Responder Rehab

Not just a coffee wagon anymore…

Why Rehab?

- Fire Service Statistics
  - About 100 deaths per year
  - About 100,000 injuries per year
    - Over 50% during emergency operations
    - Firefighters core body temperatures can reach 104°F

Line of Duty Death Report

- David Mitchell Tatum
- November 5, 2012
  - …became sick at the scene of an emergency response but did not request treatment at that time.
  - Later in the day, he began having trouble breathing and became unconscious.
  - Tatum was treated and transported to Bladen County Hospital and then transferred to Cape Fear Valley Hospital in Fayetteville where he passed away from a cause still to be determined.

Line of Duty Death Report

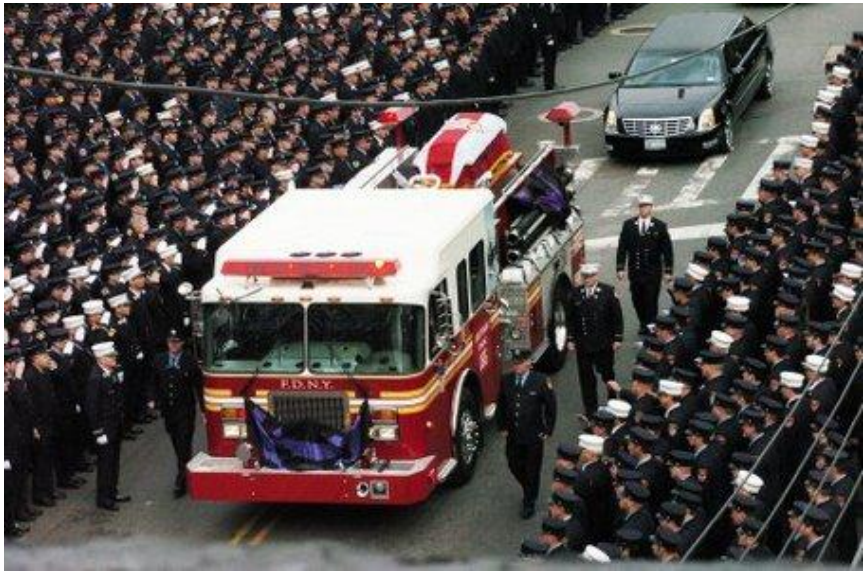
- Chris Seelye
- September 17, 2012
  - …suffered a medical emergency while battling the Wenatchee Complex Fire.
  - Firefighter Seelye was treated by incident medical personnel and rushed to a nearby hospital, where he passed away later that evening.

Line of Duty Death Report

- David Wintz
- May 16, 2012
  - While directing traffic at the scene, Wintz started to feel ill and was taken home.
  - Wintz went into cardiac arrest at home and was then taken to Aria Health's Torresdale Hospital where he passed away from an apparent heart attack.

Line of Duty Death Reports

- Richard Nappi
- April 16, 2012
  - While battling the fire, Lt. Nappi became overheated and collapsed.
  - Firefighters removed him on a stretcher to the street where he initially was conscious and alert.
  - He was placed in an ambulance and EMS personnel began to treat him when he suddenly became unconscious and suffered cardiac arrest.
  - While paramedics and EMTs continued to work on him, he was rushed by ambulance to Woodhull Hospital where he later died.



Could any of these deaths been prevented?

How many injuries?

How many injuries go unreported?

Who thinks it is important?

YOU?

Consensus Standard - NFPA 1584

- Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises
- 2008 Edition

Prevention and Preparedness

- Health Risk Reduction
- Fitness Programs
- Proper Hydration and Nutrition
- Training

Health Risk Reduction

- Occupational Medical Programs
  - NFPA 1581
- Acclimatization to conditions
- Monitoring of weather conditions
  - Understanding associated risks

Fitness Programs

- Physical Conditioning
  - NFPA 1582
  - operate at a higher core temperatures
  - decrease cardiovascular strain associated with strenuous activity
  - improve physical performance
  - optimize a member's performance under extreme conditions
  - facilitate effective rehabilitation

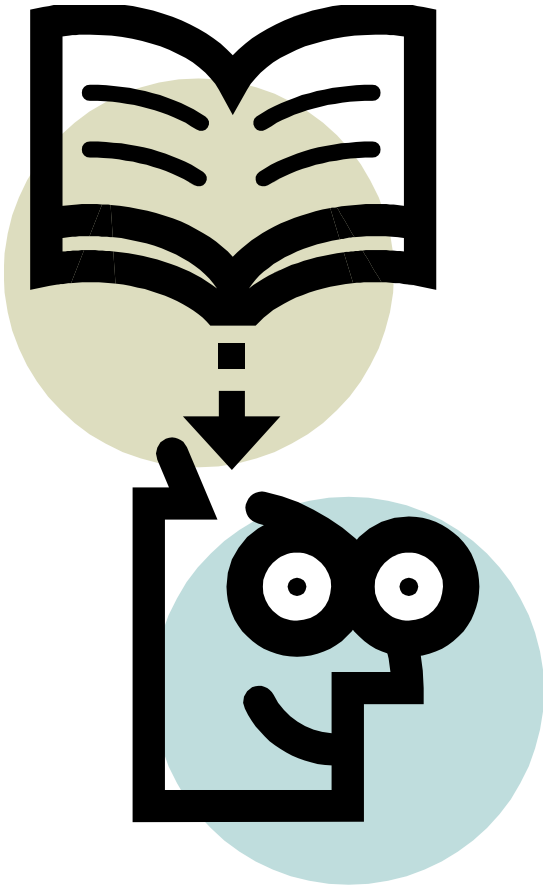
Proper Hydration and Nutrition

- Beverages, foods, and substances that should be avoided include the following:
  - Carbonated, high-fructose/high-sugar drinks
  - Foods with high fat and/or high protein content
  - Alcohol
  - Tobacco (nicotine)
  - Creatine/Ephedrine
  - Caffeine!


That's right...
I said Caffeine!

Training

- Expectations and Requirements
  - Command Officers
  - Unit Supervisors
  - Individual Responders
- Rehabilitation Process
  - Responders
  - Providers
- Specific Injury or Illness Patterns
  - Heat/Cold Stress
  - Overexertion
  - Likely injury and illness patterns



When to do Rehab…

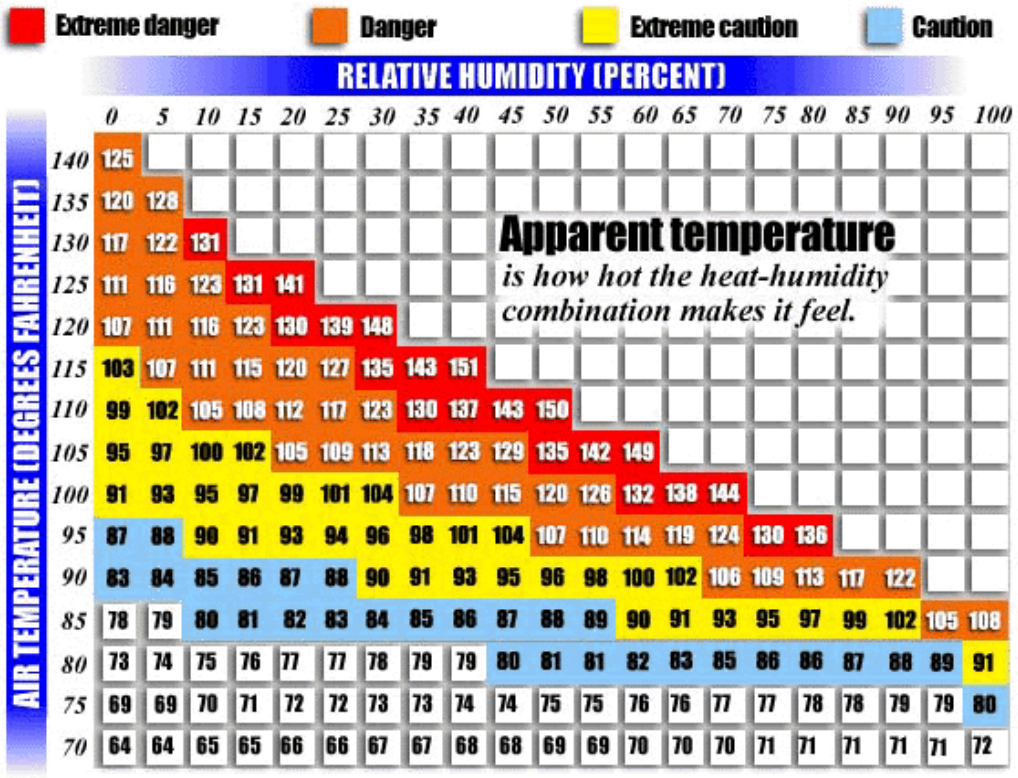
- “Rehabilitation operations shall commence whenever emergency operations or training exercises pose a safety or health risk to members.”
  - NFPA 1584

When…

- Consider the scope of the incident:
  - Time
    - Extended use of turnout gear
    - Extended exposure to weather conditions.
  - Complexity
    - Crime scenes/standoffs
    - Search operations,
    - Mass gatherings/public events
  - Intensity
    - Mental and/or physical stress on a member, such as major extrications, actual fire attack, radiant heat load, or interior search and rescue.

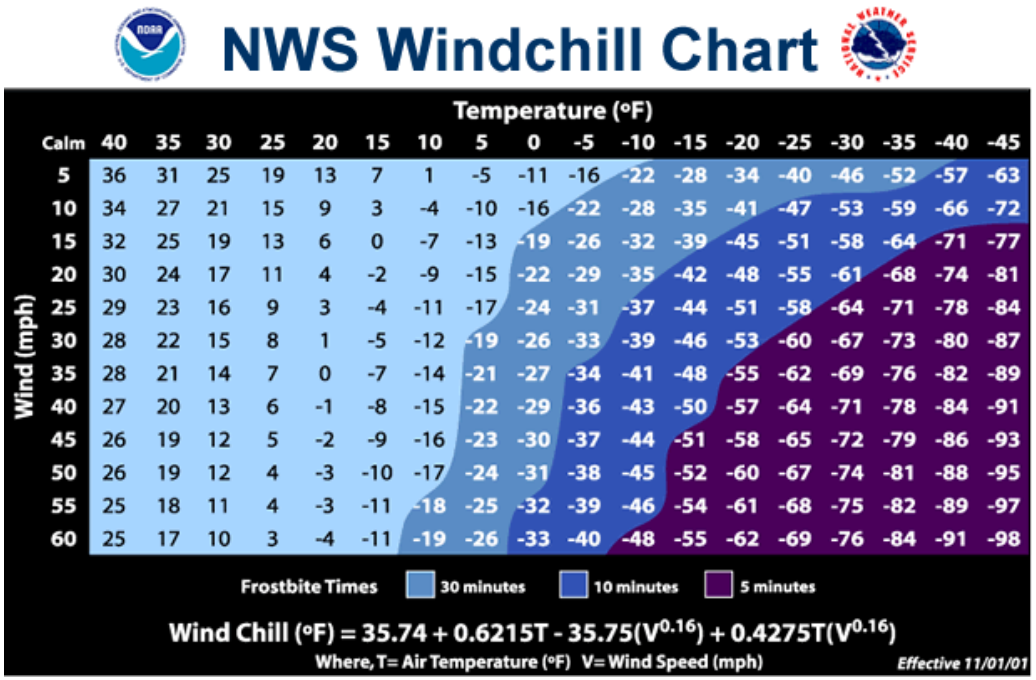
How about when it's hot…

- Consider
  - Temperature
  - Relative humidity
  - Sunlight
  - Air Quality



How about when it's cold…

- Temperature
- Wind Speed
- Precipitation



When something bad happens…

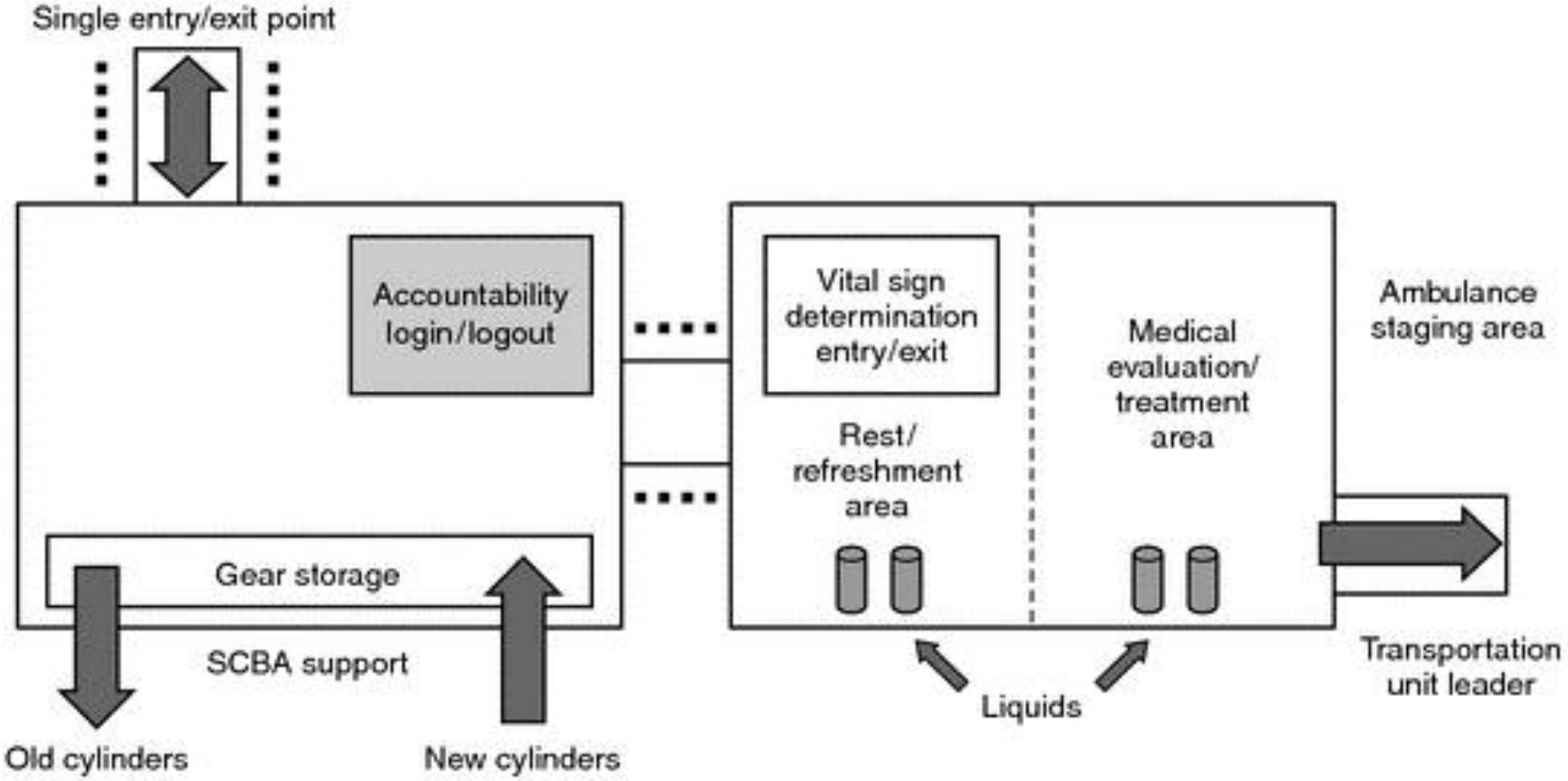
- If one or more of the crew members is seriously injured or killed during the incident, the entire unit shall be removed from emergency responsibilities at the incident as soon as possible.
- Mental health services shall be made available to all members of the department.

Rehabilitation Area and Equipment

Area Selection – SAFE PAD

- **S**ize
  - Multiple crews
  - Rehabilitation personnel
- **A**way
  - Safe to remove PPE
  - Physical and mental rest
  - Resist freelance return to duty
- **F**resh
  - Free of exhaust fumes
- **E**MS
  - Provide medical screening and treatment
- **P**rotected
  - From the prevailing environmental conditions
- **A**ccess
  - For EMS Transports, if necessary
- **D**rop
  - PPE prior to entering the designated rehabilitation area.

Example Layout



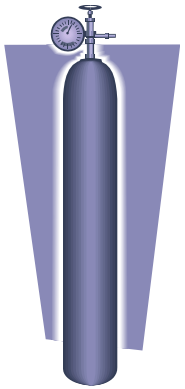
Wieder, M. A., *Emergency Incident Rehabilitation,* 2nd edition

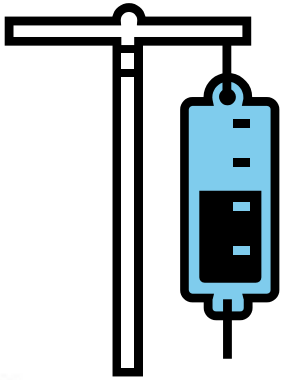
Rehabilitation Logistics

- Area
  - Portable Shelters/Chairs
  - Rehabilitation area designation marking equipment
    - Traffic Cones/Marking Tape
  - Generators/Power Equipment/Lighting
  - Trash Bags/Receptacles
  - Consider Toilet Facilities
- Administrative
  - Large Battery Powered Clock
  - Log book, forms, and writing utensils

Rehabilitation Logistics

- EMS Equipment
  - BLS
    - Vital Signs Monitoring
    - Oxygen Delivery
  - ALS
    - Cardiac Monitor
    - IV Therapy
  - Patient Movement



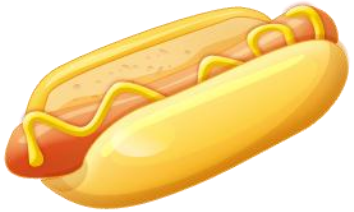


Rehabilitation Logistics

- Environmental
  - Cooling
    - Fans/blowers
    - Misting and cooling equipment
  - Warming
    - Blankets
    - Portable heaters
    - Dry clothing
  - Washing
    - Personnel washing equipment
      - Basins, soap, water, towels

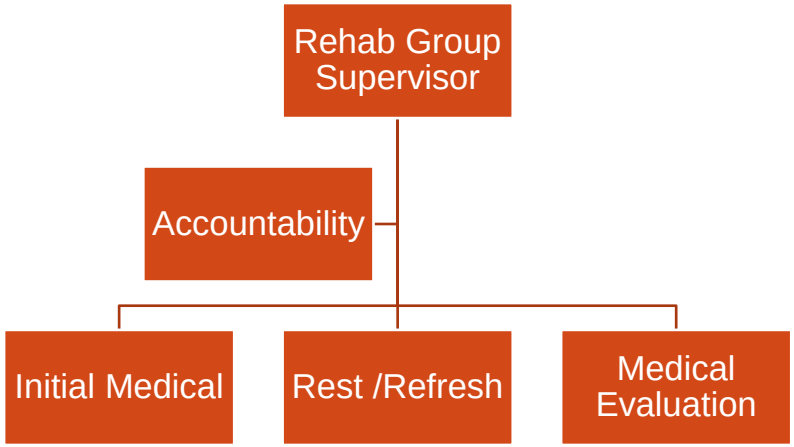
Rehabilitation Logistics

- Hydration
  - Beverage-serving equipment
  - Cups (hot and/or cold)
  - Drinking water
  - Electrolyte replacements
- Nutrition
  - Food
    - Service Equipment



Rehab Group Staffing

- Rehab Group Supervisor
- Estimate 2 EMS Providers/10 responders



Rehab vs. Canteen

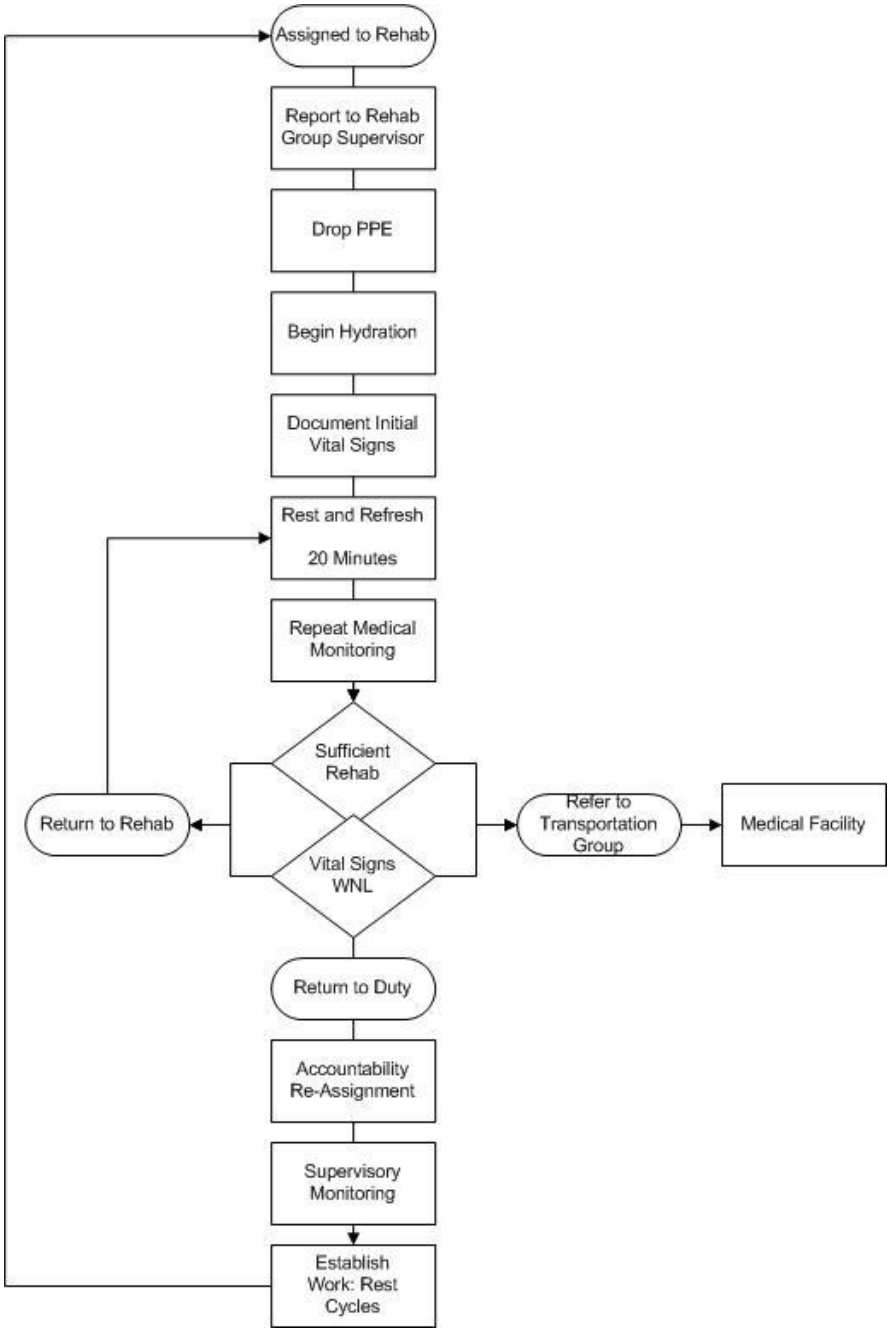
- Rehab
  - Accountability Controlled
    - Mandatory
  - Associated with Medical Monitoring

- Canteen
  - Food and Beverage
    - Not Mandatory
  - Essential and appreciated service
    - Must be properly integrated with Rehab
    - “Not just a Coffee Wagon anymore…”

Rehabilitation Process

- Report/Accountability
- Drop PPE
- Initial Medical Evaluation
- Rest/Refresh
- Repeat Medical Monitoring
- Treatment, if necessary
- Return to Duty/Transport

Rehab Process



Member Accountability

- All members entering and leaving rehabilitation shall be assigned by the incident commander
- Tracked through the existing personnel accountability system

Medical Monitoring and Care

- Evaluate all responders arriving at rehabilitation for symptoms suggestive of a health and/or safety concern
- BLS should be the minimum level of available care
  - ALS is preferred

Be on the look out for…

- Chest pain, dizziness, shortness of breath, weakness, nausea, or headache
- General complaints such as cramps, aches and pains
- Symptoms of heat- or cold-related stress
- Changes in gait, speech, or behavior
- Alertness and orientation to person, place, and time of members
- Vital signs considered to be abnormal
- Symptomatic responders or those with abnormal findings shall receive additional monitoring during rehabilitation.
- Members treated for any heat-related injuries shall be removed from active duties.

Suggested Vital Sign Parameters

- Heart Rate
- Respiratory Rate
- Blood Pressure
- Oximetry (SpO2 and/or SpCO)
- Core Temperature

Heart Rate

- Normal heart rate
  - 60 to 100 beats per minute
- Post Rehab Period
  - HR > 100 should not be released
    - Consider orthostatic HR and blood pressure measurement

Respiratory Rate

- Normal respiratory rate
  - 12 to 20 breaths per minute
- Post Rehab Period
  - Abnormal rate or dyspnea should not be released from rehab

Blood Pressure

- Normal blood pressure
  - Approximate 120/80 mmHg
- Post Rehab Period
  - Hypertensive should not be released
    - > 160 systolic and/or >100 diastolic
  - Hypotensive
    - < 100 systolic should not be released

Pulse oximetry/CO-oximetry

- Normal readings
  - 95-100% SpO2
  - 0-5% SpCO
- Post Rehab Period
  - Oximetry has significant limitations and should not replace careful assessment.
  - Bright external lighting or sunlight can falsely lower oximeter readings.
  - SpO2 <95% or SpCO > 10% should not be released

Core Temperature

- Normal core body temperature
  - 98.6°F to 100.6°F
- Measurement
  - Oral – approximately 1°F lower
  - Tympanic – approximately 2°F lower
  - Measured temperature in the normal range cannot exclude the possibility of heat-related problems
    - Treat your patient, not the thermometer
- Post Rehab Period
  - Measured and adjusted > 100.6°F should not be released

EMS Authority

- EMS Providers assigned to the Rehab Group shall have the authority, as delegated from the incident commander, to keep members in rehabilitation or to transport them for further medical evaluation or treatment.

EMS Authority

- Rehab is mandatory and enforced.
- Prevent “stoic” responders with serious medical conditions from refusing medical evaluation and treatment at the incident.

Dehydration

- Impairs the body's ability to maintain core temperature
- Decreases strength
- Shortens endurance time
- Decreases blood volume, which increases cardiovascular strain
  - A 15 percent reduction in plasma volume and a 40 percent reduction in stroke volume have been reported following less than 20 minutes of strenuous fire-fighting activity.

Hydration

- Goal - match the volume of fluid intake with the volume of sweat output.
  - Up to 64 oz (2L) per hour in hot and humid conditions
  - Up to 32 oz (1L)/20 minutes in firefighting environment
  - Protective clothing creates a hot and humid environment
  - Sweating continues even after work stops

Hydration

- Nausea and loss of thirst can be early signs of dehydration and heat stress.
- All responders in rehab should demonstrate the ability to consume some fluids.
- Sports drinks should be considered
  - Calorie and electrolyte replacement
  - Activities are of moderate to high intensity
  - Lasting 1 hour or longer.

Too much fluid…

- Overhydration (drinking too much, too fast) during operations
- The gastric emptying capacity of an exhausted, warm, and dehydrated fire fighter is likely about 32 oz (1 L) per hour.
- Forcing large amounts of fluids in a single rehab period
  - May result in nausea and vomiting

Too much fluid…

- During high-intensity, long-duration activity (longer than 1 hour), the following precautions are recommended:
  - Ingest 30 g/hr to 60 g/hr of carbohydrate.
  - Drink 8 oz of sports drink containing approximately 15 g of carbohydrate.
  - Consume other readily available carbohydrate sources, such as fruit and meal replacement bars.

Too much fluid…

- Hyponatremia
  - “water intoxication”
  - Serious health condition
- Excessive water intake dilutes the electrolytes in the blood to dangerous levels.
  - Avoided by ingesting 16 oz of sports drink for every 64 oz to 96 oz (2 L to 3 L) of water.
  - 1 Part Sports Drink to 4 parts water

Cooling

- Remove protective clothing
- Drink fluids
- Apply active and/or passive cooling
  - Forearm immersion
  - Misting fans
    - less effective in high humidity
    - susceptible to steam burns if returned to operations

Warming

- Add dry clothing
  - Remove wet clothing
- Add blankets
- Inside Shelter
  - Buses
  - EMS Units
  - Vehicles

Nutrition

- Calorie and electrolyte replacements
  - Incidents greater than 3 hours
  - Total high exertion work greater than 1 hour
- Ensure that appropriate calorie and electrolyte replacements are available
- Ensure a means to wash members' hands and faces is available whenever calorie replacement will be used
- Integrate Canteen resources

Post-Rehab Disposition

- Immediate transport to an emergency medical facility
- Close monitoring and treatment in rehabilitation
- Release from rehabilitation and re-assignment

Immediate treatment and/or transport

- Vomiting after oral intake
- Chest pain/Respiratory distress
- Any burns
- Any injury or trauma needing immobilization
- After one 20-minute Rest Period
  - Heart rate above 140 bpm
  - Oral temperature above 100.6F after active cooling
  - SpO2 less than 95% after oxygen administration.
  - SpCO greater than 15%

Continue Rehab

- Nausea after oral intake
- After one 20-minute rest period
  - Heart rate remains above 120 bpm
  - Blood pressure above 140/90 after a fifteen (15) minute rest period
  - SpCO value of 10% to 15% (treat w/high flow O2)

Return to Full Duty

- Member tolerated oral fluids
- After one 20-minute rest period
  - Heart rate is below 100 bpm
  - Blood pressure is below 140/90
  - SpO2 is greater than 95%
  - SpCO is less than 5% for non smokers,
    - 10% for smokers

Return to Full Duty

- Responder shall not return if:
  - Responder does not feel adequately rested
  - EMS or supervisory staff present see evidence of medical, psychological, or emotional distress
  - Otherwise unable to safely perform his or her duties

Release

- EMS personnel shall also evaluate members prior to their release from rehabilitation to ensure there are no obvious indications that would prevent them from safely performing full-duty activity.
- Members being released from rehabilitation must be with their unit supervisor and confirm their accountability with the rehabilitation group supervisor.

Documentation

- Time-in/time-out for each individual
- Rehabilitation evaluation report
- Where emergency medical care is provided, a patient care report shall be generated
  - a copy placed in the member’s employee health record.

Work/Rest Cycles

- Baseline 2 Work/1 Rest
  - 40 minutes of work/20 minutes of rest
  - Estimate by self-contained breathing apparatus (SCBA) cylinders consumed
    - Two (2) 30-minute
    - One (1) 45-minute or 60-minute
- Ratio adjusted based on environment/work activity

Conclusion

- Incident Rehabilitation is much more important to responder health and safety than just the comfort provided by a cup of hot chocolate on a cold day.
- Proper expectations, training, equipment, and techniques can curtail death and disability in the responder population
- EMS leaders and providers are on the front line of this effort…

Questions?