

# REHABILITATION: STANDARDS, TRAPS, AND TOOLS

BY DAVID ROSS, PETER J. McBRIDE, AND GERALD A. TRACY

**R**EHABILITATION IS INTENDED TO ENSURE THAT emergency workers can safely return to active duty following a work rotation (often defined as the use of a single 30- to 45-minute cylinder). An effective rehabilitation program must include the following:

- Rest—a “time-out” to help firefighters stabilize vital signs.
- Rehydration—replacing lost fluids/plasma volume.
- Restoration—of core temperature through “active cooling” (warming).
- Rx—medical monitoring and treatment.
- Relief from extreme climatic conditions (heat, cold, wind, rain).
- Refueling—calories and electrolytes.

All of these factors are essential components of a rehab program and must be included to avoid dehydration and heat stress.

Firefighting is hot, strenuous work. Firefighters work in extremely hot environments with little opportunity to cool their bodies through normal sweating. Even the moderate to heavy work demands at routine emergencies generate metabolic heat. Bunker gear makes it

difficult to dissipate this heat buildup, resulting in heat stress (photo 1).

Heat stress occurs when the body’s internal core temperature rises above its normal level. It is a result of internal, metabolic heat buildup (from working in bunker gear) and external stress from environmental factors while wearing personal protective equipment (PPE). As core temperature rises, so does the risk of heat stress.

Heat-stress factors include air temperature, humidity, radiant heat, air movement, the physical demands of work, the clothing worn, the materials used for PPE, and PPE construction and use. Physical fitness level, body composition, psychological disposition, and personal perception can also affect a person’s perception of heat stress.

The key activities for controlling heat stress are essentially the same as those required for an effective rehabilitation program. We must ensure that firefighters stay hydrated and have an opportunity to cool down. We also must develop protocols for member rotation during an incident to provide for rest. If personnel are limited, they may be rotated to less stressful tasks. For long-



**(1) Firefighting is hot and strenuous work. (Photo by Peter J. McBride.)**

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McBride has initiated many innovative partnerships and regularly presents safety-related programs to his and other departments. He proposed and co-authored a study examining the use of positive-pressure ventilation (PPV) for smoke movement and control in high-rise buildings and chaired an international group that produced guidance, an implementation strategy, and operating guidelines for the use of PPV in high-rise buildings. Recently, he spearheaded an investigation into the purity of compressed breathing air used by the fire service. McBride is a nationally recognized instructor and presenter in Canada and the United States.

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duration incidents, some balanced food should be available during rehab.

### STROKE VOLUME, HEAT STRESS, AND HEART-RELATED ILLNESS

In "Effects of Live Fire Training on Recruits" (*Fire Engineering*, September 2001), Denise Smith et. al., discuss the relationship between heat stress and stroke volume (SV). Smith describes how firefighting is physically demanding work that stresses the heart through heavy work and thermal strain. The thermal strain is a result of moderate to heavy work loads while wearing "heavy, insulative, non-permeable protective gear .... The cardiovascular demands of heavy muscular work and increased body temperature result in competing demands for blood flow to (a) the metabolically active muscle groups to support heavy muscular work, (b) the skin in response to the thermoregulatory demands resulting from muscular work in a hot environment, and (c) vital organs (including the brain and heart) to support life. The cardiovascular demands are exacerbated by excessive fluid loss through profuse sweating and vasodilation of vessels in the skin and muscle."<sup>1</sup>

### TEST RESULTS

The data from this study involving simulated fire exercises suggest that "repeated short bouts (approximately seven minutes) of strenuous firefighting activity in a building that contained live fires resulted in age-predicted maximal HRs [heart rates] and a significant reduction in SV in this group of firefighters. The cardiovascular responses were mirrored by changes in psychological variables .... In

fact, SV decreased approximately 35 percent from the end of the first trial to the end of the third trial. Furthermore, the dramatic decrease in SV at the end of the third trial occurred despite a 10-minute rehabilitation period during which firefighters consumed fluid .... The reduction in SV may be caused by decreased venous return (caused by vasodilation in the vessels in the working muscles and skin) or a reduction in plasma volume (due to profuse sweating) or, as is most likely the case, a combination of these factors. Psychological responses to firefighting activities indicate progressively greater stress with subsequent trials." (1)

We question the extent to which this decrease in stroke volume, when combined with heat stress, may increase the risk of suffering heart-related illnesses—especially for those firefighters who might have either a genetic or lifestyle predisposition to experience cardiovascular disease.

Although this research does not show a causal link to fireground injuries and fatalities because of cardiovascular stress, it does identify the potential synergistic effects. Exertion, heat/cold stress, and dehydration and their effects on human performance are well understood. It is the physiological processes that are now being researched in an effort to improve our understanding and, hopefully, our management of these effects on performance. These findings, in our opinion, stress the need for an effective rehabilitation program.

### NFPA STANDARDS

The fact that rehabilitation is mentioned in National Fire Protection Association (NFPA) 1500, *Fire Department Occupational Safety and*

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Health; NFPA 1521, *Fire Department Safety Officer*; and NFPA 1561, *Emergency Services Incident Management System* and that it has its own guideline—NFPA 1584, *Recommended Practice on Rehabilitation of Members Operating at Incident Scene Operations and Training Exercises* (2003)—emphasizes the importance of this activity to firefighter health and safety.

According to NFPA 1561, a department should have standard operating procedures (SOPs) to provide for a systematic approach to rehabilitation. The incident commander (IC), who is ultimately responsible for the incident, shall evaluate circumstances and initiate rest and rehabilitation (or rehab), according to NFPA 1561. The standard continues that rehab shall include basic life support (BLS) care and that members are responsible to communicate rest and rehab needs to their supervisor. The IC is to provide for rest and rehabilitation according to the circumstances. Provisions shall include medical evaluation and treatment, food and fluid replenishment, crew rotation, and relief from extreme climatic conditions.

NFPA 1561 describes a *tactical-level* management component, designed according to SOPs, to address large-scale incidents, long-duration incidents, and those associated with significant temperature extremes. In all these cases, the rehab area should be established in a safe environment away from the hazardous area and integrated into the incident management system (IMS) accountability system as a means to manage risks.

### NFPA 1584 REHAB GUIDELINE

#### Preplanning

To prepare for the incident, all members should be familiar with the rehabilitation SOP or standard operating guideline (SOG) (see Figure 1) and other provisions defined in advance so that they will know their expected roles and functions. All members need to be trained to recognize heat/cold stressors and stress symptoms and their risks. Members are encouraged to maintain physical conditioning to minimize the effects of emergency operations and maximize performance. Rehabilitation should commence when emergency operations pose a physical or mental risk.

One of the best preincident methods for avoiding the risks associated with strenuous fireground activities is to ensure that firefighters maintain sufficient hydration at all times. Thirst is not necessarily a good indicator of a member's hydration level. People usually don't feel thirsty until they are already mildly dehydrated. Performance diminishes before you are thirsty! Thirst is often blunted before and just after physical activity, especially as we age. Drinking water quenches your thirst

before the water gets into your bloodstream. Flavored uncarbonated drinks may encourage firefighters to consume more fluids. Caffeinated beverages are diuretics and may increase dehydration.

It is also helpful if members monitor weather conditions and limit their outdoor physical activities if it is too hot or attempt to acclimate to local conditions where possible (e.g., dress down for certain activities, get used to working in existing conditions while remaining hydrated). All members must understand the potential dangers of heat stress and dehydration and recognize their signs and symptoms, to prevent their occurrence.

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### Rehab Area and Site Guidelines

The NFPA's recommended rehab guideline states that the IC shall ensure that an adequate area or facility is available to reduce the effects of extreme weather. It suggests that more than one rehab area may be established if the size of the operation or geographic area and other factors warrant. It recommends using shaded areas, misting fans or air conditioning for hot weather, and a place to sit and rest. For cold weather, it recommends using dry, protected, and heated areas for the rehab site. It is important that the site allow for physical rest, where members can remove their PPE safely, away from exhaust fumes or other potential hazards, and provide for mental rest from the stress and pressure of the incident. The site characteristics should accommodate multiple crews and be accessible to the medical treatment area.

### Incident Scene and Training

At the incident scene and during fireground training, rehabilitation efforts should be preplanned so that all members can know what to expect and what their roles are. Rehabilitation should be available for incident scene tactical rehab. According to NFPA 1584, this rehabilitation should include a minimum of BLS, although advanced life support (ALS) is preferred if available. EMS personnel will question members for symptoms of dehydration, heat stress, cold stress, physical exhaustion, cardio abnormalities, emotional or mental stress, or exhaustion.

The primary role of EMS personnel is to treat a member's symptoms of heat or cold stress. The guideline suggests that members remove/add clothing to regain normal body temperature, drink fluids, eat food, and rest. In all cases, members entering or leaving the rehab area are assigned by the IC and tracked by the accountability system.

For extreme heat, we are advised to remove all PPE and replace fluids, electrolytes, and calories lost during the incident. A shaded or misted area for initial cool-down should be provided, and fans should be used to create air movement, if necessary. An air-conditioned area for extended rehabilitation to which members can be moved after their body temperatures have stabilized in the initial cool-down area should be made available if possible; medical evaluation and treatment for heat emergencies should be provided per local EMS protocols.

The medical evaluation and treatment provided in the rehab area should include drinking between 12 and 32 ounces of water during a 20-minute rest period and even more in extreme temperatures. The recommended work-to-rest ratio is 20 minutes of work when using a 30-minute cylinder, followed by 10 minutes of rest. The rest period should be accompanied with hydration. When up to two 30-minute cylinders or one 45- to 60-minute cylinder is used for a hazmat incident, the member must be allowed a 20-minute rest period with hydration. All members must be hydrated and medically assessed to ensure they are fit to return to duty.

### KEEPING THE CORE COOL

Human physiology depends on keeping the core body temperature close to 98.6°F (37°C). Our natural thermal regulation system cools the body through sweating and evaporative cooling through vasodilation (increased blood flow to the skin). PPE restricts this cooling. Core temperatures greater than 102°F (39°C) are dangerous and can lead to heat stress.

Although this guideline is an excellent document that provides the



**(2) Too little, too late: First aid is not rehabilitation! (Photo by Scott Stilborn.)**

basics for a good rehabilitation program, it does not stress the importance of core cooling enough. One can assume that medically evaluated members can safely return to work. This, however, may not be the case! Failure to monitor increases in core temperature can expose an emergency worker to a greater risk of succumbing to heat stress. Last year's tragic deaths of thousands of elderly people in Europe attest to the potential dangers of heat stress. Core temperature cooling must become a standardized rehabilitation practice, along with hydration!

Typically, most departments have been providing passive cooling—the removal of clothing to allow the body to cool through evaporative cooling. Passive cooling is recognized as insufficient, and a number of strategies to assist cooling have been used for decades in the fire service—for example, hose streams; ice; ice packs; wet towels; fans; and, more recently, misting fans (photo 2).

The military, industrial, and municipal fire services have recognized that passive cooling does not reduce core temperature. The almost universal use of bunker gear and the interest in the physiological responses with respect to its use have driven more research in these areas.

Recent scientific studies have identified the critical importance of “actively cooling” the body's core temperature as a means of lowering the risk of suffering from heat stress. In particular, forearm immersion has been identified as the most effective means to quickly lower core temperatures (photo 3).

### British Royal Navy Study

A declassified British Royal Navy document (1996)<sup>2</sup> arising from the Falklands War describes the superior effectiveness of using hand and forearm immersion to lower core body temperatures for shipboard firefighting. The Institute of Naval Medicine investigated the effectiveness of hand and forearm immersion in water as a technique for reducing heat strain (stress). Personnel exercised at a moderate work rate while wearing firefighting PPE in an environmental chamber set to 104°F (40°C). This study clearly showed that without hand/forearm immersion (active cooling), subjects were unable to cool and that “immersion of the hands in water (at 50°F/10°C, 68°F/20°C, and 86°F/30°C) significantly lowered body core temper-

## Figure 1. Sample Rehabilitation Standard Operating Procedure

### **PURPOSE**

To provide guidance on the implementation and use of rehabilitation as a tactical requirement of the incident command system (ICS) at the scene of a fire/emergency or training exercise. It will ensure that personnel who may be suffering the effects of metabolic heat buildup, dehydration, physical exertion, and/or extreme weather receive evaluation and rehabilitation during emergency operations.

### **SCOPE**

All personnel attending or operating at the scene of a fire/emergency or training exercise.

### **RULES**

- Rehabilitation shall commence when fire/emergency operations and/or training exercises pose a physical or mental risk.
- Tactical level rehab shall be provided for large-scale incidents, long-duration incidents, and those associated with significant temperature extremes.
- IC shall establish a rehabilitation sector and make provisions for rehabilitation according to the circumstances of the incident. These provisions shall include the following:
  - Rest: a “time-out” to help firefighters stabilize vital signs.
  - Rehydration: replacing lost fluids/plasma volume.
  - Restoration: of core temperature through “active cooling” (warming).
  - Rx: medical monitoring and treatment.
  - Relief from extreme climatic conditions (heat, cold, wind, rain).
  - Refueling: calories and electrolytes.

### **RESPONSIBILITIES**

#### *Incident commander shall*

- Include tactical rehabilitation in incident/event size-up.
- Establish a rehabilitation sector to reduce adverse physical effects on firefighter while operating during fire/emergencies, training exercises, and extreme weather conditions.
- Designate and assign an officer to manage the rehabilitation sector.
- Ensure sufficient resources are assigned to the rehabilitation sector.
- Ensure EMS personnel are available for medical monitoring and treatment of firefighters as required.

#### *Rehab sector officer shall*

- Don the rehab officer vest.
- Whenever possible, select a location for the Rehab Sector according to the following site characteristics:
  - Able to accommodate the number of personnel expected (including EMS personnel for medical monitoring) and accommodate a separate area to remove PPE.
  - Accessible for an ambulance and EMS personnel should medical treatment be required.
  - Removed from hazardous atmospheres including apparatus exhaust fumes, smoke, and other toxins.
  - Provide shade in summer and protection from inclement weather at other times.
  - Have access to a water supply (bottled or running) to provide for hydration and active cooling.
  - Located away from spectators and media whenever possible.
- Ensure personnel in Rehab “dress down” by removing their bunker coats, helmets, and hoods and open their bunker pants to promote cooling.
- Provide the required resources for rehab, including the following:
  - Potable drinking water for hydration.
  - Sports drinks (to replace electrolytes and calories) for long-duration incidents (working more than one hour).
  - Water supply for active cooling through forearm immersion.
  - Medical monitoring equipment (chairs to rest on, aural/timpanic thermometers, blood pressure cuffs, stethoscopes, first-aid supplies, check-sheets, and so forth).
  - Food, where required, and a means to wash or clean hands and face prior to eating.
  - Blankets and warm, dry clothing for winter months.
  - Washroom facilities, where required.
- Time personnel in Rehab to ensure they receive at least 15 to 20 minutes of rest.
- Ensure personnel rehydrate themselves.

- Ensure personnel are provided with a means to be actively cooled where required.
- Maintain accountability and remain with the Rehab Sector at all times.
- Document members entering or leaving the Rehab Sector.
- Inform the IC and EMS personnel if a member requires transportation and treatment at a medical facility.
- Serve as a liaison with EMS personnel.

#### *Company officers shall*

- Be familiar with the signs and symptoms of heat stress.
- Monitor their company members for signs of heat stress.
- Notify the IC when fatigued members require relief, rotation, or reassignment according to conditions.
- Provide for adequate rehabilitation of company members as required.
- Ensure that their company is properly checked in with the Rehab Sector officer and that the company remains intact.

#### *Crew members shall*

- Be familiar with the signs and symptoms of heat stress.
- Maintain awareness of their and company members’ signs and symptoms of heat stress.
- Promptly inform the company officer when members require rehabilitation or relief from assigned duties.
- Maintain unit integrity.

#### *EMS personnel shall*

- Report to the IC and obtain the rehab sector requirements.
- Coordinate with Rehab Sector officer.
- Identify the EMS personnel requirements.
- Check vital signs, monitor for heat stress and other medical issues, and provide treatment and transportation to medical facilities as required.
- Inform IC and Rehab Sector officer when personnel require transportation to and treatment from a medical facility.
- Document medical treatment provided and, where possible, document medical monitoring, including core temperature, for all members in the Rehab Sector.

### **PROCEDURES**

- All personnel are encouraged to prehydrate themselves on an ongoing basis and rehydrate throughout the incident.
- Members shall be sent to Rehab as required.
- All members must be sent to Rehab following the use of two cylinders or one 45-to 60-minute cylinder. Shorter times may be considered during extreme weather conditions.
- Active cooling should be applied where temperatures, conditions, and/or workload create the potential for heat stress.
- Provide a minimum of 10 minutes (20 minutes is preferable) of active cooling through forearm immersion following the use of the second and each subsequent cylinder use.
- Personnel in Rehab are to rest for at least 15 to 20 minutes prior to being reassigned or released.
- EMS personnel are to provide medical monitoring including core temperature, heart rate, and blood pressure. Members displaying elevated or abnormal signs should be considered for medical treatment.
- Members displaying elevated vital signs will be checked twice while in Rehab. Vital signs shall be within the normal range prior to the member’s being released or reassigned.
- Personnel who are weak or fatigued with pale clammy skin, low blood pressure, nausea, headache, or dizziness shall be assessed by EMS personnel.
- Personnel experiencing chest pain, shortness of breath, dizziness, or nausea shall be transported to a medical facility for treatment.
- Personnel transported to a medical facility for treatment should be accompanied/attended to by a department representative.
- Members should drink approximately 8 to 10 ounces of water during rehab. After the first hour, a sports drink containing electrolytes (e.g., Gatorade) should be provided. Soda and caffeinated and carbonated beverages should be avoided.
- Members should consume 16 ounces (500ml) of water during the final rehabilitation period.
- Nutritional snacks (e.g. power bars) or meals should be provided during longer-duration incidents as required.
- Personnel should refrain from smoking in or near the Rehab Sector.

ature within 10 minutes.” This cooling process does not lead to vasoconstriction. Vasoconstriction refers to the restriction of blood flow to skin surface where capillaries decrease in size.

**Effectiveness.** “Hand immersion in water at a temperature of between 10°C and 30°C (50°F and 86°F) is an efficient means of cooling heat-stressed personnel who have been exercising. This simple and effective technique may be applied to many industrial and military tasks to reduce heat strain, lower the risk of heat injury, and increase safe total work times in the heat.” (3)

### DEFENCE RESEARCH AND DEVELOPMENT CANADA (DRDC) STUDY

Another more recent study clearly demonstrates the critical importance of not allowing the body’s core temperature to rise beyond 38.5°C (101.3°F). Dr. Tom McLellan, from Defence Research and Development Canada (DRDC), conducted a study funded by the Workplace Safety and Insurance Board of Ontario on the “Heat Stress of Wearing Firefighting Protective Clothing: Defining the Problem and Creating Solutions” in 2002.<sup>3</sup> The Toronto Fire Services participated. The study defined work limits in warm environments while wearing PPE, reviewed hydration strategies, and evaluated three cooling strategies (passive cooling or “dressing down”) and two active cooling strategies (misting fans and forearm immersion).

**Implications/conclusions.** Several significant conclusions resulted. One is that heart rate during recovery cannot be used to indicate the thermal strain. This study also confirms that two-thirds-full fluid replacement results in a 20-percent performance advantage compared with no fluid replacement. It goes on to assert that “active cooling” (forearm immersion or misting fan) is essential for core cooling. Forearm immersion and misting fans extend exposure and work times significantly. Misting fans rely on evaporative cooling, which is significantly less effective in humid environments.

Passive cooling will not alleviate heat stress. Core temperatures continued to rise following moderate or heavy work during a 30-minute rest even though heart rates continued to decrease. Heart rate recovery and subjective feelings of comfort cannot be used to determine when it is safe to return to work (photo 4).

Forearm immersion was found to be the most effective cooling strategy. Total forearm immersion is superior because the skin surface is in continuous contact with the medium and will provide maximum heat transfer through conduction. When combined with hydration, it can double the time firefighters can safely continue to work and remain encapsulated.

### Active Cooling Strategy

If resources are available, active cooling with forearm immersion should be used after each cylinder use. Even where resources are not available, active cooling must be used after the use of two cylinders. Following this initial rehabilitation (after the second bottle), firefighters must use active cooling (e.g., forearm immersion) after each cylinder use.

### Traps

Traps are easy to fall into and should be avoided. Even following the recommended guideline can promote a false sense of security if you fail to address active core cooling in your protocols. Resting even when you don’t feel you “need” it is important. Hydration, of course, is critical. You must drink an adequate amount of water (between 12 and 32 ounces/354 and 946 ml) to avoid dehydration. Passive cooling is inadequate much of the time, particularly when more than two cylinders are used or in conditions that significantly increase thermal loads. Not actively cooling is not an option! Standards and guidelines should be followed and used as a minimum benchmark. Core temperature cooling should be included in medical monitoring, and active cooling must become part of normal rehabilitation procedures (photo 5).

### PROTECTING OUR OWN

Firefighters can start by recognizing that our tools involve more than just equipment! Firefighters must understand what the equipment is used for—*rehabilitation is a required fireground tactic!* The incident management system begins with buy-in from the senior level. Incident management must be practiced and followed. Chief officers must understand and implement tactical rehabilitation, when required.

Firefighters must know what to do and practice it regularly. Rehab procedures should be used at all incidents where it is needed. Individuals need to know their responsibilities and departmental operating procedures or guidelines. Firefighters should review current, pertinent materials such as scientific studies referenced herein and firefighting reference materials.

- **Develop rehab SOGS/SOPs.** Fire departments must develop SOGS or SOPs to provide the recommended rehabilitation practice. This procedure should include rest, hydration, active cooling, and fueling. These procedures should be linked to a “heat index” for hot weather. Ambient air temperature and relative humidity can be factored together to create what is often referred to as a “heat index.” The Steadman heat index is often used to help define heat/humidity benchmarks. Working in direct sunlight can add 10°F (5.5°C) to the heat index. Working in full turnout gear can add an additional 10°F (5.5°C).



(3) “Active cooling” through hand and forearm immersion. (Photo by Gerald A. Tracy.)



(4) Changing out must address core cooling. (Photo by Peter J. McBride.)

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(5) Medical monitoring during "active cooling." (Photo by Gerald A. Tracy.)

The same hot-weather guidelines for rest, rehydration, and cooling apply under cold weather conditions during interior operations such as high-rise fires, interior firefighting, undergrounds, and so forth. Rehabilitation in cold weather still requires rest, hydration, and active heating. We must continue to recognize the need to maintain our core temperature. Cold stress can have as detrimental an effect on safety and performance as heat stress. Cold-weather guidelines require that we observe members for the



(6) A timpanic membrane thermometer is used to measure core temperature. (Photo by Gerald A. Tracy.)

effects of frostbite (white, waxy skin) during each cylinder change and rest period. Members operating for prolonged periods in cold, wet conditions will be observed for signs of hypothermia.

- **Get proper resources and equipment.** Obtain the necessary resources and equipment. Determine the resources you will need, and identify logistical problems that may be unique to your department. Some of these resources may include bottled water, chairs to rest on, buckets or rehab chairs for forearm immersion, umbrellas, and misting fans. It is also important to have healthy, nutritionally balanced food

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available for long-duration incidents. Intra-aural tympanic (ear) thermometers should be used to check core temperatures. Wipes to clean members' hands and faces or a source of running water and some form of cleansing agent should be provided for hygiene and decontamination (photo 6).

• **Train like you mean it.** We must provide training. Effective rehabilitation can save firefighter lives. It is essential that departments develop procedures and practice and implement them to help ensure their members' safety! Once procedures and protocols are developed and the equipment/supplies are obtained, the SOP can be issued. These same protocols should be used consistently. Personnel must know how, when, and

**EFFECTIVE REHAB CAN SAVE FIREFIGHTERS' LIVES. THUS, IT IS ESSENTIAL THAT DEPARTMENTS NOT ONLY DEVELOP PROCEDURES BUT PRACTICE THEM TO HELP ENSURE THEIR MEMBERS' SAFETY.**

where to establish rehab. During training or practice, firefighters should practice as if it were the real thing. Train firefighters to use the same protocols for all incidents, and monitor operations to ensure it is done.

• **Determine fitness for work.** NFPA 1582, *Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians* (2000), specify health and fitness levels required to perform active fire service duty. They list categories A and B. Those who qualify for A can be outfitted with PPE and SCBA to perform interior structural firefighting activities. Those who are rated B can still assist at the incident in a less physically demanding way (e.g., operate the engine or pump). Regardless of a firefighter's fitness level or fireground position, rehabilitation must be provided.

• **Promote wellness.** Fit firefighters perform better. Wellness promotes a fit and healthy lifestyle of strength, aerobic conditioning, and flexibility. It addresses living with stress, smoking cessation, and nutrition. IFSTA's *Fire Department Safety Officer* (2002) and the International Association of Fire Fighters/International Association of Fire Chiefs *Joint Wellness Initiative* (1997) are good resources for a fire department wellness program.

### WHERE DO WE GO FROM HERE?

The fire service must understand the importance of rehabilitation in managing the consequences of firefighters' physiological response to heat and cold stress. We need to manage tactical operations with tactical rehabilitation to prevent temperature-related injuries.

We have identified the core components for an effective rehabilitation program. Review the literature referenced herein, and work within your department and with other departments to develop best practices. Obtain the necessary resources, through budget requests, fundraising, sponsorships, and other means. Issue the SOP, and train your members in their



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- Meets NFPA 1500 Regulations
- Flex Boom mic for clear communication
- Lightweight • Rugged • Dependable

### Ultrasound Intercom



- Interfaces with all mobile radios
- Single or dual radio interfaces
- Up to 12 intercom positions

### S-A-F-E Communicator



- Ideal intercom for mobile command centers, ambulances, marine and air port vehicles
- Simultaneous transmission on two radios — Monitor a third radio

### Featured Accessories

- **Mobile Radio Interface Modules**  
Connects between a headset, PTT switch, and a mobile radio or cell phone
- **Portable Radio Adapters**  
Connect a headset to a portable radio

NFPA Member • Made In the U.S.A.

**HEAR IT RIGHT**  
*the first time!*  
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## Rehabilitation: Standards, Traps, and Tools

### REHAB STRATEGIES THAT INCLUDE ACTIVE COOLING AND HYDRATION MAY HELP TO PREVENT FUTURE TRAGEDIES.

roles and responsibilities in the use of rehab as a tactical tool. Implementing these suggested rehabilitation practices will go a long way in protecting firefighters' health and safety and, we believe, reduce fireground injuries and deaths.

#### BEYOND THE FIRE SERVICE

The rehabilitation practices described herein are not limited to the fire service. Many athletes suffer from heat stress, and not just at the professional level. College and high school football players continue to die from heat stress. Many industries such as

utilities, petroleum, mining, entertainment, and the construction trades may all benefit from employing these same rehabilitation practices. Rehab strategies that include active cooling and hydration may help to prevent future tragedies such as those that occurred in the European heat wave of 2003. The science is sound. We just need to apply it! ■

#### Endnotes

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3. McLellan, Dr. Tom, Defence Research and Development Canada, "Current Fire Fighter Occupational Medicine Issues, Approaches for Fire Fighter Rehabilitation," Sept. 2003, IAFF John P. Redmond Foundation Health and Safety Seminar, San Francisco.

#### Additional References

*Commanders' Guide for Continuous Work Times for Firefighters*, Defence Research and Development Canada, Toronto, 2003.

*Guide for Fluid Replacement, Rehabilitation and Personnel Management*, Defence Research and Development Canada, Toronto, 2003.

Ottawa Fire Services Rehabilitation Training Notes.

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in Safety, Rescue  
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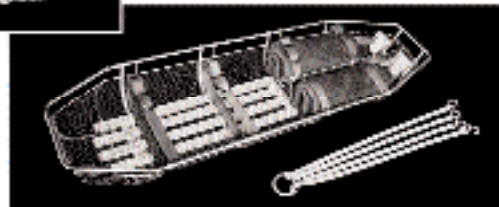
### 300 Series - Lightweight Basket-Type Stretchers

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