Taking Care of Our Own (TCO)

LOS ANGELES
FIRE DEPARTMENT
12
Firefighters Hurt
Fire
LIGHT NOW
FIREFIGHTER INJURED IN
DUTY ON DETROIT'S WES
TONIGHT
BREAKING NEWS
5700 Blk. N. Newark
CHICAGO

Overview

- Complexities of an injured provider in full personal protective equipment (PPE)
- Today's PPE advancements and impacts on patient care
- Chain of custody of PPE of an injured provider
- Best practices for dealing with provider in full PPE
- How to establish interactive training drills

Complexities

- Removing PPE without jeopardizing immobilization
- Comparison to other specialized gear
  - Motorcycle riders
  - Football players
    - Football gear does not fully envelop the player
    - Football gear weighs less than 30 pounds
    - Full firefighting PPE encapsulates and can weigh up to 75 pounds
  - Just as in the management of a football player or any helmeted and/or protected patient, a system is needed

Complexities

- Need a rapid, systematic approach to remove PPE to ensure any existing injuries are not aggravated and new ones are not created
- Firefighters must be removed from their environment
  - Often is a toxic, super heated environment
- Wear your proper level of PPE when working in the hot zone
- Initial priorities
  - Cool/extinguish burning PPE
  - PPE and clothing may be melted to skin – Cut PPE versus pulling it off to prevent further injury

PPE Advancements

- Improved protection
- Injury patterns
  - Scotchlite ™
  - Energy and heat absorption
  - Inner garments
- SCBA
  - Component materials

Temperature

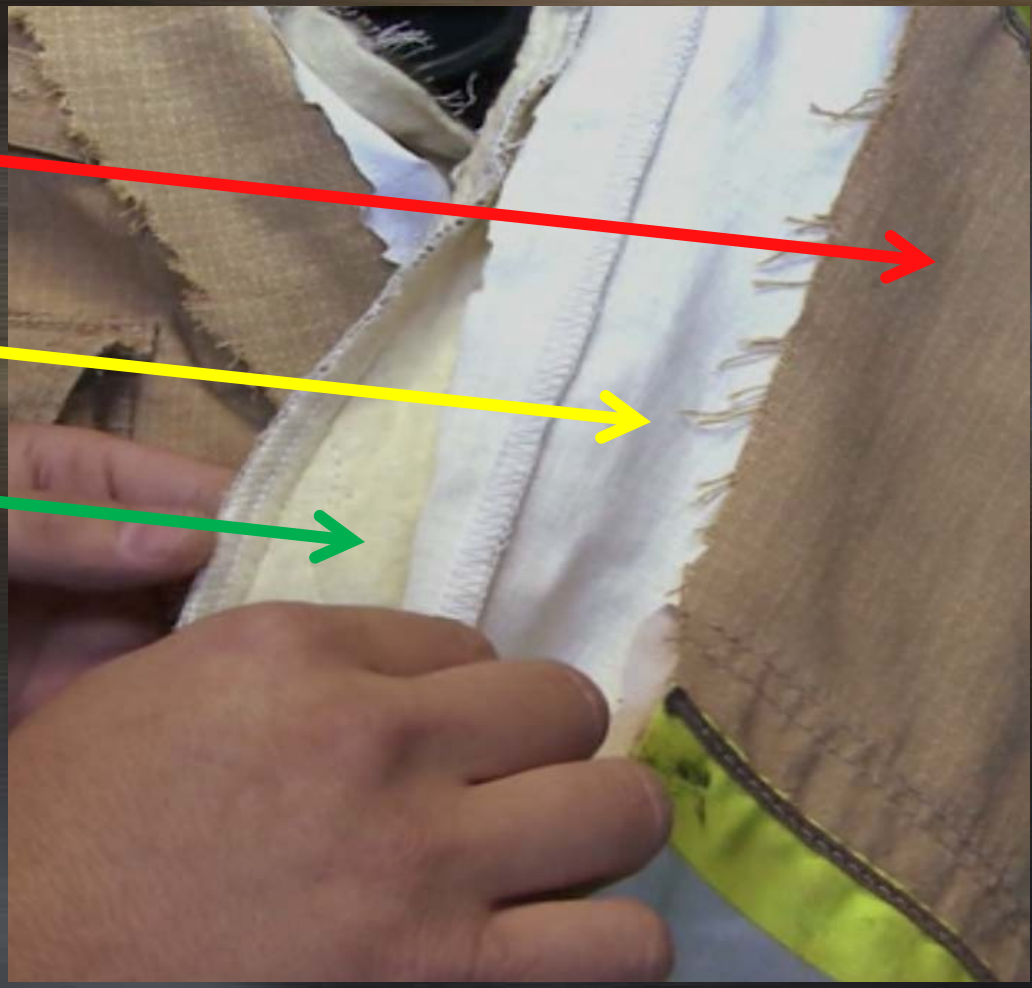
Temperature	R
37°C (98.6°F)	Normal human
44°C (111°F)	Human skin begins to f
48°C (118°F)	Human skin rec
55°C (131°F)	Human skin rec
62°C (140°F)	Burned human t
72°C (162°F)	Human skin is in
100°C (212°F)	Water boils and
140°C (284°F)	Glass transition
230°C (446°F)	Melting tempera
250°C (482°F)	Charring of natu
>300°C (>572°F)	Charring of prot
>600°C (>1112°F)	Temperatures in

Removal from Heated Environments

- Need to rapidly cool the PPE
  - Materials hold heat = can increase underlying injuries
  - Metal buckles
- Protect the rescuers hands

PPE Layers

- Outer shell (PBI material)
- Vapor barrier
- Inner quilted layer
- Easier to cut if layers are separated



Approach

- General categories
  - Conscious versus unconscious
  - Ambulatory versus non-ambulatory
- As the patient is assessed and treated the integrity of the spine and the patency of the airway both need to be protected

Approach

- Conscious and oriented firefighter, with minor injuries
  - If appropriate may walk out of a building, alone or with assistance
  - Assume a position of comfort while PPE is doffed
- Seriously injured, decreased mental status or unconscious firefighters may have been removed by being carried, dragged or lowered out of a building

Approach

- Rescuing firefighters typically lay the patient supine but tilted to one side because of the SCBA cylinder
- Consequently this is the most common position in which rescued firefighters would present

PPE Removal

- Accomplished in three steps
  - Head and neck
  - Upper body
  - Lower body
- Speed of each step and method chosen (cutting vs. loosening) dependent on injury severity

Assessment

- Assessment of the ABCs can begin immediately, with the turnout gear still on
  - SCBA mask will need to be removed to have an accurate assessment
  - If patient is breathing adequately - can be heard through SCBA mask
  - Slow or shallow breathing can be heard, depending on actual rate and quality

Assessment

- Depending on mechanism of injury
  - Cervical injuries should be suspected
  - Depending on rescue method the spine may or may not be stabilized
- Spinal immobilization must be started simultaneously with ABCs by stabilizing the head

PPE Removal

- Disconnect the regulator from the SCBA mask (*MSA devices may be better left in place)
  - Assessing conscious patient's ABCs will be easier
  - Communication will be improved
- While head is immobilized, unstrap and remove the helmet

PPE Removal

- Cut the front neck area of the hood straight down from the face opening to the bottom
  - Stabilize the head with one hand on the mandible and another at the occiput, similar to the initial hand position on a motorcycle helmet
  - Permits the hood to be pulled completely to the back

PPE Removal

- SCBA face piece straps are now exposed
  - Loosen or cut straps
  - Pull face piece away
- Transfer stabilization of head to the sides
  - Hood and mask can be removed from the head and neck

PPE Removal

- Upper body
  - Unbuckle SCBA waist strap – it is thick, don't bother trying to cut
  - Cut upper-chest strap, if present (MSA has this, Scott does not) – it is thin
- Thread the shoulder straps back through the adjuster or cut the straps at the lower adjustable section
  - Reduce patient movement

PPE Removal

- Remove SCBA

PPE Removal

- Roll patient flat
- Turnout coat
  - Unfasten and cut sleeves starting at wrists – cut layers of PPE (moisture and thermal barriers)
  - Turn near the armpit and continue cutting straight across the chest to the opening of the coat - Collar and storm flap is thick
  - Cut drag strap when located

PPE Removal

- Turnout Pants
  - Cut strap that attaches suspender to pants
  - Cut legs parallel to seam avoiding reinforced areas
- Boot
  - Removal method dependent on injuries
  - Avoid shin protection

Best Practices

- When cutting gear:
  - Trauma shears work the best and are most available
  - Cut outer shell first and liner second
  - Stay away from pockets and knee pads
  - Be careful not to injure victim while using trauma shears

Best Practices

- Face piece- Is it in place? Is it damaged?
  - Inhalation of heated toxic gases?
- Protect c-spine
- Remove regulator, helmet and hood
- Remove SCBA- quicker to unclip waist and thread shoulder straps vs. cutting
- Position on back
- Unfasten PPE (coat and pants)
- Remove gloves
- Cut PPE, remove boots – remove all PPE!
- Collect & secure PPE

Evidence Preservation

- Equipment preservation
  - Bag, tag, chain of custody
  - Inventory of items
  - Control access
  - Control storage environment
  - Third party examinations
  - Cleaning and inspection records
- Storage site
  - Chain of custody
  - Security
  - Climate control

Bring Your Tools To The Victim

For Assessment and Treatment

Other Tools to Consider

- Assessment for Carbon Monoxide
  - Capnography provides an immediate picture of patient condition where pulse oximetry is delayed
  - CO/Cyanide poisoning cause low EtCO2 readings
  - Assists in determining level of distress

Assess for Carbon Monoxide

- Conditions that may cause false readings
  - Ensure finger probe is aligned
  - Nail polish and dirt can interfere with readings
  - Bright ambient light can interfere with readings

Assess for Carbon Monoxide

COHb Level%	Signs & Symptoms	Pre-Hospital Treatment
0-4	None- Normal (Non-smoker)	None (Smoker 3-5% Higher)
5-9	Minor Headache	None – Normal (Non-smoker)
10-19	Headache Shortness of Breath	ABC's, 100% Oxygen, Transport, Consider HBO
20-29	Headache, Nausea, Dizziness, Fatigue	ABC's, 100% Oxygen, Transport, Consider HBOT
30-39	Severe Headache, Vomiting, Vertigo, Altered LOC	ABC's, 100% Oxygen, Transport, Consider HBOT
40-49	Confusion, Syncope, Tachycardia	ABC's, 100% Oxygen, Transport, Consider HBOT
50-59	Seizures, Shock, Apnea	ABC's, 100% Oxygen, Transport, Consider HBOT
60 & up	Coma, Cardiac Arrhythmias	ABC's, 100% Oxygen, Transport, Consider HBOT

Cyanokit

*Requires **BOTH** incident specific and patient specific conditions*

- Known exposure – industrial, poisoning, suspected significant smoke inhalation
  - Exposure to smoke in enclosed area
  - Presence of soot around mount/nose
- Patient specific not attributable to other causes:
  - Decreased LOC - GCS 3 or less
  - Seizure
  - Severe respiratory distress

Transport Considerations

- Protocol driven
- Receiving facilities
  - Local facility
  - Regional trauma center
  - Regional burn center

Advise Hospital

- Consultation - Make the tactical translation
  - "Firefighter was removed after being trapped in a house"
  - "Firefighter was injured after a deck collapsed on him"
  - "Firefighter has severe chest pain after fighting a fire"
- Assessment findings – SpO2, NIBP, EKG, EtCO2, physical findings
- Hospital Choice
  - Local E.D. defined by protocol
  - Burn Center
  - Smoke (Hyperbaric)
  - Trauma Center

Case Discussion #1

- Single family structure

Case Discussion #1

Firefighter Mayday

- Sudden change in conditions
  - Zero visibility, high heat, intense advancing fire
  - Hose line burned through
- Crew members became separated
  - Tower officer physically separated by fire conditions and partial ceiling collapse
- Mayday
  - Occurs seven minutes from marking on the scene
- Firefighter self rescues
  - 1 dove out window
  - 3 performed ladder bails

Case Discussion #1

Mechanisms of Injuries

- Fall – distance?
- Strikes?
  - What hit them
  - What did they hit – landing surface(s)
- Environment?
  - Temperature extremes
- Role of PPE?
  - Additional weight
  - Center of gravity shifts
  - Loss of integrity – worn correctly, damaged, knocked off

Case Discussion #1

<u>Firefighter Injuries</u>

- Four personnel seriously burned
  - One officer continues to recover and has retired due to the extent of injuries received
- Three injuries occurred later in the event
  - One EMS provider with respiratory complaint
  - One firefighter with a shoulder injury
  - One firefighter with a wrist injury
- Near miss multiple line of duty death incident

Case Discussion #2

- Single family structure (duplex)

Case Discussion #2

<u>Firefighter Mayday</u>

- Stair /floor collapse into basement
- Three firefighters fell from first floor steps into the basement
- Mayday
  - Occurs six minutes after arrival
- Firefighters self-rescue via basement door

Case Discussion #2

Mechanisms of Injuries

- Fall – distance?
- Strikes?
  - What hit them
  - What did they hit – landing surface(s)
- Environment?
  - Temperature extremes
- Role of PPE?
  - Additional weight
  - Center of gravity shifts
  - Loss of integrity – worn correctly, damaged, knocked off

Case Discussion #2

<u>Firefighter Injuries</u>

- Three firefighters injured and burned
  - First and 2nd degree burns to body
  - Arms, legs and back
  - Senior fire fighter service connected disability retirement
- One firefighter with an injured knee and lower back

Case Discussion #3

- Apartment Fire

Case Discussion #3

- Catastrophic floor collapse into fire apartment
- Mayday
  - Occurs twelve minutes after arrival on the scene
  - Two fell with collapse debris
  - One remained on the hose line and trapped in a standing position by debris
- Firefighter self rescue
  - Two self-rescued via window (13 feet off ground)
  - One self-rescued by self extrication and exiting through apartment

Case Discussion #3

Mechanisms of Injuries

- Fall – how many times, distance(s)?
- Strikes?
  - What hit them
  - What did they hit – landing surface(s)
- Environment?
  - Temperature extremes
- Role of PPE?
  - Additional weight
  - Center of gravity shifts
  - Loss of integrity – worn correctly, damaged, knocked off

Case Discussion #3

<u>Firefighter Injuries</u>

- Three personnel injured and burned
  - 1st, 2nd, 3rd degree burns to body
  - Arms, legs and back
- Officer with a ruptured spleen and broken back

Common Threads of Injuries

- Burn Injuries
  - Superficial to full thickness
  - Arms, legs and back
- Orthopedic Injuries
  - Back
  - Strains and sprains
- Internal Injuries
  - Distance of fall, strike areas
- Psychological
  - Significant recovery time
- Activities

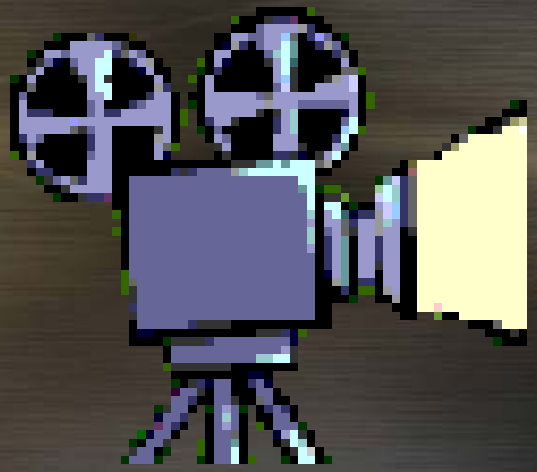
Overall Strategies

- Scene Approach
  - Ingress
  - Egress
- Scene Size Up
  - PPE use
  - Needed equipment and resources
- Triage
- Treatment
  - Remove all PPE
  - Associated trauma/mechanism of injury
- Transport
  - Medical consultation

Taking It Back To Your Agency

- In station training
  - What are your typical scenarios?
  - Use out of date PPE – 10 year shelf life; work with vendors; work with regional partners
- Department training
- Protocols/Policies
  - PPE removal, inspection, investigation
  - Destination determinations for personnel
- Best Practices
  - Incorporate into curriculums
  - Share the information

Video & Practice



Questions/Comments

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