Question 1

Which of the following statements regarding Emergency Incident Rehabilitation is TRUE?

a. Thermal clothing protect providers from heat stress
b. High heart rate and hyperthermia are normal responses to fire suppression
c. Provider heart rate should be used to determine the frequency of rest periods
d. Elevated heart rate in warm environments is primarily due to work demand.

Question 2

The role of the Medical Director with respect to Emergency Incident Rehabilitation includes?

a. Establishing vital sign criteria to release firefighters from the rehab sector
b. Establishing protocols to determine when firefighters should be transported to the hospital
c. Providing advice for optimal rehydration solutions
d. All of the above
Learning Objectives

Upon the completion of this program participants will be able to:
• Describe the physiological stresses associated with fire suppression.
• Describe the need and timing for emergency incident rehab
• Define the five roles for the medical director in emergency incident rehabilitation
• Discuss the merits of common rehab techniques.

Introduction

• Any incident requiring PPE to work in an immediately dangerous to life and health (IDLH) environment is governed by the hazardous waste operations and emergency response (HAZWOPER) regulations
• Both HAZWOPER and NFPA 1500 Standard require a transport capable EMS unit at all fireground and hazmat incidents

Any incident requiring the use of protective gear to work in a dangerous environment is governed by HAZWOPER regs. It refers to many types of hazardous waste operations and emergency response conducted in the United States under Occupational Safety and Health Administration (OSHA) Standard 1910.120 "Hazardous Waste Operations and Emergency Response." The standard contains the safety requirements employers and their sub-contractors or public sector responders must meet in order to conduct clean-ups or emergency response operations.
Physiology of Structural Firefighting

- High heart rate and hyperthermia are normal responses to fire suppression.
  - EMS providers must understand the differences between normal physiology to exertion and illness
- Thermal protective clothing consists of an outer shell, thermal barrier, and moisture barrier
  - Normal thermoregulation inhibited
  - Uncompensatable heat stress is created

The EMS roles on the fire ground that do not deal with civilian victims require a substantial understanding of the physiology of firefighting. Early studies showed that firefighters’ heart rates increase at the time of initial alarm, before any physical activity occurs. Heart rate monitoring does not directly correlate with energy expenditure or core temperature rise. Part of the increase in heart rate is due to work demand, but much more is due to thermal stress.

While PPE protects firefighters from heat and burns, it also prevents the physiological cooling that would normally occur through convection and evaporation of sweat. The PPE creates a thermal microenvironment next to the skin that is hot and has 100% relative humidity. The coat and bunker pants comprise multiple layers of composite materials, including outer shell, moisture barrier, and thermal barrier. They are rated for total heat loss (THL), which measures evaporative heat transfer, or breathability, and thermal protective performance (TPP), which measures thermal insulation as outlined by NFPA 1971, “Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.” Increasing TPP may result in decreased THL, but any interference with evaporative cooling can contribute to rapid temperature elevations in exercising firefighters.

Emergency Incident Rehabilitation

- Structured rest period to partially correct cardiovascular and thermal strain associated with work in protective clothing.
- Should be initiated any time work is performed for 20 minutes or more in fire suppression or hazardous materials protective clothing.
Role of the Medical Director

- Establish vital sign criteria to release firefighters from the rehab sector
- Establish protocols to determine when firefighters should be transported to the hospital
- Ensure the medical providers operating the rehab sector have delegated authority to retain firefighters in rehab or order transport to the hospital when appropriate
- Provide advice for optimal rehydration solutions
- Provide advice on when/how to deploy passive and active cooling solutions

Rehab Quantity

- Suggested by NFPA 1584 Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises
  - 5-10 minutes rest after consuming one 30-minute SCBA cylinder or 20 minutes of heavy exertion
  - 20 minutes formal rehab after consuming two 30-minute SCBA cylinders or 45 minutes heavy exertion
- Recommendations are not based on data and may be adjusted based on conditions and firefighter fitness

Rehab Quality

- Hydration
  - Emphasize prehydration
  - Minimum of 8oz of water or sport drink at every rehab period
- Nutritional support
  - Solid food required at longer duration incidents
- Cooling
  - Active cooling required when rehab done in hot/humid conditions
  - Passive cooling with protective garments removed is adequate in moderate (<75°F) and low humidity conditions
Firefighter cooling

• Passive cooling
  – Only effective if the majority of protective garments are removed (helmet, hood, coat, and gloves)
  – Further enhanced by pushing turnout pants down over boots when seated

• Active cooling
  – Forearm/hand immersion in cool/cold water
  – Fans
  – Cooling vests

• Exogenous cooling will not be required when rehab is performed on cool/cold days

Take-Home Points

• Take home points
  – Emergency incident rehab provides an opportunity to partially correct heat stress and keep firefighters/hazmat responders working at the incident
  – EMS providers should be trained to understand the differences between clinical illness and physiologic response to extreme exertion
  – Effective rehab should provide for rest, rehydration, cooling, and nutritional support

Question 1

Which of the following statements regarding Emergency Incident Rehabilitation is TRUE?

a. Thermal clothing protect providers from heat stress
b. High heart rate and hyperthermia are normal responses to fire suppression
c. Provider heart rate should be used to determine the frequency of rest periods
d. Elevated heart rate in warm environments is primarily due to work demand.

B is the answer
Thermal clothing worsens heat stress
Elevated Heart rate is a physiologic
Heart rate does not correlate with
energy expenditure or core temp
Elevated heart rate in warm
environments is primarily due to heat
stress

Question 2

The role of the Medical Director with respect to Emergency Incident Rehabilitation includes?

a. Establishing vital sign criteria to release firefighters from the rehab sector
b. Establishing protocols to determine when firefighters should be transported to the hospital
c. Providing advice for optimal rehydration solutions
d. All of the above

D is the answer

EMS Subspecialty Certification
Review Course

2.3.3 EMS Provider Health and Wellness
2.3.3.1.4 Awareness of Ergonomic Factors and
2.3.3.1.5 Disordered Sleep and Work Schedules
Learning Objectives
Upon the completion of this program participants will be able to:
• Become familiar with the common types of injuries experienced by EMS providers
• Understand techniques and strategies used to prevent injuries and fatalities among EMS providers
• Become familiar with occupational factors that interface with provider wellness, occupational injury and career longevity
• Discuss measures used to evaluate sleep and fatigue in relation to provider wellness.

Introduction
• Wellness refers to the physical and mental well-being of the individual
• Regular exercise, good sleep hygiene and proper diets are required to maintain individual wellness
• 77.5% of EMS providers are overweight and 12.5% smoke tobacco; 52.4% of US adults are classified as physically inactive.

Fatigue and Sleep
• Fatigue is defined as “unpleasant symptoms incorporating feelings of tiredness to exhaustion creating mental and physical conditions that interfere with the ability to function in a normal capacity
• Fatigue is associated with increased risk of injury, medical error or adverse event and safety-compromising behaviors (O.R's from 2.3 to 4.9)
• Sleep measures utilized (Pittsburgh Sleep Quality Index for sleep domains and Epworth Sleepiness Scale for daytime sleepiness) do not measure fatigue
Ergonomics and Injury

• Most common fatal injuries are vehicular crashes (air and ground) with operations in the “emergency mode”
• Most common non-fatal injuries are related to blidly exertion, exposure to harmful substances and contact with objects/equipment.
• Most common non-fatal diagnoses are strain/sprain, contusion/abrasion, and laceration/puncture.
• EMS workers fail to report up to 32% of injuries
• Ambulance crashes are the greatest source of tort claims against EMS agencies.

• Essential that employees be fit for their job to prevent injury. This includes adequate strength in the low back and legs as well as hip flexibility.
• Appropriate training on devices and lifting procedures improves biomechanics
• Descending control devices alter movements from carrying to push-pull and improve stair transports

Take-Home Points

• Emergency Medical Services Systems should have mechanisms in place to capture all injuries to workers within the system.
• Contact with body fluids and violent patients, shift work and disrupted sleep patterns need to be addressed in provider wellness and safety programs
EMS Subspecialty Certification
Review Course

2.3.3 EMS Provider Health and Wellness
2.3.3.1.6 Prevention and Intervention for
Psychologically Stressful Events

Version Date: 4/2017

Question 1
An ambulance crew just finished running a code on a 5-month-old victim of cardiac arrest who did not survive. In regards to providing mental health care to the providers experienced a potentially traumatic event (PTE), what is the best course of action?

a. Require the providers to attend a Critical Incident Stress Debriefing (CISD).
b. Refer the providers to immediate counseling with the Employee Assistance Program (EAP).
c. Give providers an hour “time-out” period to regroup, and make sure they are aware of the support and counseling options that are available should they need it.
d. Place the providers back in the field immediately.

Question 2
Which of the following is an evidence-based treatment of clinical mental health conditions?

a. Cognitive behavior therapy using graded exposure
b. Critical Incident Stress Debrief with peer counsellors
c. Supervisor “hot wash”
d. Stress “first aid”
Learning Objectives

Upon the completion of this program participants will be able to:

• Describe the occupational health approach to Critical Incident Stress Management.
• Describe the steps in a Potentially Traumatic Event (PTE) evaluation
• Define the components of an integrated system for delivering care to providers following PTE’s.

Introduction

Critical Incident Stress Debriefing (CISD) and Critical Incident Stress Management (CISM) have not been shown to limit rates of PTSD and some studies have shown them to actually be harmful.

This was thought to be because of the lack of training and oversight of CISD providers. There is more of a push towards placing these types of programs under the oversight of occupational health physicians and to provide better, more specific standard to the employee assistance programs (EAPs) that administer these services.

Occupational Health Approach

• National Fire Protection Association Standard recommended changes to the way post-traumatic mental health for providers was administered based on recommendations from the Cochrane Collaboration.
• Immediate Assistance: Should be proximal and non-intrusive. A prototype was recommended following the “The Combat Operations Stress First Aid program of the US Navy and Marine Corps.”
Occupational Health Approach

• Early, Reliable and Non-intrusive: Support, compassion and watchful waiting is often the best course unless obvious and profound difficulties present themselves. Non-intrusive screening measures recommended.
• Stepped Care: Provide treatment to those that need it, at the level they need it. Not everyone will benefit and some may be harmed.
• Evidenced-based treatment: Care should be delivered by specialty behavioral health providers.

Systems-Based Approach

• Figure 24.1 in the NAEMSP text outlines an algorithm to evaluate Potentially Traumatic Events
• Entry question: Does the individual feel the event was significant?
• Next recommendation is a supervisor-led “hot wash” of the event.
• If resolution not achieved, administer the 10 question Trauma Screening Questionnaire
  http://www.nus.edu.sg/uhc/cps/resources/selfhelp/TSQ.pdf

• If six or more items on the TSQ are positive, referral for a more complete assessment is indicated.
• If a provider screens as subsyndromic but still needs assistance with symptom regulation or compounding life issues, appropriate referral to basic Employee Assistance Program should be considered.
Systems Based Approach

Elements that are critical for building an integrated system for PTE and resources are:

– After-action review (hot wash)
– Stress first aid program,
– Trauma screen questionnaire (TSQ),
– Effective behavioral health program (conforming to revised NFPA 1500 standard), and
– Assistance to behavioral health providers (from the National Crime Victims Research and Treatment Center).

Take-Home Points

• Take home points
  – Personal wellness and fitness programs are integral to the provider’s capacity to absorb stressful exposures on the job
  – Traditional Critical Incident Stress Management programs must be reconfigured to reflect emerging standards for evidence-based behavioral health care
  – Effective PTE responses utilize a systems-based and tiered approach.

Question 1

An ambulance crew just finished running a code on a 5-month-old victim of cardiac arrest who did not survive. In regards to providing mental health care to the providers experienced a potentially traumatic event (PTE), what is the best course of action?

a. Require the providers to attend a Critical Incident Stress Debriefing (CISD).
b. Refer the providers to immediate counseling with the Employee Assistance Program (EAP).
c. Give providers an hour “time-out” period to regroup, and make sure they are aware of the support and counseling options that are available should they need it

Correct answer is C
Question 2

Which of the following is an evidence-based treatment of clinical mental health conditions?

a. Cognitive behavior therapy using graded exposure
b. Critical Incident Stress Debrief with peer counsellors
c. Supervisor “hot wash”
d. Stress “first aid”

Correct answer is A. CISD with peer counsellors has been found to be less effective than other systems-based approaches to PTE. Supervisor hot washes, while helpful, are not considered adequate treatment for clinical mental health conditions. Stress First Aid, developed by the US military, is an effective first intervention but not a treatment for clinical mental health conditions.
Question 1

All of the following factors predict a higher probability of emergency-vehicle related driver injury EXCEPT:

a. Male gender
b. History of prior emergency vehicle collision(s)
c. Fatigue due to extended shift work (over 24 hours)
d. Warning Lights and Sirens (WLS) responses

Question 2

True or False: Without research to determine the effectiveness of the many ambulance driver training programs currently used, no logical recommendation can be made.

Learning Objectives

Upon the completion of this program participants will be able to:

• Describe the risk to providers and others of emergency vehicle operations
• List the contributing factors to ambulance crashes
• Describe the key components of provider ambulance safety teams
Introduction

- Ambulance crashes cause 59% of all EMS occupational fatalities
- Rate of transportation-related injury to EMS providers is 30X higher than the national average
- Greater burden of injury and death on persons not in the ambulance
- Account for majority of EMS agency lawsuits

Contributing Factors

- Fatigue: 21 hours of wakefulness\(=\)BAL 0.08%; 3.6X greater odds of safety compromising behavior if fatigued than if not
- Poor driver training: no evidence of effectiveness of the many training programs offered
- Poor use of passenger restraints: up to 26% of drivers who died in ambulance crashes were not restrained

Contributing Factors

- Distractions: ambulance drivers may have to operate several devices (radio, data system terminal, WLS) driving on busy streets with a vehicle full of distraught individuals
- Ambulance structural design: crashworthiness largely unknown, especially patient compartment
- Diesel fumes: neuropsychological effects in short term exposures per EPA, long term effects unknown
Contributing Factors

• Use of WLS (red lights and sirens) despite NAEMSP/NASEMSO position paper—needs local implementation to be effective
• Passenger restraints and vehicle safety—can be monitored with “black box” devices to give real-time feedback to crews (but can be additional distractor)
• Driving history—targeted education for those with previous records
• Age and gender—women more likely to be injured; crash rates vary by age group of the driver

Contributing Factors

• Improving vehicle design to mandate safety features in the patient compartment (e.g. crash-worthy equipment restraints, improving safety of hard surfaces) will take partnerships between government, industry, researchers and EMS provider agencies
• Public education to improve understanding of safer ambulance operations (e.g. decreased use of WLS responses) will be necessary

Roles of Ambulance Safety Team

Elements that are critical for a provider-based AST (in addition to having crash investigation training):
– Ensure EMS agency has a reliable comprehensive data collection system
– Determine the agency’s historical risks
– Set goals for improvement
– Develop and test interventions
– Celebrate accomplishments
– Work with other groups to share best practices
Take-Home Points

- Ambulance safety programs are essential for the protection of providers, patients and the public
- Emergency vehicle collisions have modifiable factors and are preventable
- Targeted interventions are needed at the national, EMS agency and individual provider level
- More research is needed especially into the efficacy of driver training and crash safety features

Question 1

All of the following factors predict a higher probability of emergency-vehicle related driver injury EXCEPT:

a. Male gender
b. History of prior emergency vehicle collision(s)
c. Fatigue due to extended shift work (over 24 hours)
d. Warning Lights and Sirens (WLS) responses

Correct answer is A

Correct answer is A. Females are more prone to EV operations related injury than males. EV crash drivers had a 71% incidence of prior EV crashes. Performance impairment of over 21 hours of wakefulness is equivalent to a blood alcohol level of 0.08%. A disproportionate amount of EV crashes occur when WLS are being used.
Question 2

True or False: Without research to determine the effectiveness of the many ambulance driver training programs currently used, no logical recommendation can be made.

Correct answer is True. While programs that have a classroom, practice track and mentored driving component are more thorough than brief orientations, there is no research evidence to support their effectiveness.