CPP TCCC

COMBAT PARAMEDIC/ PROVIDER

TACTICAL COMBAT CASUALTY CARE COURSE

MODULE 18: BURNS

Committee on Tactical Combat Casualty Care (CoTCCC)

TCCC TIER 1
All Service Members

TCCC TIER 2
Combat Lifesaver

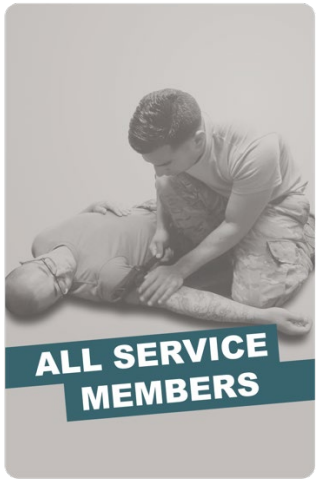
TCCC TIER 3
Combat Medic/Corpsman

TCCC TIER 4
Combat Paramedic/Provider

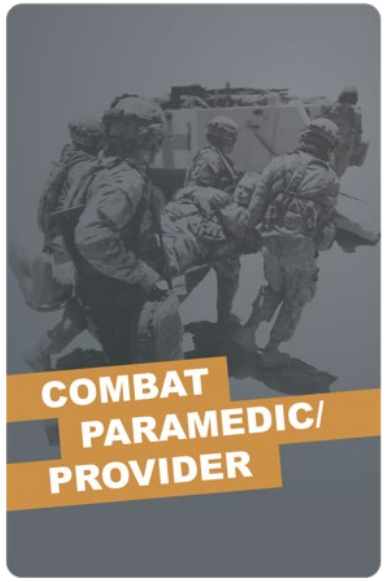
TACTICAL COMBAT CASUALTY CARE (TCCC) ROLE-BASED TRAINING SPECTRUM

ROLE 1 CARE

NONMEDICAL PERSONNEL



MEDICAL PERSONNEL



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STANDARDIZED JOINT CURRICULUM

CPP TCCC

Module 18: Burns

1 x TERMINAL LEARNING OBJECTIVES

20 Given a combat or noncombat scenario, perform assessment and initial treatment of burns during Tactical Field Care in accordance with CoTCCC Guidelines.

- **20.1** Identify the specific scene safety issues and actions required of a trauma casualty with burns before evaluation and care of the casualty.
- **20.2** Identify types and severity of burns in accordance with the conventional burn classification.
- **20.3** Identify how to estimate the body surface area burned using the Rule of Nines.
- **20.4** Identify airway considerations and management techniques for burn casualties in Tactical Field Care.
- **20.5** Demonstrate the application of a dry dressing to a burn casualty in accordance with CoTCCC Guidelines.
- **20.6** Describe hypothermia prevention techniques in a severely burned casualty IAW CoTCCC Guidelines.
- **20.7** Demonstrate techniques used to prevent heat loss in a severe burn casualty in accordance with CoTCCC Guidelines.
- **20.8** Describe burn fluid resuscitation in Tactical Field Care.
- **20.9** Demonstrate burn fluid resuscitation calculations for a severely burned casualty in Tactical Field Care
- **20.10** Identify the indications, contraindications, and administration methods of lactated Ringer's in Tactical Field Care.
- **20.11** Identify any evidence-based medicine, best practices, casualty data, and Subject Matter Expert consensus on burn management techniques in Tactical Field Care.

11 x ENABLING LEARNING OBJECTIVES

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

Three PHASES of TCCC

1 CARE UNDER FIRE (CUF) / THREAT

RETURN FIRE AND TAKE COVER

2 TACTICAL FIELD CARE (TFC)

WORK UNDER COVER AND CONCEALMENT

YOU ARE HERE

3 TACTICAL EVACUATION CARE (TACEVAC)

MORE DELIBERATE ASSESSMENT AND PRE-EVACUATION PROCEDURES

NOTE: This is covered in more advanced TCCC training!

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

POTENTIAL BURN CAUSES IN TFC

FIREFIGHTS

EXPLOSION
IED / VBIED

VEHICLE/ AIRCRAFT CRASHES

ELECTRICAL

THERMAL

CHEMICAL

P A W S

POTENTIAL BURN CAUSES IN TFC

From 2001 – 2018: **2507** surviving service members sustained **5551** burn injuries while deployed

EXPLOSIONS (IED/VBIED)

- Blast accounted for 82% of burn casualties; 80% were by IEDs

VEHICLE / AIRCRAFT CRASHES

- 65% burned while driving/riding in a vehicle; 23% dismounted

INHALATION INJURY

- Inhalation injury in 10%

NOTE: 30% of all burn casualties sustained Traumatic Brain Injuries

PAWS

BURN WOUNDS

The U.S. Army Institute of Surgical Research (USAISR) leads burn care efforts for the U.S. military

BURN WOUNDS are an injury to skin or other tissues caused by heat, electricity, or chemicals and are present in **5%** to **15%** of combat casualties

Burn patients have unique management challenges and consideration.

The combination of **burn** and **non-burn injuries** results in a synergistic increase in mortality

Significant advancements in the care of burn casualties have been made in recent conflicts

PAWS

FOLLOW MARCH PAWS

- Follow the MARCH PAWS sequence to address ALL life-threatening injuries.
- All trauma treatments can be performed on or through burned skin
- Burn wounds may be distracting, despite the increase of synergistic mortality immediate death is unlikely
- Depending on the source of the burn special consideration must be taken when providing care

REMEMBER: A burned trauma casualty is a trauma casualty first!

P A W S

IN CASE OF ELECTRICAL AND THERMAL INJURY

- **Secure** the power, if possible
- Otherwise, **remove** the casualty from the electrical source using a nonconductive object, such as a wooden stick
- **Move** the casualty to a safe place

- **STOP** the sources of the burning
- **Assess** and **manage** the burn, cut the clothing from around the burned area and gently lift it away
- Be sure to avoid grabbing or further damaging burned areas

NOTE: If clothing is stuck to the burn, ensure you cut around the clothing and leave it in place

P A W S

IN CASE OF CHEMICAL INJURY

Advise all first responders of the presence of a chemical burn

EXAMPLE

An example of a chemical is **WHITE PHOSPHORUS**

SOURCE

Commonly found incendiary in munitions; it is also found in fertilizers, pesticides, and fireworks

SIGNS & TREATMENTS

Ignites spontaneously in contact with air; produces yellow flame and white smoke in the wound bed

Submerse the burned area in water

Apply wet barrier (water-soaked gauze, clothing, mud, etc.) with an occlusive dressing

Patients with chemical burns should be deconned IAW Unit SOP

Level of Evidence: B-NR

P A W S

SEVERITY OF BURN

BURNS ARE CLASSIFIED BY THE DEPTH OF THE WOUND

SUPERFICIAL

1ST DEGREE BURNS

These burns are painful and erythematous without blistering or open wounds. An example of a superficial burn is sunburn.

PARTIAL THICKNESS

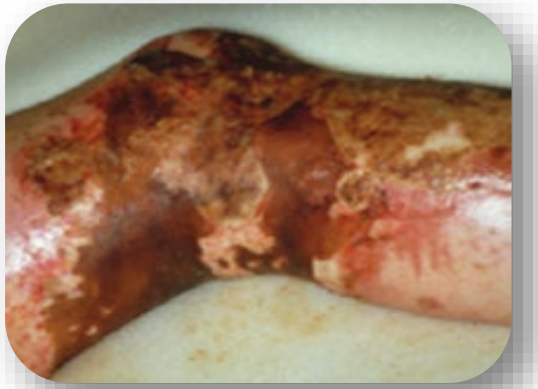
2ND DEGREE BURNS

Bright red to mottled in appearance and wet to the touch. Blisters are commonly seen in superficial partial-thickness burns.

FULL THICKNESS

3RD DEGREE BURNS

May appear charred or whitish in color, dry, leathery, and insensate. Thrombosed blood vessels may be visible.



SUBDERMAL BURN

4th DEGREE BURNS

Subdermal burns extend through subcutaneous tissue into fascia, muscle, and even bone.

P A W S

RULE OF NINES

11 areas that **each** have **9% body surface area** (**head**, **upper extremities**, **front** and **back** of **lower extremities,** and **front** and **back** of the **torso** having **TWO** **9% areas**)

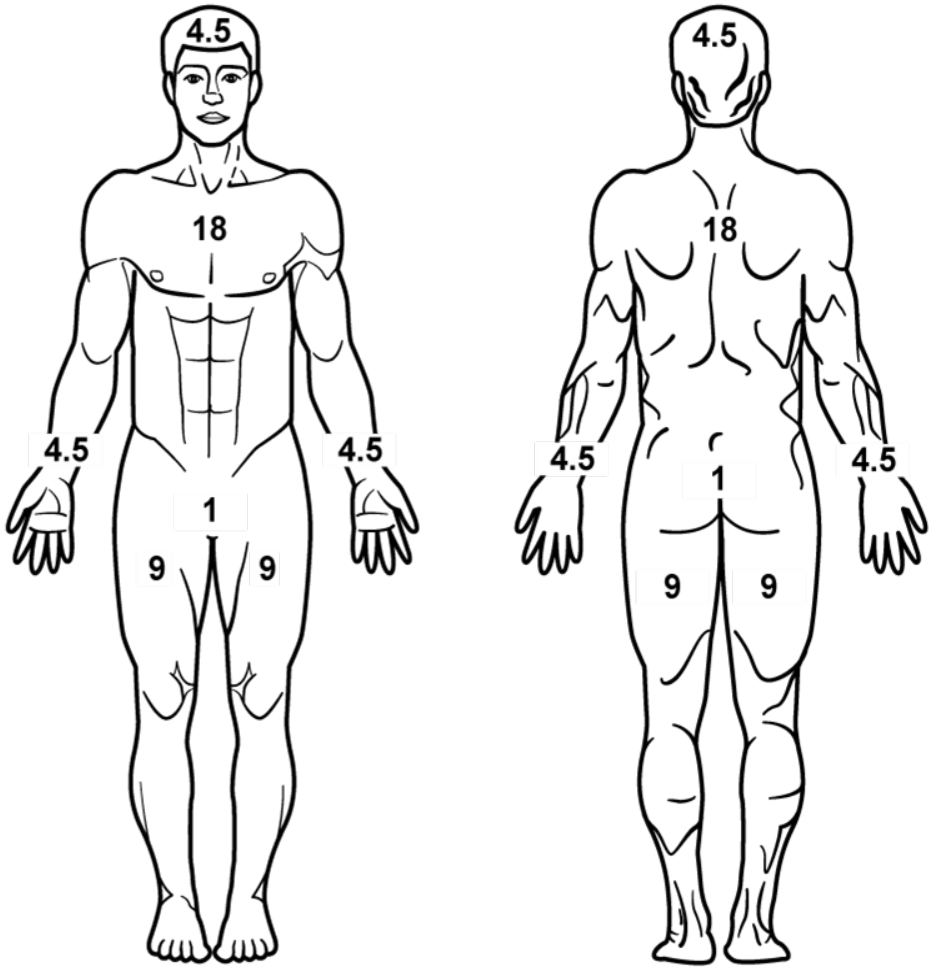
- **Palm size** represents ~1%
- **Estimate/round up to nearest 10%**

If half of the front or rear area **is burned**, the area would be **half** of the **area value**

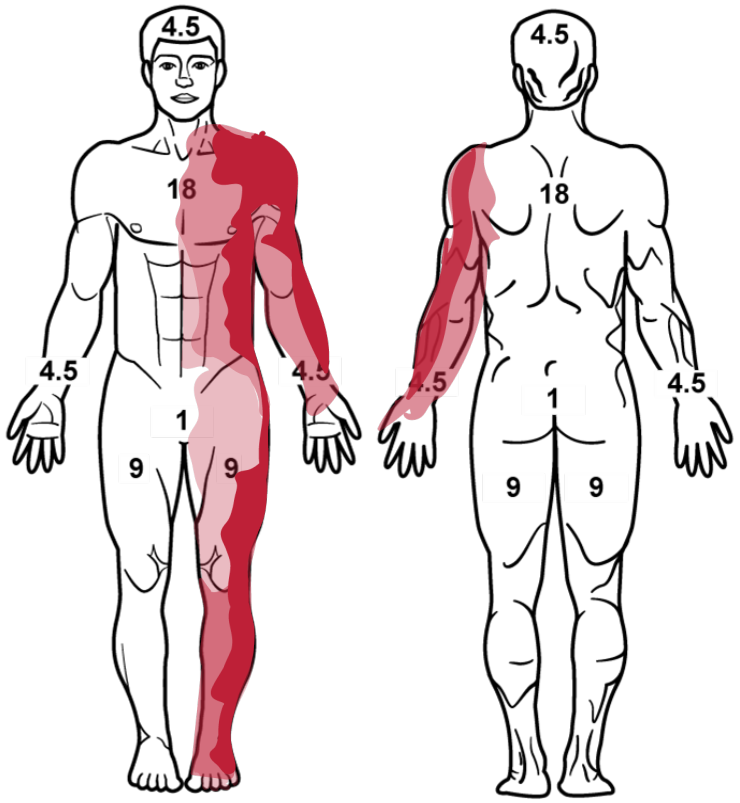
Estimation Example:

- **Half** of the front upper/lower extremity is **4.5%**
- **Half** of the front upper/lower torso is **9%**

DO NOT include first-degree wounds in this assessment



CALCULATING RULE OF NINES



RULE OF NINES:

- **9%** Left half of anterior torso
- **9%** Front and back of left upper extremity
- **9%** Anterior portion of left lower extremity

Total Body Surface Area (TBSA) Burned = 27%

NOTE: For estimation of fluid resuscitation requirements this would be rounded up to 30%

BURNED AREAS STATS
From 2001 through 2018, 2507 surviving SVMs
TBSA: ▪ 92% of burns were small ▪ < 20% TBSA
HEAD: ▪ Most frequent burn site ▪ 29% of all burns
HANDS: ▪ 2ND most frequent burn site ▪ 19% of all burns

P A W S

AIRWAY MANAGEMENT IN BURN CARE

Findings suggestive of **Inhalation Injury** include:

- Facial burns
- Carbonaceous sputum
- Stridor
- Hoarseness
- Cough

STOP the burning process immediately!

If the casualty was in an enclosed space such as a vehicle, a building, or a burning compartment in a ship at sea, suspect inhalation injury

27% of combat burn casualties had an associated inhalation injury

Level of Evidence: C-LD

P A W S

AIRWAY MANAGEMENT IN BURN CARE (cont.)

AIRWAY CONSIDERATIONS
▪ Facial burns, especially in closed spaces, may be associated with inhalation injury
▪ Aggressively monitor airway status and oxygen saturation
▪ NPAs and EGAs may not suffice for respiratory distress or oxygen desaturation, an advanced airway may be required
▪ Ensure the ETT in casualties with facial burns is critical to prevent catastrophic airway loss
▪ Burn casualties may also require intubation due to decreased mental status

RESPIRATION CONSIDERATIONS
▪ Follow airway evaluation with assessment of bilateral breath sounds and pulse oximetry
▪ The presence of an inhalation injury may cause delayed respiratory failure that can occur 15 to 60 minutes after the injury
▪ Burning compounds can release a variety of chemicals such as carbon monoxide and cyanide, all burn casualties should receive 100% oxygen
▪ Full-thickness burns across the chest can impair breathing by inhibition of chest wall motion

Level of Evidence: C-LD

P A W S

BURN CARE

REMOVE watches and jewelry from burned area

NOTE: Loosely wrap dressings to avoid constricting burned skin to allow for swelling

COVER the burn area with dry, sterile dressings

IMPROVISED DRESSINGS include clean dry clothing or sheets

HYPOTHERMIA PREVENTION

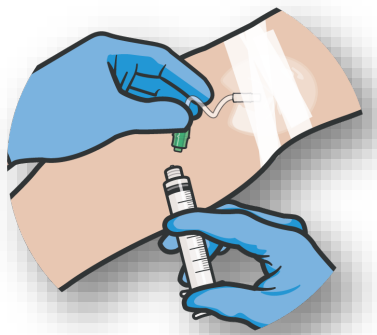
For extensive burns (>20%), place the casualty in a Heat-Reflective Shell or Blizzard Survival Blanket

NOTE: For large surface area burns, the HPMK can act as a dressing in addition to hypothermia management

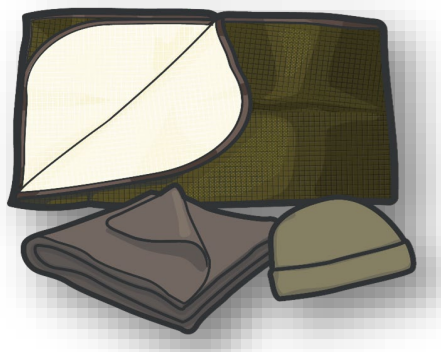
P A W S

BURN CARE AND HYPOTHERMIA PREVENTION

For **EXTENSIVE BURNS (>20%)**, consider using **ACTIVE** warming supplies to cover the burned areas and prevent hypothermia



PASSIVE
Warming Supplies

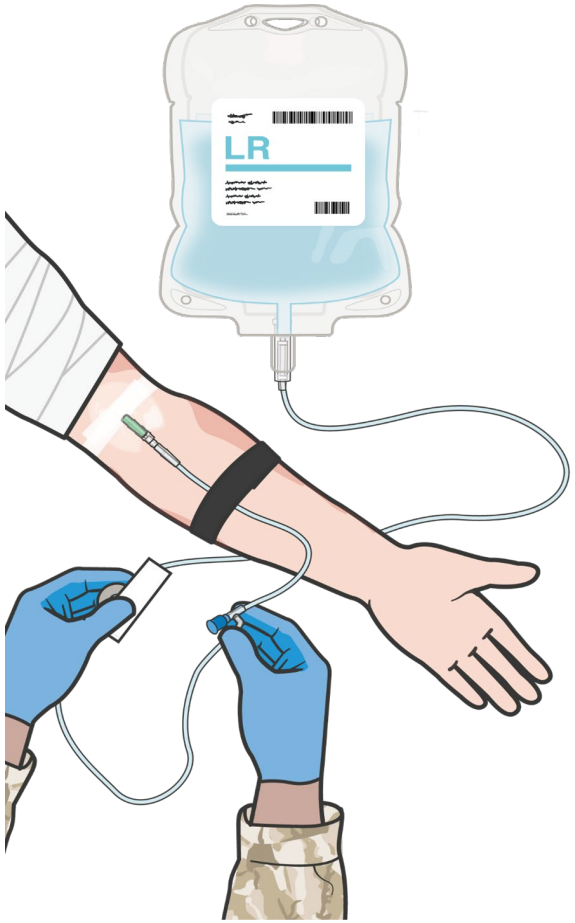


⚠ **ANALGESIA** may be administered to treat burn pain
ANTIBIOTIC therapy **NOT** indicated solely for burns

- Burn patients are particularly susceptible to hypothermia
- Extra emphasis should be placed on barrier heat loss prevention methods

P A W S

BURN FLUID RESUSCITATION



- Fluid resuscitation for burn casualties is guided by the **USAISR Rule of Ten**
- For burns > 20% TBSA, initiate fluid resuscitation as soon as IV/IO access established
- For burns ≤ 30% TBSA, consider administration of oral fluids, if casualty is conscious and able to swallow
- Use Lactated Ringer's and normal saline
  - *(If Hextend® is used, no more than 1000 ml should be given, followed by lactated Ringer's or normal saline as needed)*
- Initial IV/IO fluid rate is %TBSA x 10 ml/hr for adults 40-80 kg
- **NOTE:** For every **10 kg ABOVE 80 kg**, increase initial rate by **100 ml/hr**
- **REMEMBER:** If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock

Level of Evidence: C-LD

P A W S

ADMINISTRATION OF LACTATED RINGERS IN TACTICAL FIELD CARE

Lactated Ringers is indicated in:

- Burns greater than 20% TBSA
- Provides electrolytes, calories, and source of water for hydration

ROUTES OF ADMINISTRATION:

- Intravenous (IV)/Intraosseous (IO)

SUPPLY:

- 250ml, 500ml, and 1000ml bags

SOLUTION CLASS:

- Isotonic Crystalloid Solution

CONTRAINDICATIONS:

- Heart failure, renal failure, or suspected hyperkalemia, severe metabolic acidosis or alkalosis, severe liver disease or anoxic states
- **DO NOT** administer Lactated Ringer's Injection, simultaneously with citrate anticoagulated/preserved blood through the same administration set

POTENTIAL SIDE EFFECTS:

- Allergic reactions, fever, infection at injection site, or redness/red streaking and swelling from the site of injection

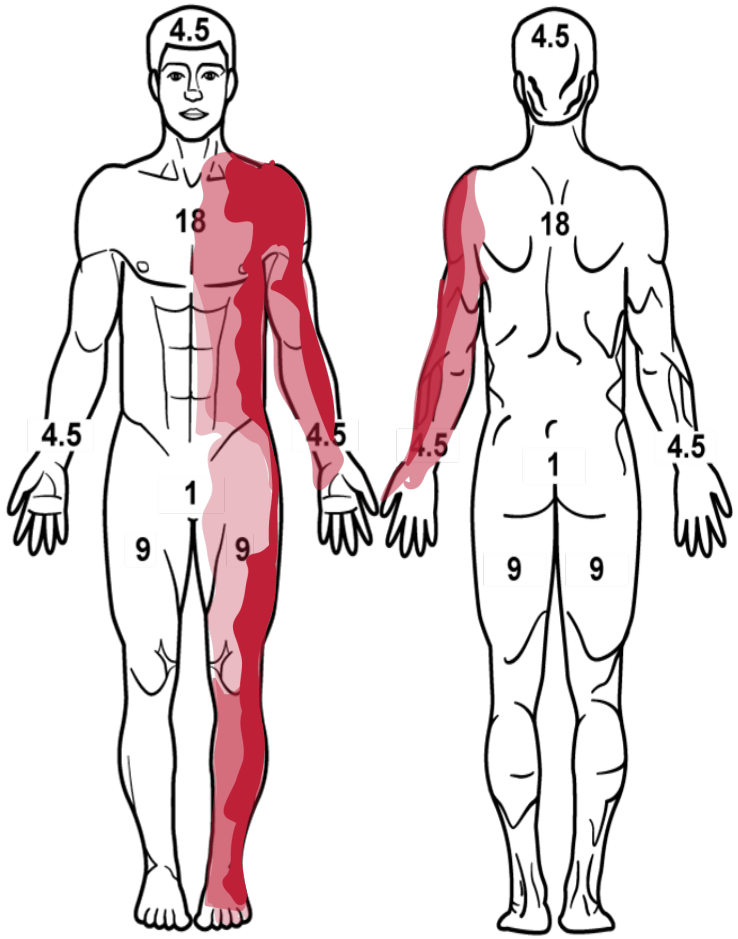
DRUG INTERACTIONS:

- Ceftriaxone, Corticosteroids or Corticotropin

TACTICAL CONSIDERATIONS:

- Monitor closely for signs of circulatory overload
- Use caution in casualties with hypervolemia, renal insufficiency, urinary tract obstruction, or impending or frank cardiac decompensation

BURN FLUID CALCULATION PRACTICE



NOTE: For estimation of fluid resuscitation requirements round TBSA to the **nearest 10**

BURNED AREAS:

9% Left half of anterior torso

9% Front and back of left upper extremity

9% Anterior portion of left lower extremity

27% = Total Body Surface Area (TBSA) Burned

Using the **USAISR Rule of Ten** *(%TBSA x 10 ml/hr for adults 40-80 kg)* calculate the burn resuscitation fluid rate required:

Example #1: 36-year-old SVM with 27% TBSA (2nd and 3rd degree) burned who weighs 74kg:

30 (%TBSA) x 10 (ml/hr) = 300ml/hr

Example #2: 22-year-old SVM 54% TBSA (2nd and 3rd degree) burned who weighs 95kgs:

50 (%TBSA) x 10 (ml/hr) + 100 (*10kg) = 600ml/hr

NOTE: *For every 10 kg **ABOVE** 80kg, increase initial rate by 100 ml/hr

P A W S

SKILL STATION

Burn Treatment (Skill)

- Burn Dressing and Hypothermia Prevention
- Burn Fluid Resuscitation Administration

EVIDENCE SUPPORTING BURN TREATMENT STRATEGIES

Subject Category	Study Types	Level of Evidence
Strategies & Techniques for Burn Resuscitation	Meta-analysis of retrospective observational studies; lab evaluations with limitations	**C-LD**
Treatment of Chemical Burns	Retrospective observational study	**B-NR**
Airway Management	Retrospective observational registry study & Retrospective 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.	

SUMMARY

Knowledge Topics

- Treatment priorities in trauma and burn casualties
- Airway considerations in burn casualties Potential causes of burns
- Types of burns (Electrical, Thermal, and Chemical)
- Severity of burn injuries according to depth
- Estimating burn size with the Rule of Nines
- Evidence supporting the burn management

Skills and Abilities

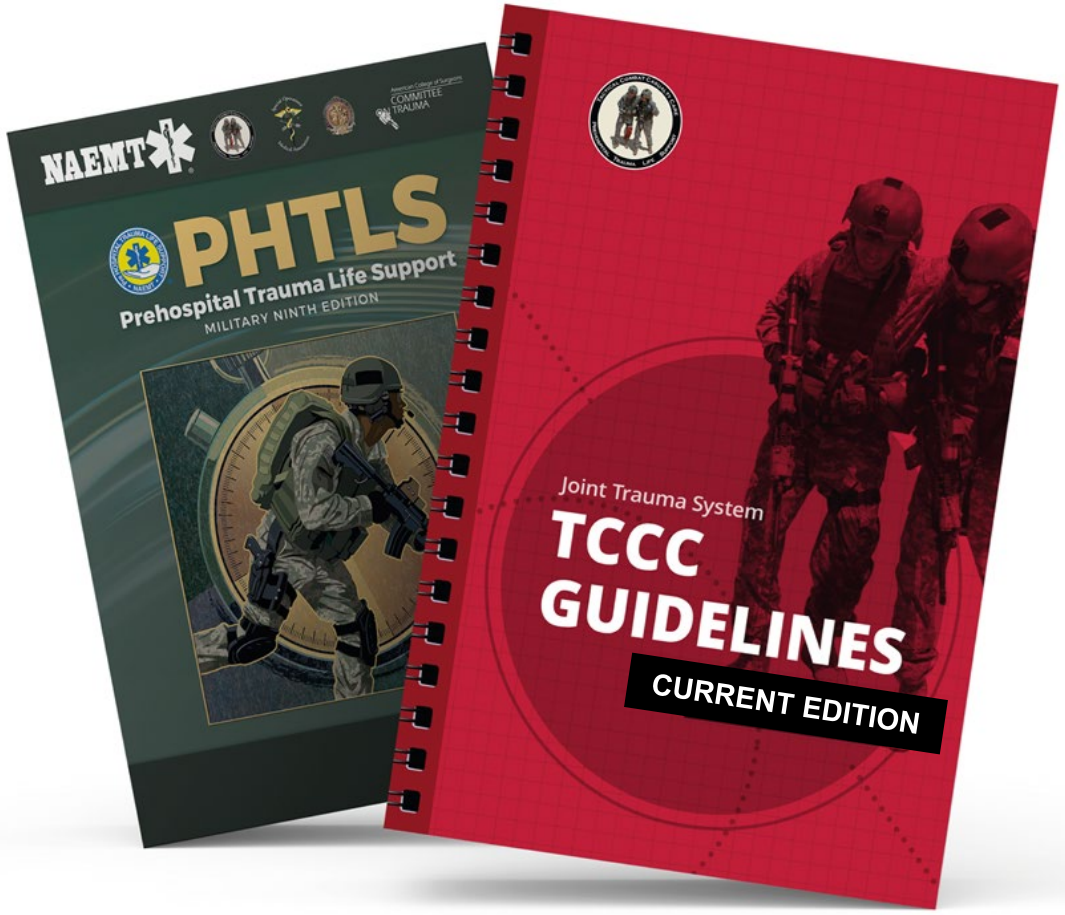
- Application of dry sterile dressings
- Hypothermia prevention and management for burn casualties
- Burn fluid resuscitation calculation and administration

CHECK ON LEARNING

- What are approved improvised burn dressing materials?
- What should you do first when you encounter a casualty with a thermal burn?
- What size burn requires IV/IO fluid resuscitation?
- What would be the fluid infusion rate for a 90 kg person with a 40% burn according to the USAISR Rule of Ten?
- What is the maximum amount that should be given if Hextend® is used for fluid resuscitation?

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.