



Firemedically

with Mike McEvoy

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Serious About Rehab in 2007

It takes twice as long to conceive and birth a National Fire Protection Association (NFPA) standard than a full-term healthy baby. On Dec. 22 last year, a draft, "Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises," was released for comment. Known affectionately as NFPA 1584, this baby was originally born and published in 2003. The draft document, comment form, and development history can be downloaded from [NFPA's Web site](#). Comments are due back by March 2 this year.

Two major changes

The first version of NFPA 1584 was called, "Recommended Practice on the Rehabilitation of Members Operating at Incident Scene Operations and Training Exercises." The new name highlights the most significant change. If approved, the guideline will be reborn as a standard, giving it more teeth than the present "recommendations." A second significant change is the addition of active cooling and warming measures to the rehab process for members with symptoms of heat or cold-related stress. An annex to the 1584 draft touts the superiority of forearm immersion (hands and forearms immersed in cool water) as a preferred means for active cooling.

What 1584 requires

The intent of 1584 is to establish minimum criteria for rehab of firefighters at incident scenes and during training. It's designed to function within the context of the Incident Management System (IMS) and operate within a department's usual chain of command.

Crews need to be rotated to allow for rehab, ideally following the use of a single 30-minute SCBA cylinder or a 20-minute work cycle. The standard mandates formal rehab after a second 30-minute SCBA cylinder, a single 45 or 60-minute cylinder, or a 45-minute work cycle and implies that firefighters should rehab themselves after the first bottle.

Rehab operations start whenever an incident or training session poses a risk of exceeding safe levels of endurance to members. Department SOPs prescribe when and how members are assigned to rehab, although company officers must assess rehab needs of their crews at least every 45 minutes, or more often in extreme conditions. Tracking through the accountability system is required.

Pre and post-incident hydration are emphasized. For training, pre-hydration includes an additional 500 ml (16 oz) of fluid within two hours of the exercise. All firefighters should ingest a minimum of 180 to 240 ml (6 to 8 oz) of fluid every six hours to maintain a normal state of hydration readiness, in addition to fluids consumed with meals. During training or incidents, company officers must assure that members remain hydrated and that safe drinking water is available. Post-incident hydration includes 500 to 1,000 ml (16 to 32 oz) of fluid over a period of up to two hours after an incident.

Rehab areas require appropriate shelter, protection from harsh environmental conditions, seating for members, and a designated medical monitoring and treatment area. An additional area for members to remove their PPE (Personal Protective Equipment) prior to entering the rehab location is required. Emergency medical personnel must evaluate each member arriving at rehab for symptoms suggestive of health or safety concern.

How medical monitoring is conducted lies in the hands of local medical control, although 1584 requires EMS to be alert for members complaining of chest pain, dizziness, shortness of breath, weakness, nausea, headache, cramps, aches and pains, symptoms of heat/cold-related stress, changes in gait, speech, behavior, or altered mental status.

Medical evaluation also includes RPE (Rate of Perceived Exertion) assessment. Symptomatic members and anyone with abnormal findings require additional monitoring. Any member treated for heat-related injuries must be removed from active duty. Before leaving rehab, each member must be re-evaluated by emergency medical personnel to assure they can return to duty.

A minimum 10 minute rest is required for first time rehab (self-rehab); a 20 minutes minimum applies after the second 30-minute SCBA cylinder, a single 45 or 60-minute cylinder, or a 45-minute work cycle. Members entering rehab need to consume a minimum 1 liter (32 oz) of fluid before leaving. Appropriate calorie and electrolyte replacement must be available, especially during prolonged incidents (greater than three hours) or for members working for more than one hour. Whenever calorie replacement (e.g., food) is used, a means for members to wash their hands and faces must be available.

If heat-related stress is observed, PPE must be removed and, if applicable, active cooling applied. Members with cold-related stress should add clothing, wrap themselves in blankets, or use other methods to regain normal body temperature.

If any member is seriously injured or killed during an incident, all members of his/her crew are to be removed from service and undergo critical incident stress management according to department policies.

Documentation required by 1584 includes time in/out for members in rehab. Any medical evaluation performed must be documented. A copy of each member's medical monitoring is also required to be placed in their employee medical record.

Helpful attachments

1584 contains three helpful annexes that explain and elaborate on the standard. Information on healthy nutrition, sample rehab SOPs and a layout of a rehab and treatment area, heat and cold stress documentation, the RPE scale, suggested medical monitoring components, forms for use in rehab, recommended foods for calorie replacement, and all the references used to develop 1584 are included.

Clarifications are found in the annexes for some of the confusing elements of the standard. For example, the 10 and 20 minute minimum rest periods are further broken down into at least 10 minutes of self-rehab after the first 30-minute cylinder (or 20 minutes of intense work) followed by at least 20 minutes in a rehab area after the second bottle. Prepackaged wipes are suggested as a means for providing members to wash their hands and faces (running water not required).

Training required

As in other NFPA standards and guidance documents, an emphasis on fitness and ongoing healthy nutritional and hydration habits serve as underpinnings of 1584. Members, like professional athletes, need consultation to maintain a healthy style of living. RPE is an exertional scale that helps to quantify fatigue levels; teaching members how to use this self reporting scale will speed up medical monitoring during rehab. Heat and cold stress are considered significant factors affecting firefighter performance. NFPA has included a substantial heat/cold stress educational component in Annex C of 1584.

Reading between the lines

Scientific evidence supports much of how modern medicine is practiced. Traditions that lack evidence are increasingly called into question. The 2003 version of 1584 suggested EMS evaluate the RPE, heart rate, blood pressure, and temperature of every member entering rehab. That was controversial, and the revising authors wisely recognized this.

RPE is subjective; use it to determine length of rehab and firefighters may learn to self-report an RPE that quickly returns them to duty. Heart rate varies widely amongst individuals; while extreme highs and lows might be significant, the time needed to return to baseline is far more telltale for fatigue than actual heart rate itself. Blood pressure has not one scrap of medical evidence correlating measurement with patient outcomes (a sad lesson that modern medicine has yet to comprehend).

Accurate temperature measurement befuddles even the most talented hospital clinicians. It's hardly likely to be accomplished reliably in the harsh environmental conditions of a fire-ground. Recent studies seem to be telling us that conditioned athletes as well as firefighters can tolerate (and actually function quite well) at higher than normal body temperatures.

The bottom line: Each department must determine how to medically assess their members. Members also need to recognize their own signs of fatigue before reaching complete exhaustion. Any assessment must be correlated with

how a member looks and feels – treat people, not numbers.

While few could argue with the inherent dangers of hypothermia, current medical science is not so strong on hyperthermia. While the authors of 1584 provide evidence for the superiority of forearm immersion compared to other methods of active cooling (misting fans), they fail to adequately justify a medical need for active cooling to begin with. That may be a little out of synch with the remainder of the medical monitoring and treatment recommendations contained in 1584.

Something missing?

One problem seemingly overlooked in the revised standard is assessment for carbon monoxide poisoning. Ability to rapidly determine carbon monoxide levels in firefighters with exhaled air measured through an adapter connected to a CO meter has been available for years. In 2006, a non-invasive unit came on the market in the U.S. for the measurement of carbon monoxide blood levels through a finger oximeter probe, the RAD-57 made by **Masimo Corporation**.

While no comprehensive data exist on normal CO levels in firefighters, two facts are widely known: CO is the most common poison in the world today, and dead firefighters often have significantly elevated CO levels. It might be wise, especially given the availability of this new technology, the high incidence of CO poisoning, and the close connection between CO and a fireground, to at least recommend it be available for use in rehab.

Thinking it through

Evidence of a problem is no further away than the U.S. Fire Administration firefighter fatalities listing. We need rehab and NFPA is leading the charge to have 1584 grow from a recommendation to a standard. Your comments will help. Consider how 1584 might meet the needs of your department and put your two cents in. Make 2007 the year the fire service got serious about rehab. null

Mike McEvoy is the EMS Coordinator for Saratoga County and the EMS Director on the Board of the New York State Association of Fire Chiefs. Formerly a forensic psychologist, he is a clinical specialist in Cardiac Surgery and teaches Critical Care Medicine at Albany Medical College. Mike is a paramedic for Clifton Park-Halfmoon Ambulance, chief medical officer for West Crescent Fire Department, and past chair and current member of the New York State EMS Council.

He is the fire-EMS editor for Fire Engineering magazine and recently published a book titled "Straight Talk About Stress for Emergency Responders." Mike is a popular speaker at fire, EMS, and medical conferences and in his free time, is an avid hiker and winter mountain climber. To contact Mike, e-mail Mike.McEvoy@firerescue1.com.

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