

SECTION: M-13

PROTOCOL TITLE: Adult Cold Emergencies

REVISED: November 16, 2010

GENERAL COMMENTS: True Hypothermia is defined as a body temperature less than 95 degrees. Mild hypothermia is 34-35C / 93-95F. Moderate Hypothermia is 30-34 C/86-93F. Severe hypothermia is <30C/86F.

BLS SPECIFIC CARE: See adult General Medical Care Protocol M-1

- Handle gently
- Do not re-warm cold injured extremities if there is a chance of refreezing prior to arrival at definitive care
- Obtain a temperature, core temp if unresponsive
- For mild hypothermia, increase heat production through exercise and calorie/fluid replacement
- For moderate and severe hypothermia, treat gently and keep horizontal.

Begin passive re-warming

- Heat packs to critical areas.
- Rewarm trunk prior to extremities.

Cardiac Arrest treatment for moderate to severe hypothermia:

- CPR as normal, and increase duration of pulse check to 30 seconds.
- One (1) SHOCK then hold until temperature is >30 C/86 F
- Keep horizontal, avoid rough treatment but do not delay critical interventions
- Active re-warming

Fight Heat loss:

- radiation (55-65%): Cover with warm blankets. Cover the head (not the face).
- conduction (15%): Separate the patient from cold surfaces
- convection (15%): REMOVE WET CLOTHING
- evaporation (15%): Cover with warm blankets. Cover the head (not the face)
- Obtain core body (i.e. rectal) temperature as necessary
- Handle patient gently, at core body temperatures less than 30°C (86°F) rough handling can precipitate lethal cardiac dysrhythmias
- Remove patient from cold environment if possible, remove wet clothing and insulate against further heat loss
- Do not attempt to re-warm cold injured extremities if there is a chance of the extremity refreezing prior to arrival at definitive care

Protocol M-13

ADULT COLD EMERGENCIES

BLS Continued

- For patients in cardiopulmonary arrest
 - o If an automated external defibrillator (AED) is being used:
 - Shock as indicated
 - Continue CPR and obtain core body (rectal) temperature.
 - If core body temperature <30C/86F °, administer further shocks as indicated
 - If core body temperature <30C/86F withhold further shocks.
 - Focus on CPR and re-warming

ILS SPECIFIC CARE: See adult General Medical Care Protocol M-1

- If available, a microwave oven may be used to warm IV fluids.
 - o Two (2) minutes per liter on, "high"
 - o Shake bag prior to initiating infusion

ALS SPECIFIC CARE: See adult General Medical Care Protocol M-1

- Assess and treat underlying disorder
- Obtain blood glucose

Severe Pain: See Adult Pain Control and Sedation Protocol M-13

Cardiac Arrest treatment for moderate to severe hypothermia:

- (1) One total shock, then hold until temperature is >30 C/86 F
- Keep horizontal, avoid rough treatment but do not delay critical interventions
- Active re-warming
- Temp <30 C/86 F: withhold medications
- Temp >30 C /86 F: Increased intervals between meds.
- Sinus bradycardia may be physiologic in severe hypothermia and cardiac pacing and medications are usually not indicated
- Focus treatment on re-warming and rapid transport of patient
- For cardiopulmonary arrest associated with hypothermia see the algorithms

Hypothermia: Stages

Normal Cold response 98.6-95.1°F

- Feel cold
- Shivering

- Vasoconstriction

Mild hypothermia (34-35C / 93-95F)

- Maximum **SHIVERING** at 35C (95F)
- Cold, pale skin (vasoconstriction)
- Pulse and BP are normal or elevated

- Faster breathing
- Mild confusion, slurred speech, unsteady gait
- Amnesia

Moderate (30-34 C/86-93F) to severe hypothermia (</30C/86F)

- SHIVERING STOPS
- Pulse slows (bradycardia)
- Breathing slows
- Risk of cardiac arrhythmia

- Atrial fib
- Intense vasoconstriction - surface pooling (promotes afterdrop)
- Decreased LOC

Increased mortality in major trauma by 40-50%

Severe hypothermia (</30C/86F)

- Intense vasoconstriction - surface pooling (promotes afterdrop)
- As core temp drops the risk of cardiac arrest increases dramatically

- Lethal cardiac dysrhythmias
- Non-cardiac pulmonary edema

Protocol
M-13

Adult Cold Emergencies: Hypothermic Cardiopulmonary Arrest:

ADULT COLD EMERGENCIES

Box #1:

If adequate CPR is being performed upon arrival:

- a. Confirm cardiopulmonary arrest.
 - i. When the patient is hypothermic, pulse and respiratory rates may be slow or difficult to detect. For these reasons assess breathing and later assess the pulse for a period of 30 to 45 seconds to confirm respiratory arrest, pulseless cardiac arrest, or bradycardia that is profound enough to require CPR.
- b. Apply defibrillation pads and cardiac monitor without cessation
 - i. of CPR.
- c. Move on to, "**Box 4.**"

Box #2:

Sudden, witnessed arrest in the presence of EMS:

- a) Perform CPR only long enough to apply defibrillation pads and charge monitor.
- b) Move on to, "**Box 4.**"

Box #3:

If inadequate CPR, or no CPR at all, is being performed upon arrival:

- a.) Confirm cardiopulmonary arrest.
 1. When the patient is hypothermic, pulse and respiratory rates may be slow or difficult to detect. For these reasons assess breathing and later assess the pulse for a period of 30 to 45 seconds to confirm respiratory arrest, pulse-less cardiac arrest, or bradycardia that is profound enough to require CPR.
- b.) Initiate CPR.
- c.) 5 cycles 30 compressions: 2 ventilations (approximately 2 minutes.)
 1. Apply defibrillation pads and cardiac monitor.
 2. Prepare equipment for endotracheal intubation.
 3. Prepare IV equipment.
 4. Move on to, "**Box 4.**"

Adult Cold Emergencies: Hypothermic Cardiopulmonary Arrest:

**Box #4:
Rhythm Check**

VF/Pulseless VT:

- a) **Shock @ 200J or per manufacturer's recommendations.**
 - 1) Continue CPR while defibrillator charges.
- b) Immediately resume CPR without pause for rhythm check.
- c) Perform 5 cycles 30:2 (approx. 2 min)
- d) Intubate without cessation of compressions.
- e) Establish IV access without cessation of compressions.
- f) **Obtain core body (rectal) temperature.**

Asystole/PEA:

- a) **No shock indicated.**
- b) Immediately resume CPR.
- c) Perform 5 cycles 30:2 (approx. 2 min)
- d) Intubate without cessation of compressions.
- e) Establish IV access without cessation of compressions.
- f) **Obtain core body (rectal) temperature.**

**Box #5:
Core Body Temperature**

Core Body Temperature < 30° C (86°F):

- a) Continue CPR 30:2, check rhythm every 5 cycles (approx. 2 min)
- b) **Withhold further shocks if VF/VT present.**
- c) **Withhold IV/IO/ETT medications.**
- d) Transport and focus efforts upon raising core body temperature > 30°C.
 - 1) Infuse warm NS fluid boluses. (43° C/109° F)

Core Body Temperature > 30° C (86°F):

- a.) Continue CPR30:2, check rhythm every 5 cycles (approx. 2 min)
- b.) Shock as necessary if VF/VT present.
- c.) Administer appropriate IV/IO/ETT medications for presenting rhythm (i.e. VF/VT, PEA, asystole) as indicated but at longer than standard intervals.
- d.) Transport, monitor core body temperature and continue re-warming.
 - 1) Infuse warm NS fluid boluses. (43° C/109° F)

ADULT COLD EMERGENCIES

Protocol M-13

ADULT COLD EMERGENCIES

PHYSICIAN PEARLS:

If the core temperature falls below 32 C a characteristic J-wave (AKA Osborn wave) can occur. The J wave occurs at the junction of the QRS complex and the ST segment. Also noticeable are T wave inversion and prolongation of the PR, QRS, and QT intervals.



EKG IN HYPOTHERMIA

Hypothermic patients also exhibit "cold diuresis." Peripheral vasoconstriction initially causes central hypervolemia to which the kidneys respond by putting out large amounts of dilute urine. Alcohol and cold water immersion worsen this process. Therefore hypothermic patients may be dehydrated as well. Ringers Lactate is NOT used because it is not metabolized by a hypothermic liver. When available, a microwave can be used to warm the IV fluid. Two minutes on high per liter is usually sufficient, but be sure to shake the bag well to avoid "hot spots."