CPP TCCC

COMBAT PARAMEDIC/ PROVIDER

TACTICAL COMBAT CASUALTY CARE COURSE

MODULE 12: HYPOTHERMIA PREVENTION AND TREATMENT

Committee on Tactical Combat Casualty Care (CoTCCC)

TCCC TIER 1
All Service Members

TCCC TIER 2
Combat Lifesaver

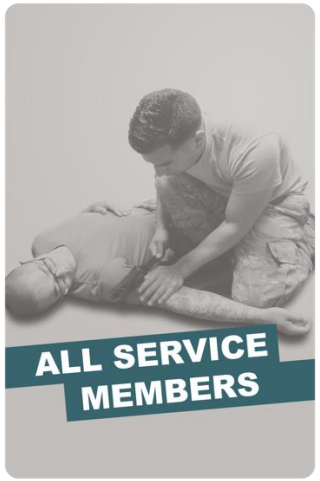
TCCC TIER 3
Combat Medic/Corpsman

TCCC TIER 4
Combat Paramedic/Provider

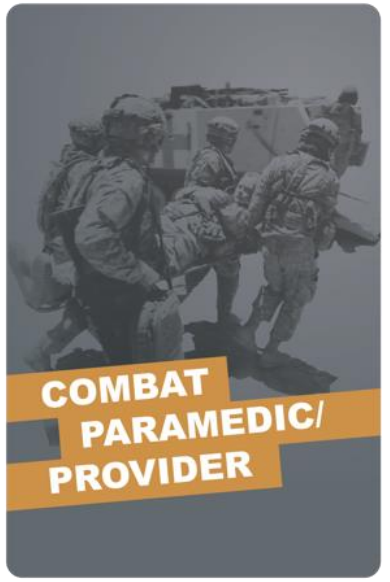
TACTICAL COMBAT CASUALTY CARE (TCCC) ROLE-BASED TRAINING SPECTRUM

ROLE 1 CARE

NONMEDICAL PERSONNEL



MEDICAL PERSONNEL



YOU ARE HERE

STANDARDIZED JOINT CURRICULUM

1 x TERMINAL LEARNING OBJECTIVES

14 Given a combat or noncombat scenario, perform hypothermia prevention measures on a trauma casualty during Tactical Field Care and Tactical Evacuation Care in accordance with CoTCCC Guidelines.

- **14.1** Identify the progressive strategies, indications, and limitations of active hypothermia prevention of a trauma casualty in Tactical Field Care.
- **14.2** Identify passive hypothermia prevention measures on a trauma casualty in Tactical Field Care.
- **14.3** Demonstrate passive and active external warming hypothermia prevention and treatment measures on a trauma casualty.
- **14.4** Identify any evidence-based medicine, best practices, casualty data, and Subject Matter Expert consensus on the prevention and management of hypothermia in Tactical Field Care..

04 x ENABLING LEARNING OBJECTIVES

\# = **Terminal Learning Objectives** ● = Cognitive ELOs ▨ = Performance ELOs

MARCH PAWS

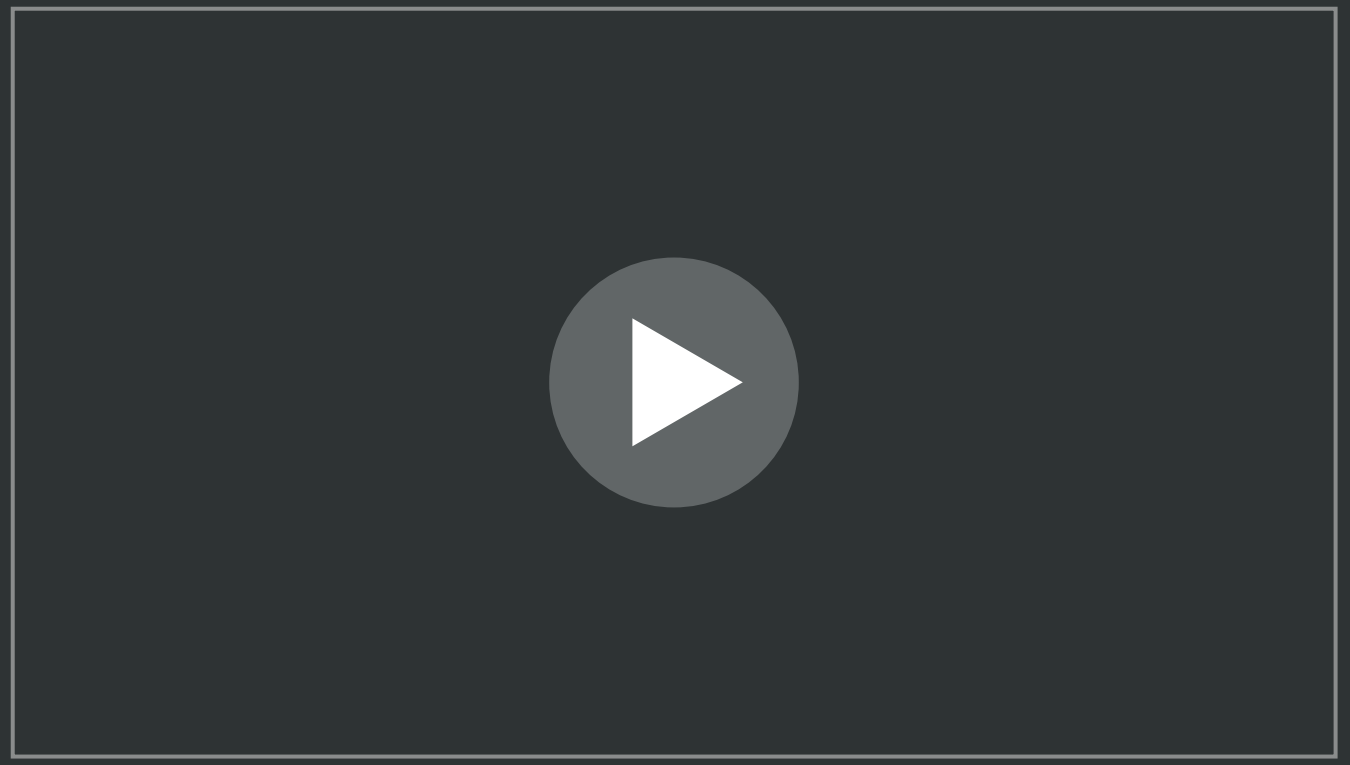
LIFE-THREATENING

- **M** MASSIVE BLEEDING
  - #1 Priority
- **A** AIRWAY
- **R** RESPIRATION *(Breathing)*
- **C** CIRCULATION
- **H** HYPOTHERMIA / HEAD INJURIES

AFTER LIFE-THREATENING

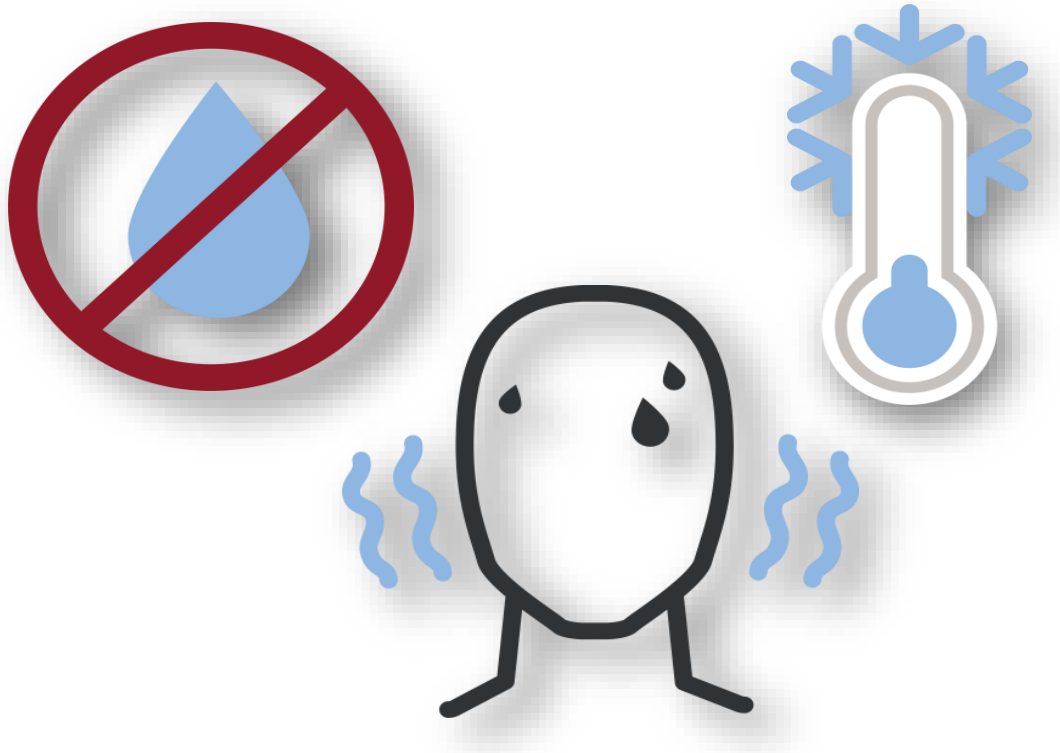
- **P** PAIN
- **A** ANTIBIOTICS
- **W** WOUNDS
- **S** SPLINTING

HYPOTHERMIA PREVENTION VIDEO



Video can be found on deployedmedicine.com

HYPOTHERMIA



- Hypothermia is a **decrease** in core body temperature
- This can result from **exposure to cold air** or **water** in the environment
- In trauma, hypothermia can result from impaired body thermoregulation due to **bleeding and shock**
- Even a **small decrease** in core body temperature (below 36 degrees C or 96.8 degrees F) can **increase mortality** in trauma casualties
- The vicious cycle of **acidosis, hypothermia** and **coagulation (lethal triad)**, requires prevention management strategies at each level

IMPORTANT CONSIDERATIONS:
Hypothermia is a potential concern in trauma even when operating in warm environments

MARCH

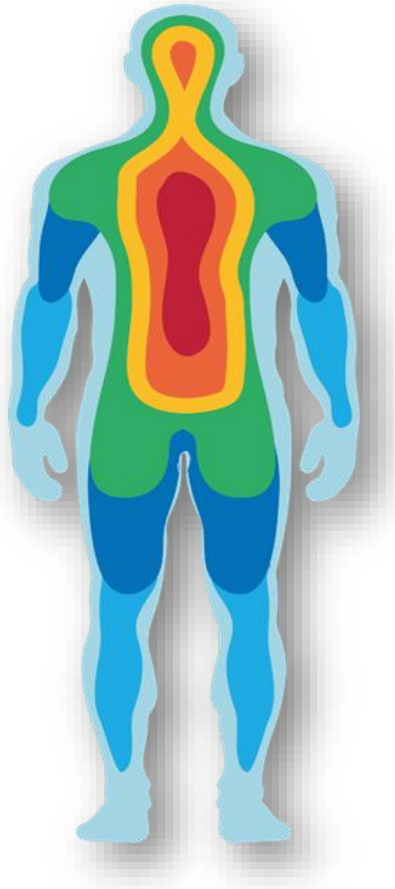
HYPOTHERMIA SIGNS AND SYMPTOMS

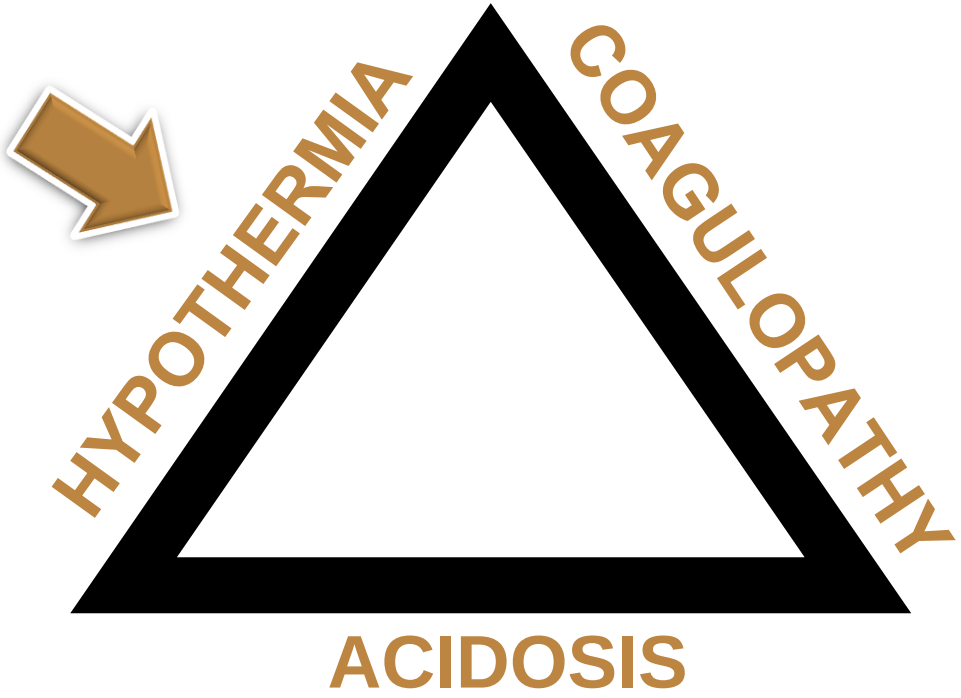
- Maintain a high index of suspicion when operating in cold, wet, windy environment
- **Shivering**, **Confusion**, **Disorientation**, and **Slurred Speech** in mild hypothermia
- **Diuresis** which can result in **Dehydration** in mild to moderate hypothermia
- **Breathing Slows** with **Decreased Respiratory Drive** in moderate to severe hypothermia

The body loses the ability to shiver when the core body temperature reaches around 32°C or 90°F

MARCH

TRAUMA'S LETHAL TRIAD





KEY FACTORS

- **Environmental** factors
- **Physiologic response** to **BLOOD LOSS**
- **Clotting factor dysfunction** from hypothermia
- Casualties with **BURNS** are also at increased risk of **HYPOTHERMIA**

Active Warming prevents spontaneous trauma induced hypothermia, this method is easy to implement and contributes significantly to interrupting the **LETHAL TRIAD**.

Level of Evidence: C-LD

MARCH

HYPOTHERMIA PROGRESSIVE STRATEGIES AND PREVENTION

HYPOTHERMIA PREVENTION METHODS
▪ Take early/aggressive steps to prevent further body heat loss
▪ Minimize the casualty's exposure to the elements
▪ Replace wet clothing with dry, if possible
▪ Add external heat, when possible, for both trauma and severely burned casualties
▪ Use dry blankets, poncho liners, sleeping bags, or anything that will retain heat, if an HRS is not available
▪ Use warmed IV resuscitation fluids, as indicated

⚠ It is much easier to **PREVENT** hypothermia than to treat it

Level of Evidence: C-LD

MARCH

HYPOTHERMIA INDICATIONS

- Moderate to severe trauma
- Central nervous system trauma
- Burn patients >33% TBSA with second-degree or third-degree burns
- Altered level of consciousness/unresponsive
- Inability to shiver
- Hypothermic patients with core temperature <28°C (82.4°F)

⚠ **ALL** trauma casualties in shock or at risk of shock are at risk for trauma-induced hypothermia even when operating in warm environment

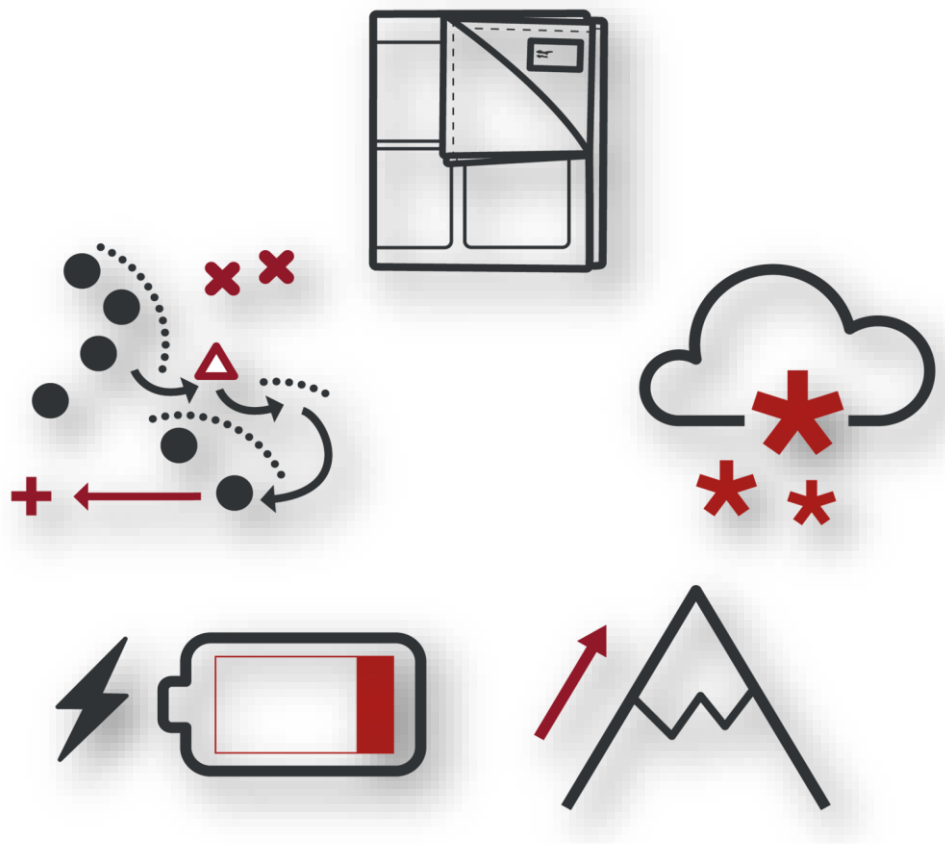
MARCH

PASSIVE HYPOTHERMIA MANAGEMENT

Key Factors of Passive Hypothermia Management	
• Passive hypothermia management **does not** reverse the hypothermic process	• Blood loss can cause a significant drop in body temperature, even in hot weather
• If an active warming device is not available, wrap passive warming materials under and around the casualty	• Wrap the entire blanket-like shell (or passive heating materials) completely around the casualty, including the head
• Enclose casualty in vapor barrier to retain heat and keep dry/insulated	• **Do not** cover the face
• Upgrade as additional materials become available	• Keep the casualty off the ground

Level of Evidence: C-LD

ACTIVE HYPOTHERMIA LIMITATIONS



Possible active hypothermia limitations may include:

- Service specific mission and load out
- Limitation of active rewarming devices
- Cold Weather
- Altitude (if oxygen/chemical driven)
- Battery powered IV fluid warming device(s)

Level of Evidence: C-LD

ACTIVE HYPOTHERMIA MANAGEMENT

CAUTION: **Do not** apply active warming blanket directly to bare skin to prevent burns

Level of Evidence: C-LD

- Advantages of the HPMK are that it is lightweight, 1.6 kg (3 lb. 8 oz)
- Can be used with or without the Ready-Heat thermal blanket
- Provides 10 hours of continuous dry heat by an oxygen-activated to 40°C [104°F] by 15 to 20 minutes
- Self heating liner has no external power supply requirement
- The rate of trauma induced hypothermia decreased in theater after implementing hypothermia management strategies

MARCH

ACTIVE HYPOTHERMIA MANAGEMENT cont.

What are the **relevant safety concerns** for portable, battery-operate, IV warming devices?

- The risk of **aluminum toxicity** with fluid- and blood warming devices with uncoated heating plates
- The risk of **hemolysis** when heating blood

Level of Evidence: C-LD

What are the required characteristics of a portable IV warming device for infusion of fluids and blood products?		
Portable	Small Dimensions	Flight approved (Airworthy)
Light weight/ rugged for field use	Rapid Start-up (<30 sec)	Water Resistant
Low noise and Low light signature	Long battery life with easy replacement	Battery duration for 4 units of whole blood at ≥100 to 150mL/min
Rapid battery recharge duration (<100 min)	Recharger unit for two to three batteries	Optional intravenous tubing lengths
Functions in hypo/hyperbaric environments	Operating conditions for battlefield temperature (-10°C to 45°C) and humidity (5%-95% relative humidity)	Reusable warming device

MARCH

EVIDENCE SUPPORTING TCCC HYPOTHERMIA PREVENTION AND TREATMENT STRATEGIES

Subject Category	Study Types	Level of Evidence
Passive Hypothermia Management	Lab evaluation observational study with limitations	**C-LD**
Active Hypothermia Management	Meta-analysis of observational studies, lab evaluations and case studies	**C-EO**
Use of Warmed Resuscitation Fluids as an Adjunct	Lab evaluation observational study with limitations	**C-LD**

ASSESSING THE EVIDENCE FOR GUIDELINES

Level of Evidence	AHA Recommendation System Terminology Explanation	Why the AHA Classification System?
A	Evidence from multiple randomized clinical trials (RCT) with concordant results or from **HIGH-QUALITY** meta-analyses.	• The level of evidence recommendations allow readers to quickly glean information on the strength, certainty, and quality of evidence supporting each recommendation. • A recommendation with Level of Evidence (LOE) C does not imply that the recommendation is weak. • Although, RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.
B-R	Evidence from moderate-quality trials, or a meta-analysis of moderate quality (RCT) followed by an R to denote **RANDOMIZED** studies	
B-NR	Evidence from moderate-quality trials, or a meta-analysis of moderate quality followed by NR to denote **NON-RANDOMIZED** studies	
C-LD	There is no convincing evidence and is followed by LD to indicate **LIMITED DATA**	
C-EO	There is no convincing evidence and is followed by EO if the consensus is based on **EXPERT OPINION**, case studies or standards of care.	

SKILL STATION

HYPOTHERMIA (SKILL)

- Hypothermia prevention and treatment

SUMMARY

Knowledge Topics

- Hypothermia is decreased core body temperature secondary to external environmental factors and/or hemorrhage and shock
- Hypothermia in trauma casualties is an independent predictor of mortality
- Active hypothermia management/prevention is preferred, when available,
and involves external heating of the casualty
- Hypothermia is easier to **PREVENT** than it is to treat
- Hypothermia prevention and treatment strategies are evidence-based

Skills and Abilities

- Passive Hypothermia prevention
- Active Hypothermia treatment and management

CHECK ON LEARNING

Why is it important to prevent/manage hypothermia in a trauma casualty?

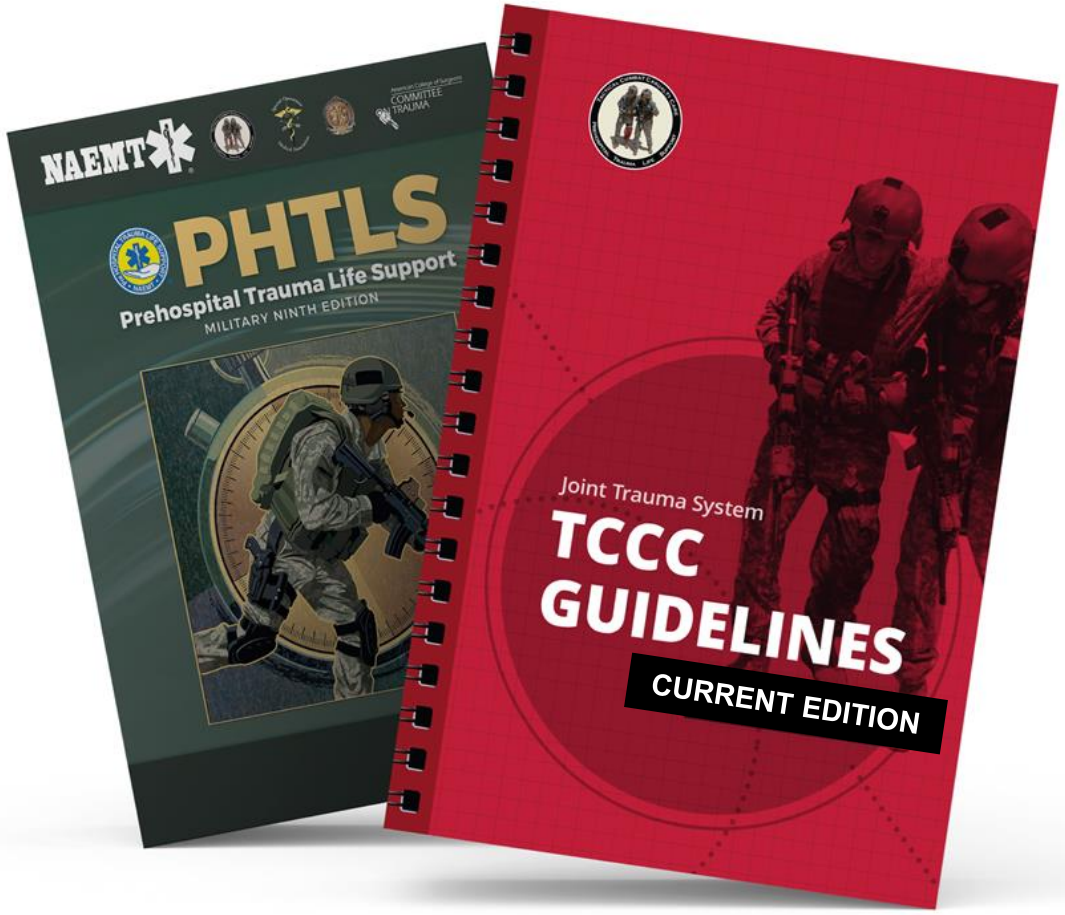
True or False? Hypothermia is not an issue in hot operational environments?

What is the difference between active and passive hypothermia management?

What are the two relevant safety concerns with portable, battery-operated, IV warming devices?

ANY QUESTIONS?

REFERENCES



TCCC: Guidelines

by JTS/CoTCCC

These guidelines, updated regularly, are the result of decisions made by CoTCCC in exploring evidence-based research on best practices.

PHTLS: Military Edition, Chapter 25

by NAEMT

Prehospital Trauma Life Support (PHTLS), Military Edition, teaches and reinforces the principles of rapidly assessing a trauma patient using an orderly approach.