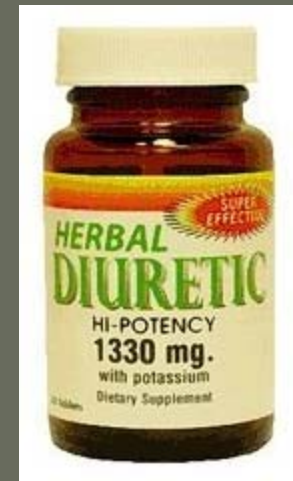




RISK FACTORS

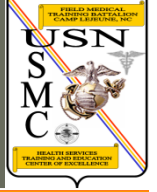


- Medication
 - Avoid medications that cause vasoconstriction, increase urinary output or produce sweating
 - Antihistamines, decongestants
 - Diuretics
 - Psychiatric drugs, BP meds





RISK FACTORS

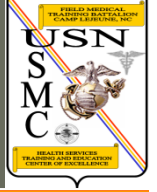


- Tobacco/Caffeine
 - Can cause vasoconstriction and poor circulation
- Alcohol
 - Vasodilator
 - Anesthetic properties cause subjects to not feel the cold





RISK FACTORS

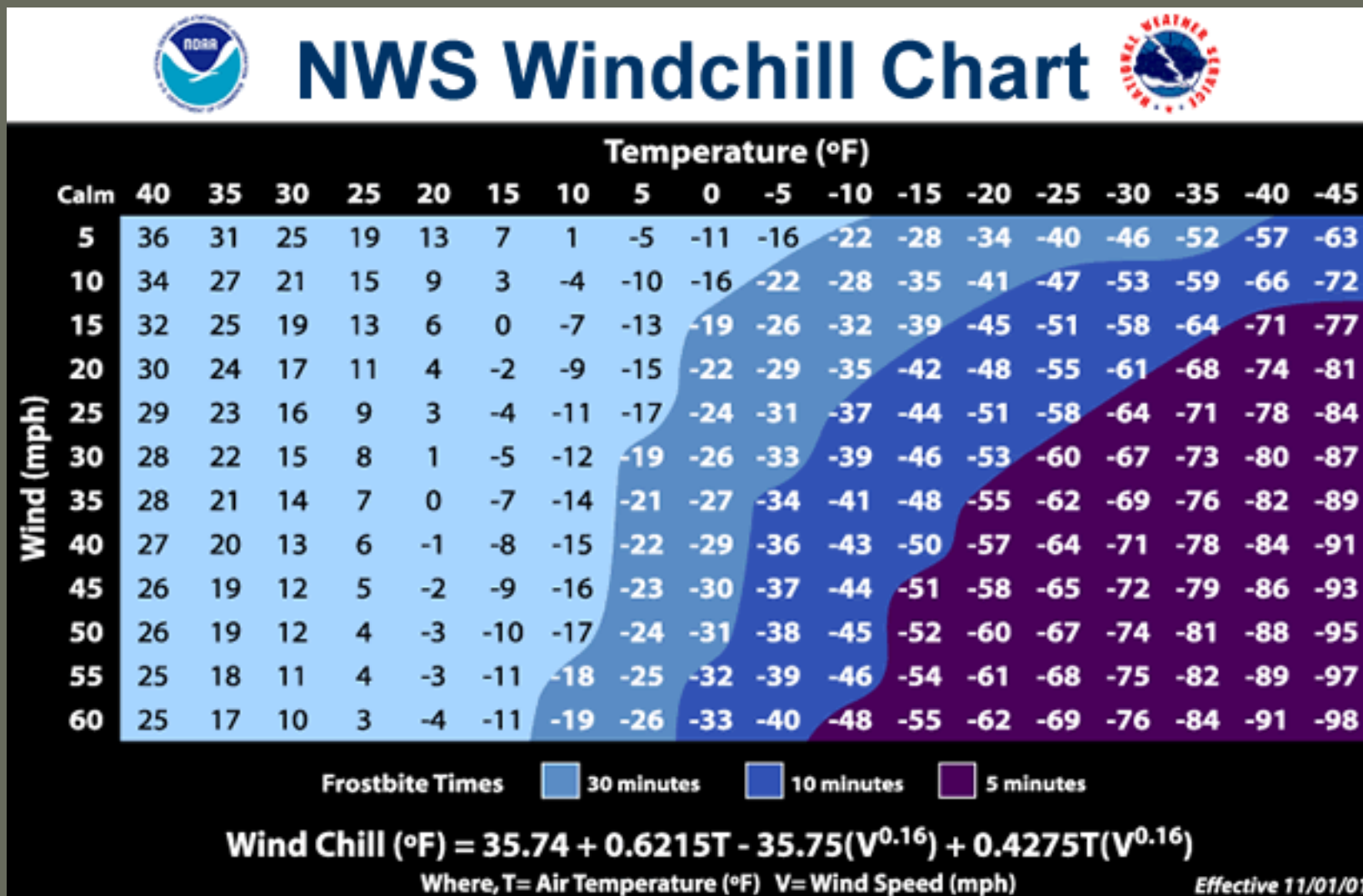


- Environmental Factors
 - Weather
 - Temperature
 - Humidity
 - Precipitation
 - Wind





RISK FACTORS

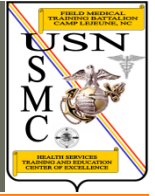


RISK FACTORS

- Activity



- Over activity increases heat loss through rapid deep breathing and perspiration
- Immobility causes decreased heat production





TYPES OF COLD INJURIES

CHILBLAINS (PERNIO)



- Small, itchy skin lesions
- Appear as red or purple bumps
- Occur on exposed skin surface from chronic cold exposure

CHILBLAINS

- Caused when cold constricts the small blood vessels
- Re-warming results in the leakage of blood and fluid in the surrounding tissues



CHILBLAINS

- Symptoms:
 - Usually occur several hours after exposure
 - Appear as nodular plaques
 - Intense pruritus
 - Burning paresthesia



CHILBLAINS

- Treatment:
 - Supportive in nature
 - Gently re-warm
 - Wash and dry affected area
 - Apply a dry, soft sterile bandage





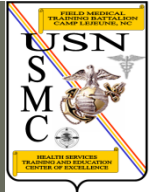
SNOW BLINDNESS



- Ultraviolet burns to the skin and eyes
- Caused from exposure to bright reflections
- Corneal burns can occur within an hour but do not become apparent for 6 -12 hrs



SNOW BLINDNESS

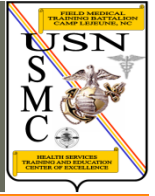


- Signs / Symptoms:
 - Excessive tearing
 - Pain
 - Redness
 - Swollen eye lids
 - Photophobia
 - Blurred vision
 - Headache
 - Gritty sensation in the eyes





SNOW BLINDNESS



- Treatment:
 - Prevent further exposure (e.g. sunglasses) or patch affected eye
 - Oral analgesics
 - DO NOT use steroid medication on eyes
 - Corneal Ulcerations
 - Corneal Perforation
 - TACEVAC if needed



FROSTBITE

- Freezing of fluids in the skin and subcutaneous tissues
- Ice crystal form, expand and cause damage to surrounding tissue
- Affects hands, fingers, feet, toes and male genitalia



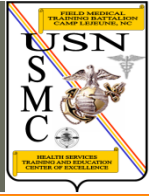
FROSTBITE

- Cause:
 - Exposure to temperatures below 28°F (-2°C)
 - Exposure time necessary to produce damage varies based on:
 - Wind velocity
 - Air temperature

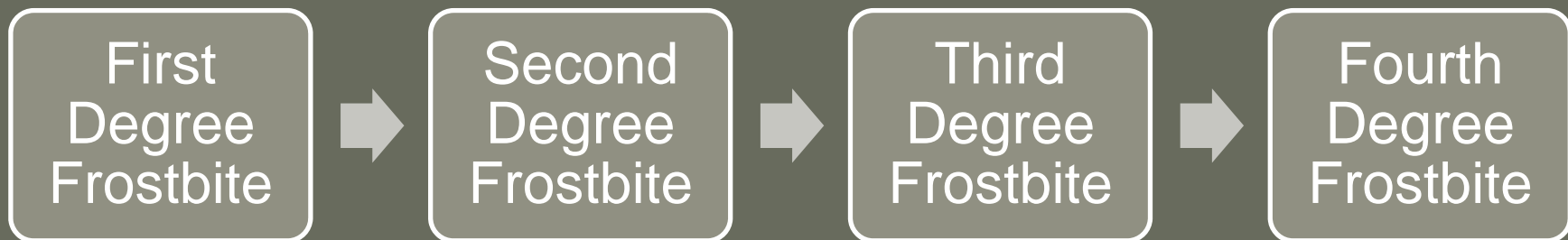




FROSTBITE



- Classified by depth of injury and clinical presentation
- Many cases will not be known for 24-72 hours



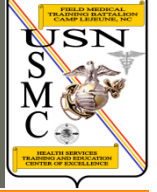
FROSTBITE

- 1st Degree:
 - Epidermal, limited to brief contact
 - Skin appears white or yellowish
 - No blister or tissue loss
 - Thaws quickly, feels numb and appears red
 - Healing occurs in 7-10 days





FROSTBITE



- 2nd Degree
 - Involves all epidermis and superficial dermis
 - Tissue feels stiff but gives way to pressure
 - Blisters contain clear or milky fluid
 - Surrounded by erythema and edema
 - No permanent loss of tissue
 - Healing occurs in 3-4 weeks





FROSTBITE



- 3rd Degree
 - Involves epidermis and dermis
 - After thawing, skin will have blood blisters
 - Slow loss of skin
 - Healing is slow



FROSTBITE

- 4th Degree
 - Full thickness through dermis with muscle and bone involvement
 - No mobility, passive movement after thawing
 - No blister, but will see early signs of necrotic tissue
 - Auto amputation





FROSTBITE

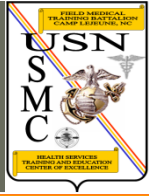


- Treatment (Superficial Frostbite):
 - First and Second Degree
 - Place affected area against warm body surface





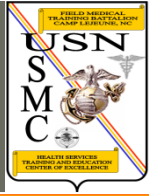
FROSTBITE



- Treatment (Deep Frostbite):
Third and Fourth Degree
 - Move to warm shelter
 - Thaw in warm water if delayed transport
 - Cover with loose, dry sterile dressing
 - Separate fingers and toes with cotton



FROSTBITE



- Treatment (Deep Frostbite):
 - Provide pain meds as needed
 - Start IV (250ml bolus warm saline)
 - TACEVAC ASAP

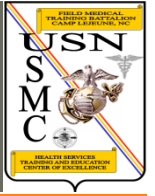


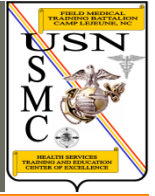


FROSTBITE



- **DO NOT:**
 - Re-warm if there is a possibility of re-freezing
 - Drain blisters
 - Use ointments
 - Rub with snow
 - Give alcohol or tobacco
 - Allow casualty to walk on affected feet
 - Use direct heat greater than 102°F





HYPOTHERMIA



HYPOTHERMIA



- Definition:
 - A systemic, non-freezing cold injury in which the body's core temperature falls below 95°F
 - The body is unable to generate sufficient heat production
 - Inadequate clothing and physical exhaustion contribute to heat loss
 - Can occur in hot and cold climates



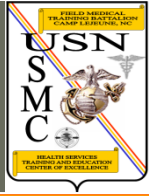
HYPOTHERMIA



- Causes:
 - Prolonged exposure to cold and/or wet conditions
 - Inadequate protection/clothing
 - Dehydration and/or poor nutrition
 - Poor physical conditioning
 - Resuscitation with cold fluids



STAGES OF HYPOTHERMIA



- Mild Hypothermia
 - Core temp above 93°F to below 97°F
 - Casualty shivering
 - Body's main mechanism to generate heat
 - Altered LOC
 - Confusion
 - Slurred speech
 - Altered gait
 - Clumsiness



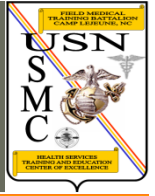
STAGES OF HYPOTHERMIA



- Mild Hypothermia (cont)
 - Body will attempt to generate heat by increasing
 - Heart rate
 - Blood pressure
 - Cardiac output
 - Respiratory rate increases



STAGES OF HYPOTHERMIA



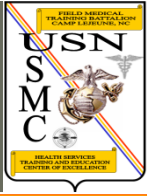
- Moderate Hypothermia
 - Core temp between 86°F to 93°F
 - Patient may not complain of being cold
 - Shivering will be absent
 - LOC greatly diminished
 - Paradoxical undressing
 - Cardiac dysrhythmias



STAGES OF HYPOTHERMIA



- Severe Hypothermia
 - Core temp below 86°F
 - Unconscious
 - Does not respond to pain
 - Vital signs barely or non-detectable

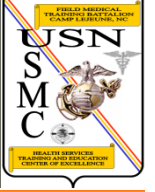




TREATMENT OF HYPOTHERMIA



TREATMENT OF HYPOTHERMIA



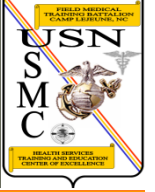
- Treatment:

**A PATIENT IS NOT
DEAD UNTIL THEY ARE
WARM AND DEAD**

- Move casualty to warm shelter
- Remove wet clothing
- Loosen / remove constrictive clothing



TREATMENT OF HYPOTHERMIA



- Warm Casualty
 - Cover head and body with warm blankets
 - Inhalation of warmed oxygen if available
 - Warm water bath (100-108°F)
 - Hot, sweet drinks if conscious

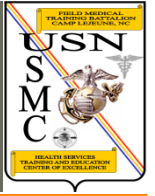


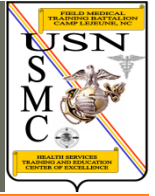


TREATMENT OF HYPOTHERMIA



- Treatment (cont)
 - Monitor vital signs
 - Monitor core temperatures
 - Warm IV solutions
 - TACEVAC





PREVENTIVE MEASURES



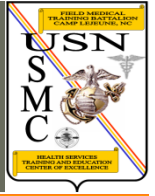
PREVENTIVE MEASURES



- EDUCATION
 - NUMBER ONE PREVENTIVE MEASURE
 - Prevention depends on education of troops and leaders
- ACTIVITY LEVELS
 - Maintain steady constant rate of work
 - Quick bursts of activity should be avoided



PREVENTIVE MEASURES

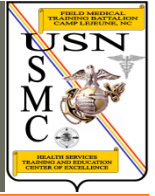


- BUDDY SYSTEM
 - Train troops to observe each other
 - Train troops how to re-warm each other





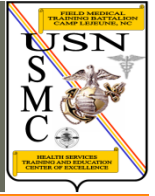
PREVENTIVE MEASURES



- The Marine Corps uses “COLD” as a standard acronym to describe cold weather protection principles.



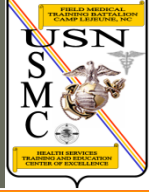
PREVENTIVE MEASURES



- **COLD**
 - Keep clothing CLEAN
 - Oily and dirty clothing quickly loses its insulating effects



PREVENTIVE MEASURES



- COLD
 - Avoid OVERHEATING
 - Over dressing and overexertion can produce dehydrated personnel and wet clothing





PREVENTIVE MEASURES



- COLD
 - LAYER correctly
 - Clothes should be loose to trap air between layers, which produces the insulating effect necessary for survival in the cold

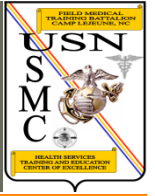


PREVENTIVE MEASURES



- COLD
 - Keep clothing DRY
 - If clothing becomes wet, so does the skin, which will promote cooling and frostbite.
 - Change wet clothing at the first opportunity







ENVIRONMENTAL COLD INJURIES

