

# EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER  
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

Author: Kelly Corbitt | Editor: Stanley Linder, DO

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## Hypothermia

A 74 year old male, PMH of Alzheimer's dementia and Type II DM, is found unconscious, submerged at the bottom of a pool at night. Upon EMS evaluation, he is in asystole with a core body temperature of 81 degree F. ACLS protocol and CPR is initiated and he is brought to the ED where his body temperature remains unchanged. In the ED, fingerstick glucose is 220 and there are no obvious signs of trauma. What is an appropriate means of re-warming for this patient, and what does the core body temperature need to be to stop, if the patient continues in asystole?

- A. Remove wet clothing, turn room temperature to 82 degree F, place blankets over the patient. Temperature needs to be 90-95 degrees Fahrenheit.
- B. Remove wet clothing, use warmed blankets with heating pads. Temperature needs to be greater or equal to 95 degrees Fahrenheit.
- C. Remove clothing, warmed blankets, IV administration of room temperature crystalloid. Temperature needs to be greater than or equal to 95 degrees Fahrenheit.
- D. Remove wet clothing, place blankets, IV administration of warmed crystalloid (40-42 degrees Celcius). Temperature needs to be 90-95 degrees Fahrenheit.
- E. Remove clothing, use warmed blankets with heating pads. Temperature needs to be 90-95 degrees Fahrenheit.

## Other Differentials to Keep in Mind:

- Sepsis
- Adrenal Insufficiency
- Hypothyroid
- Ethanol Abuse
- Carbon Monoxide poisoning
- Neuromuscular diseases
- Thiamine deficiency
- Malnutrition
- Hypoglycemia
- CVA
- Vascular Insufficiency
- Trauma
- Uremia
- Various drugs (psych, beta blockers, oral antihyperglycemics)

*EM Case of the Week is a weekly "pop quiz" for ED staff.*

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

BROWARD HEALTH MEDICAL CENTER

Department of Emergency Medicine  
1625 SE 3rd Avenue  
Fort Lauderdale, FL 33316

**The correct answer is D.** Remove wet clothing, place blankets, IV administration of warmed crystalloid (40-42 degree C). Temperature needs to be 90-95 degrees Fahrenheit.

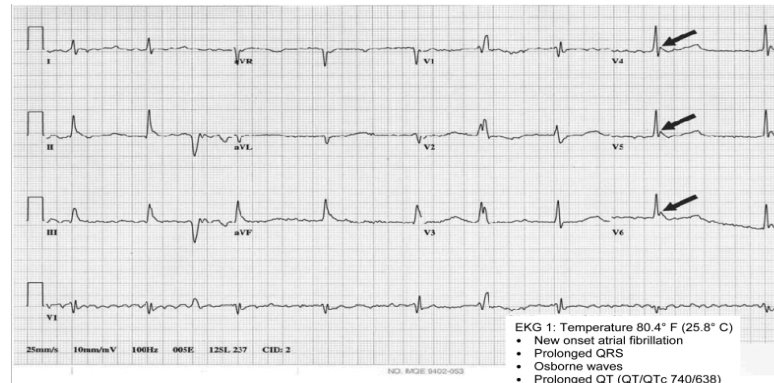
For the patient in cardiac arrest, who is also hypothermic, active internal rewarming is generally the preferred method of rewarming. The patient is at high risk of becoming hypotensive due to fluid shifts during the rewarming process and dehydration. The IV crystalloid, in large volume, will help support the blood pressure while also rewarming the patient's core body temperature. Room temperature fluids should not be used as they may worsen hypothermia. In the case of our patient, he also meets criteria for severe hypothermia (<82 degree F), which is treated with active internal rewarming regardless of cardiac arrest.

Concerning the second part of the question, to stop coding a patient who is hypothermic, they must be continued until the body temperature is 90-95 degree F. This may occasionally take several hours, however hypothermia may offer some neuroprotective effect, and complete recovery has been documented with prolonged resuscitation.

#### Discussion

The mechanism of accidental hypothermia is typically due to body heat loss via conduction to cool air or via convection to cold water. The body tries to combat heat loss by heat production via shivering and heat conservation via sympathetically driven peripheral vasoconstriction. However, once the body reaches temperatures below 32 degree C, these methods become less effective and metabolism and other body functions start to shut down.

Hypothermia is defined by a core body temperature less than 95 degree F. **Mild hypothermia** is characterized by shivering, tachypnea, tachycardia and ataxia and is defined as a body temp from 90-95 degrees Fahrenheit.



**Moderate hypothermia** is characterized by bradycardia, hypotension, lethargy, hypoventilation, loss of shivering and atrial arrhythmias. There may also be classic Osborne waves that appear on ECG as shown above. It is defined as body temperature between 82 and 90 degree F. **Severe hypothermia** is temperature below 82 degree F and in addition to those symptoms mentioned for moderate hypothermia, patients may be in coma, have loss of ocular reflexes, develop pulmonary edema, oliguria, and ventricular arrhythmias, which may be induced by patient movement.

#### Treatment

ABCs should be initially evaluated in all patients. Intubation may be considered in those with altered mental status and a lack of cough reflex who may be at risk for bronchorrhea. **Concerning circulation, a full minute may be given to find assess for a pulse and often times a Doppler is needed as these patients may be bradycardic with severe vasoconstriction.** For those patients found to be in cardiac arrest, IV access should be established early as large volumes of warmed IV crystalloid are often needed due to fluid shifts and dehydration causing hypotension during resuscitation efforts. It is also important to note that ventricular arrhythmias and asystole may be unresponsive to treatment until the patient is appropriately rewarmed.

Treatment for those who are not in cardiac arrest is typically based around core body temperature and displayed in the table on the next page.

For a list of educational lectures, grand rounds, workshops, and didactics please visit [BrowardER.com](http://BrowardER.com) and click on the **"Conference"** link.

*All are welcome to attend!*

## Treatment of Hypothermia based on severity

Severity	Type of Intervention	Description of Intervention
<b>Mild</b> (90-95F 32-35C)	Passive External Rewarming	Removal of wet clothing, blankets, insulation.  May not work for elderly, sepsis, hypovolemic.
<b>Moderate</b> (82-90F 28-32C)	Active External Rewarming  (Consider Active Internal Rewarming during code due to possibility of hypotension)	Warmed blankets, heating pads, warmed baths, warmed air, radiant heat  Trunk must be warmed before extremities!
<b>Severe</b> (< 82F <28C)	Active Internal Rewarming  (May also include extracorporeal blood rewarming, endovascular warming, or pleural/peritoneal irrigation)	IV crystalloid warmed to 40-42 degree C.  Extracorporeal (cardiac arrest or those failing to rewarm) is through venovenous, hemodialysis, arteriovenous, or cardiac bypass means.

It is important to note that a low-temperature thermometer needs to be used for these patients. The lower 1/3 of the esophagus is the most accurate temperature reading site in the intubated patient with rectal temperature used in the conscious patient.

The prognosis of accidental hypothermia is largely dependent on hemodynamic stability at time of presentation, with those who are stable generally having full neurologic recovery.

## Take Home Points

- Hypothermia is generally divided into mild, moderate or severe depending on core body temperature and each of these have different associated symptoms and treatments (passive external rewarming, active external rewarming, active internal rewarming).
- It is important to consider other differential diagnoses (listed on page 1) when dealing with a hypothermic patient.
- In cardiac arrest, it is important to get the core body temperature to 90-95 degree F for standard treatment to be effective. The esophagus is the best place to measure core body temperature during a code.
- Watch for hypotension while rewarming the patient, and do not use room temperature fluids.



## ABOUT THE AUTHOR

This month's case was written by Kelly Corbitt. Kelly is a 4<sup>th</sup> year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in January 2017. Kelly plans to pursue a residency in Internal Medicine after graduation.

## REFERENCES

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