

Response to Reviewers' Comments for "Preventing Fire Fighter Fatalities Due to Heart Attacks and Other Sudden Cardiovascular Events"

Reviewer #1

1. Page 3 – under CURRENT STANDARDS

NFPA 1500 should also be discussed, especially the portions dealing with physicals and provision of Emergency Medical Care at incidents. You may want to insert wording such as this:

NFPA 1500 Fire Department Occupational Safety and Health Program, stipulates that fire departments shall establish an Occupational Health and Safety Committee to research, develop recommendations, as well as study and review matters pertaining to occupational health. The standard stipulates requirements for standby emergency medical care at a minimum of Basic Life Support (BLS) level at certain incidents and the requirement at all incidents for the incident commander to evaluate the need for emergency medical care and patient transportation. The standard also requires compliance with NFPA 1582 and NFPA 1853 Standards.

RESPONSE: Reference to NFPA 1500 in the Currents Standards section was included.

2. Would recommend that discussion in this report of any NFPA standards should be run by the NFPA.

RESPONSE: One of the external reviewers of the entire document was from the NFPA.

3. – under the USFA and NVFC discussion

Could you add the web link for the USFA Health and Wellness Guide for the Volunteer Fire Service? <http://www.usfa.fema.gov/downloads/pdf/publications/fa-267.pdf>

RESPONSE: This web link was included in the references section.

4. USFA did not initiate the Heart Healthy Program, it as supported by an AFG Fire Act Grant.

RESPONSE: The text was changed to note that the Heart Health Program was a NVFC program, not a USFA program.

5. Would recommend that this section be reviewed by the NVFC.

RESPONSE: One of the external reviewers of the entire document was from the NVFC.

6. Page 10 – under RECOMMENDATIONS

During fire suppression and training operations

Suggest adding:

- Ensure standby emergency medical care at a minimum of Basic Life Support (BLS) level at all emergency incidents, with Advanced Life Support (ALS) and patient transportation preferred.

RESPONSE: Agree. This recommendation was added.

Reviewer # 2

These are the questions you posed:

- 1) Does the background section appropriately summarize the current literature regarding heart disease and fire fighting?
See Below
- 2) Do the case reports identify the important findings from the NIOSH cardiovascular disease investigations?
Mostly – see comments below.
- 3) Are these findings adequately discussed in the section "Data from the NIOSH CVD Investigations"?
See below.
- 4) Are the conclusions supported by the body of the document?
Yes.
- 5) Are the recommendations appropriate?
See below.

- 6) Are there any additional recommendations you think should be included in this document?

Fire Service agencies need to better define the Essential Job Functions of the fire fighter. What is needed is some performance criteria for the tasks. For example, the task is that the fire fighter needs to be able to climb a ladder and enter a building. What is needed in this is how fast he/she needs to do this. Without this piece of data, the needed aerobic capacity cannot be defined, and thus, one cannot evaluate a candidate or an incumbent as to their ability to safely do the job. As relates to CVD this will allow the physician evaluating the fire fighter to set a level of performance that must be achieved without evidence of ischemia before clearing the person for full duty.

RESPONSE: No change. The aerobic capacity needed to perform the essential job tasks of structural fire fighting is somewhere between a MVO₂ max of 35-42 ml/kg/min (10-12 METS). This is really a physical fitness test of whether the fire fighter can do the essential job tasks, not a medical issue.

COMMENTS:

Introduction – We know that 44% of the deaths with medical info had prior CAD. Do we know, of those who did not have a cardiac event, how many had prior CAD?

RESPONSE: No change. This information is not known.

Background –

1. It would be nice to have quoted in the paper the rate of cardiac events in fire fighters and in other classes of workers. What really is the difference?

RESPONSE: No change. The SMR studies show the rates compared to both the general population, and, in a few studies, compared to police officers. As mentioned in the background section, the findings are mixed: some show increased rates, others do not.

2. This does not address the changes in the fire fighter life style. Much of the literature about the increased risk is from a group that did not use SCBA's regularly, smoked, ate poorly and tended to be overweight and inactive. The current attitude toward healthy life style in the firehouse is vastly different now,

and it would be nice to have this section address the difference in the rates of cardiac events in older literature and more recent literature.

RESPONSE: No change. There is little or no published information regarding the CAD risk factors among fire fighters over time. One non-peer reviewed poster that was presented at a medical conference suggested no change.

Current Standards –

1. NFPA – suggest also reference 1581 and 1584 (infection and rehabilitation) that are issues that can impact on morbidity and mortality.

RESPONSE: Partially agree. Reference to 1584 made. 1581 (Infection control) not relevant to fire fighter CVD.

Case Reports-

Case 3 – Report his aerobic capacity in METS too.

RESPONSE: Change made.

Case 4 – May not be a good example – with that amount of CAD, AED shocks may not have made any difference. A better example would be a case that is more likely arrhythmic.

RESPONSE: No change. Even with AEDs, ALS resuscitation is only about 50%. However, without defibrillation, survival from Vfib is very unlikely.

Case 5 – This category is not the same as the others. The others are causes of the event. This is just about when they happened and is not a factor that can be considered to have cause and effect.

RESPONSE: Agree. Added a statement why this is an important issue.

“This case illustrates that sudden incapacitation by a fire fighter while performing critical functions (e.g. driving, fire suppression, rescue, etc.) jeopardizes the safety not only themselves, but other fire fighters and civilians.”

Data from NIOSH CVD Investigations –

1. Medical evaluation: Did the 31% of departments who did periodic exams have a lower rate of cardiac events in their department?

RESPONSE: No change. We do not have non-fatal data for Fire Departments.

2. Medical clearance: third suggestion: put in a comment to NFPA to adopt a PMD letter such as the one being developed by the ACOEM LEO guideline Task Group.

RESPONSE: Somewhat agree. The document was changed to reflect that medical clearance should state what the fire fighter can do and cannot do (e.g. restrictions). However, the ACOEM LEO task group document is not available to the public at this time.

3. SCD While Operating A Vehicle: I reiterate that I do not think this is an issue that is causative. There are many scenarios where the sudden incapacitation of a fire fighter would cause harm to co-workers and the public, and I do not see why

this one is singled out – especially since it has not caused any collateral damage yet.

RESPONSE: Somewhat agree. This is not a causative in his death, but illustrates the risk to co-workers and the public. I think it is important for the fire service to realize it is more than just accepting the risk for themselves.

Recommendations –

1. Fire Departments:

- a. Typo – Candidates – 3rd bullet conducted not conducted.

RESPONSE: Agree. Change made.

- b. During fire suppression ... - Need to talk about fire scene (and training) rehabilitation (NFPA 1584).

RESPONSE: Agree. Change made.

“Provide on-scene rehabilitation to monitor vital signs for indication of excessive cardiovascular strain, and to cool and rehydrate the FF.”

- c. Why test for CO only in arrests, this is when the horse is out of the barn. Maybe, this should be part of the rehabilitation to catch it before it causes a problem.

RESPONSE: Agree but no change in the document. Testing for CO post-mortem helps determine the cause of death. Use of real time CO monitors during overhaul is used by many fire departments, but it is not necessary to raise this issue in this document.

Reviewer # 3

Are there any additional recommendations you think should be included in this document?

- (Revise the following) Ensure medical clearance for full-duty fire suppression and SCBA use is conducted by either 1) the fire department physician, or 2) a primary care physician certified or otherwise confirmed by the fire department as knowledgeable about the physical demands of fire fighting and the consensus guidelines developed by the fire service [NFPA 2003].

RESPONSE: There is no certification process to become a “fire department” physician. One way to ensure the physician is “knowledgeable about the physical demands of fire fighting and the consensus guidelines developed by the fire service” is to provide the consensus guidelines to the physician. A sentence was added to incorporate this idea. “Providing these consensus guidelines to the physician should help with conformity.”

Reviewer # 4

General Comments:

This is a powerful document that has the potential to decrease LODD and to generally improve the health of Fire Fighters.

I especially like the WARNING statement on the front page. Very dramatic.

The document is logically organized and effectively pulls together appropriate standards and illustrates them with case studies.

The recommendations are a strong feature of the current document and have wisely addressed what department, individuals, and agencies can do to lessen the incidence of CVD in the FS.

General Recommendations – the following list of recommendations address ways that I think the document might be improved, either in terms of making it more attractive, or more complete. I certainly understand that some of these suggestions may not be able to be incorporated at this stage, but I offer them for your review.

1. Consider adding more graphics and using them to make the document more attractive (for example, fire fighters engaging in physical exercise, fire trucks and FF working at a fire!).

RESPONSE: I agree. Will discuss whether we can spruce up the Alert with some photos.

2. I would like to see a section devoted to describing HOW FF increases the risk for sudden cardiac death. The section on “Exposures Associated with Cardiac Effects” is excellent and I expect it will be well received. But, I also think it is important to note that, for the most part, heart attacks and sudden cardiac events occur in individuals with underlying cardiovascular disease. So, adding a section that briefly describes cardiovascular disease (atherosclerotic heart disease) and how FF might cause this chronic condition to become an acute, emergency condition seems helpful. You may also want to consider this in an accompanying document.

RESPONSE: I agree. Two sentences were added at the beginning of the background section.” Coronary artery disease among fire fighters is due to a combination of personal and workplace factors. The personal factors are well known: age, gender, family history, diabetes mellitus, hypertension, smoking, high blood cholesterol, obesity, and lack of exercise [AHA 2007b].”

3. I recommend also including NFPA 1584, Recommended Practice on the Rehabilitation of Members Operating at Incident Scene Operations and Training Exercise. I believe there is a plan to upgrade this to a standard, and I think it dovetails nicely with 1582 and 1583 in terms of addressing cardiovascular strain associated with FF. 1582 recognizes that a FF must be medically fit to safely perform FF tasks. 1583 recognizes that physical fitness enhances cardiovascular fitness and lessens the strain associated with an absolute workload. 1584 recognizes that FF causes significant thermal, cardiovascular and physiological strain – and that FF should have their vital signs measured for early signs of more severe problems.

RESPONSE: I agree. This recommended practice was included under the Current Standards section of NFPA.

Specific Recommendations.

1. Introduction, toward the end of 1st paragraph. It would be useful to also note the number of non-fatal HA that occur in the FS. While the emphasis is clearly on CV deaths, and should be, the number of deaths underestimates the problem.

RESPONSE: Agree. Added this paragraph in the introduction section.

“Fortunately, not all heart attacks and other sudden cardiovascular events are fatal. About 62% of individuals suffering a heart attack will survive for at least one year. [AHA 2007a]. Therefore, focusing on fatality data underestimates the magnitude of the problem. Unfortunately, the fire service has no surveillance system for reporting non-fatal events.”

2. Introduction, end of 2nd para. Separate the sentence, “This document...” into a new paragraph to avoid awkward transition from previous sentence. Also consider expanding the sentence, perhaps something like, In an attempt to share lessons learned from previous investigations, and to integrate that information with other meaningful data, this document...

RESPONSE: Agree. Change made.

3. Background, Increased HR and Heavy Physical Exertion – The Smith 1995 ref. is not the most appropriate since that study was conducted in a laboratory. For your convenience I will attach a list of articles that may be relevant-especially if you wanted to include a more inclusive description of the effect of FF on the CV system. I recommend the starred, 2001 article because it specifically addresses cardiovascular strain – including HR and stroke volume (which is significantly decreased following FF).

RESPONSE: Agree. Change made.

4. Background, Exposures Associates with Cardiac EVENTS – not effects?

RESPONSE: No change. Some of the referenced studies address the effects of the substance on cardiac muscle, and not necessarily a cardiac event.

5. FF and Heart Disease – the first para is a bit confusing. The first sentence seems to be addressing the occupational risk of FF relative to CVdisease. Guidotti’s conclusion is really about the acute stress of FF and its ability to cause an acute cardiac event (implicitly in individuals who have CVD), but not necessarily the likelihood that the occupation of FF is associated with developing the disease. The rest of the para again addresses occupational risk.

RESPONSE: No change. Guidotti’s article did review all the published SMR studies addressing FF and CVD. However, he concludes that FF activities that involve heavy exertion can trigger a CVD event.

6. In the same para, what does SMR mean?

RESPONSE: Agree. Abbreviation not used. Standardized mortality ratio.

7. Current Standards, I suggest adding NFPA 1584, as discussed in my general recommendations.

RESPONSE: Agree. Change made.

8. Current Standards, Occupational Safety and Health Admin, about half way into the 1st para. The OSHA standard regarding...is relevant to... You need to clarify why it is relevant rather than just assert that it is.

RESPONSE: Agree. I joined the two sentences to make it clearer why it is relevant.

9. Conclusions. 1st sentence. This is a very strong sentence. Great. Consider also placing it at the beginning of the document.

RESPONSE: It is fitting as a conclusion. No change.

10. Recommendations consider adding

- FD, Candidates. Designate personnel who can assist FF in understanding results of medical exam and how to personally implement lifestyle changes that decrease the risk factors associated with cardiovascular disease and the likelihood of suffering a sudden cardiac event.

RESPONSE: Somewhat agree. A new bullet added to address this but only to refer the candidate with CVD or CAD risk factors to their health care provider.

- FD, During fire suppression. Provide on-scene rehabilitation to monitor vital signs for indication of excessive cardiovascular strain, and to cool and rehydrate the FF.

RESPONSE: Agree. Change made.

- FD, Members. Designate personnel who can assist FF in understanding results of medical exam and how to personally implement lifestyle changes that decrease the risk factors associated with cardiovascular disease and the likelihood of suffering a sudden cardiac event.

RESPONSE: No change. Rather, this idea is included in the fitness/wellness programs that we reference.

- FD, Members. Encourage proper hydration and healthy eating habits at the station.

RESPONSE: No change. Same comment as above.

- FF Candidates and FF. Educate yourself about the cardiovascular demands of Firefighting and about the risk factors for developing cardiovascular disease. Seek ways to modify your cardiovascular risk profile.

RESPONSE: No change. Same comment as above.

- FF Candidates and FF. Make sure you understand the results of your medical exam and how your cardiovascular risk profile has changed over time.

RESPONSE: No Change. Same comment as above.

- Fire Service Agencies. Conduct research aimed at understanding how the stress of firefighting affects all components of the cardiovascular system

(cardiac function, ECG changes, coagulatory events) and investigate strategies directed at mitigating these changes.

RESPONSE: No change. Too specific.

- Fire Service Agencies. Conduct research into novel risk factors and early detection tests that may predict which FF are at risk for cardiovascular events.

RESPONSE: No change. Too specific.

- Fire Service Agencies. Conduct research into the effectiveness of on-scene rehabilitation to mitigate against cardiovascular strain.

RESPONSE: Agree. Change made. "Conduct research into the effectiveness of on-scene rehabilitation to reduce cardiovascular strain."

- Fire Service Agencies. Conduct research to better understand the long-term effects of FF on cardiovascular health.

RESPONSE: No change. I do not think another SMR study on the association of FF with CVD is needed.

Reviewer # 5

I have some minor comments.

- 1) Does the background section appropriately summarize the current literature regarding heart disease and fire fighting?

In general the background section is good. However, I believe that more than carbon monoxide and physical exertion contribute to the problem of heart disease among fire fighters. Fire smoke contains many other toxic substances that could increase the risk for acute cardiac problems. Some examples would be cyanide and hydrochloric acid found in significant amounts in many fires and small particulate matter found in nearly all fires.

Acute respiratory effects from fire smoke exposures have been documented in studies of lung function among fire fighters after a fire. I would recommend changing the title of that paragraph from carbon monoxide to fire smoke exposures and briefly summarizing the exposures that may contribute to cardiac effects including carbon monoxide. I would also mention that acute cardiac events can be delayed in onset.

RESPONSE: Agree. Section re-titled and modified with references.

- 2) Do the case reports identify the important findings from the NIOSH cardiovascular disease investigations?

I thought that the case examples were very good and useful illustrations in helping the intended audience to understand the problems and the factors that may contribute to these problems.

- 3) Are these findings adequately discussed in the section "Data from the NIOSH CVD Investigations"?

The discussion is also very good given the constraints of space, etc. Some of the language may be too technical for the audience especially in the work-relatedness and limitations sections.

RESPONSE: Agree. The document is primarily addressed to the fire service. However, I believe the technical aspects of the Alert are important for skeptics who may challenge the importance of preventing on-duty sudden cardiac deaths among fire fighters.

4) Are the conclusions supported by the body of the document?

I thought that the conclusions were appropriate.

5) Are the recommendations appropriate?

I thought that the recommendations were also good. The heading of Fire Department Members is confusing.

RESPONSE: Agree. I have added a sentence at the beginning of the Recommendations section to prepare the reader to expect recommendations for 1) Fire Departments, 2) Fire Fighter Candidates and Fire Fighters, and 3) Fire Service Agencies.

6) Are there any additional recommendations you think should be included in this document?

No.

Reviewer # 6

I have reviewed the report. I like the section on "Data from the NIOSH CVD Investigations" very much. I was not aware of the temporal death patterns and the OR's for active firefighting.

1) The main problems that I have with the report is that the information provided does not support the recommendation of mandatory annual comprehensive medical examinations regardless of age. This recommendation would require an analysis of both the appropriate frequency of testing and age-related factors. Regarding the latter, I am sure that you have data on the age of death for your cases. This could be used to generate risk rates by age. I would be very surprised if you had any sudden cardiac deaths under 40. If so, NIOSH could recommend cardiac risk factor screening programs beginning at this age or within 5 years of it.

RESPONSE: Agree in principle, but no change.

NIOSH supports the need to conduct mandatory annual medical evaluations in FF. However, nowhere in the document does NIOSH take a position on the components of that evaluation. On this point we mention that a variety of fire service organizations (NFPA, IAFF, IAFC, NVFC) have developed guidance documents.

Regarding risk rates by age, from 2004-2006 we investigated all the fatalities in the fire fighters under the age of 40. We are in the process of analyzing that data.

2) While I support the goals of the firefighter wellness programs, I would argue that the shotgun approach of the IAFF and NFPA (doing every test possible, every year, in everyone) is a terrible waste of resources, whose cost creates a barrier to wider adoption

of appropriate cardiac health promotion programs such as those endorsed by various medical organizations such as the American Heart Association. I would recommend NIOSH recommend these types of programs rather than those promoted by employee advocacy groups that are not evidence-based.

RESPONSE: Agree in principle, but no change.

As with the mandatory annual medical evaluation, NIOSH supports that Fire Departments develop a fitness/wellness program. However, with the exception of smoking cessation programs, no where in the document does NIOSH take a position on the component of such a program. In fact, in our discussion section we say, "Various researchers have reviewed worksite health promotion programs and come to differing conclusions regarding their clinical effectiveness [Glasgow 1999, Pelletier KR 1996]. Although the components of these worksite programs vary by study, programs that include individualized risk reduction for high risk employees within the context of a comprehensive program seem to hold the most promise for positive clinical and cost outcome [Pelletier KR 2001]. The guidelines developed by both the IAFF/IAFC and the NFPA, involves a comprehensive program with individualized assessment for all fire fighters."

Reviewer # 7

Page: 1

1) Can you consistently use the word cardiovascular throughout the document instead of the word cardiac

RESPONSE: Accept when appropriate. We use both terms (cardiac and cardiovascular) when appropriate.

Page: 2

2) While we all know tobacco use is a risk for all, I think the reference to environmental tobacco smoke (I assume here it means 2nd hand smoke). Maybe you just pull it.

RESPONSE: The background section was enhanced to include a discussion of the cardiovascular effects of environmental tobacco smoke.

Page: 3

3) No the standard has stringent pass/fail criteria for candidate fire fighters, as well as a more flexible guidance for medical determinations for incumbent fire fighters based upon the specific nature of their condition and the duties and functions of their job. The medical determinations for incumbent fire fighters are highly dependent on the affected individual's particular circumstances and is not blanket prohibition that prevents an incumbent member from continuing to perform the essential job tasks. It is important that the evaluating physician (s) have a clear understanding of the fire fighter's essential job requirements, capabilities, and history; and a dialogue regarding potential job accommodations should occur between the affected fire fighter, the fire department, and the evaluating physician

RESPONSE: Accept in principle. The section on NFPA 1582 was revised to mention the Category A and B conditions for candidates and flexibility for members based on the type and severity of the medical condition and their job tasks.

Page: 4

4) Further, OSHA provides medical requirement for structural fire fighters and fire fighters that respond to hazardous material incidents. The employer shall assure that employees who are expected to do interior structural fire fighting are physically capable of performing duties which may be assigned to them during emergencies. The employer shall not permit employees with known heart disease, epilepsy, or emphysema, to participate in fire brigade emergency activities unless a physician's certificate of the employees' fitness to participate in such activities is provided. (29 CFR 1910.156 (b)(2)) Fire departments where fire fighters respond to hazardous material incidents have additional legal responsibilities. The medical requirements for hazardous materials responders are contained in the Code of Federal Regulations at 29 CFR 1910.120 (f).
RESPONSE: Agree. An additional paragraph was added to the Current Standards section to address 1910.156 and 1910.120.

5) Should read "The IAFF, a labor union, and the IAFC, a management organization, are devoted to the safety and health of their members, among other fire service issues. In the late 1990's they worked together in a labor management structure to publish three programs addressing medical, fitness and wellness issues".
RESPONSE: Agree. Change made.

6) [When referencing NFPA 1582] add all editions, 1997, 2000, 2007
RESPONSE: Disagree. We feel it is important to list the most current and up to date edition.

7) [When references NFPA 1583] add all editions 1999, 2000, 2007
RESPONSE: Disagree. We feel it is important to list the most current and up to date edition.

8) Add new bullet:

Peer Fitness Trainer Certification

A certification program is to provide a fitness trainer standard consistent with the health and fitness needs of the North American Fire Service. Those successfully passing the certification exam will have demonstrated they possess the knowledge and skills required to design and implement fitness programs, improve the wellness and fitness of their departments, assist in the physical training of recruits, and assist the broader community in achieving wellness and fitness.

RESPONSE: Agree. New bullet added with explanatory paragraph.

Page: 11

9) Develop a nation-wide data base on medical data of fire fighters.

RESPONSE: Agree. Bullet added to the end of the recommendation section.

Reviewer # 8

Comments on the NIOSH Alert:

Page 1: Our number for fatalities due to sudden cardiac death from 1998 through 2004 is 304.

RESPONSE: Agree. Change made.

Page 2: First sentence describing NFPA: The NFPA develops voluntary codes and standards to protect firefighters and civilians from fire-related injuries and deaths, among other hazards. [or something like that to reflect the fact that NFPA does a range of things, much like the description of the IAFF shows that their issues extend beyond safety and health]

RESPONSE: Agree. Change made. Actually page 3.

Page 3 and throughout: The Alert references the 2003 edition of NFPA 1582. The current standard is the 2007 edition.

RESPONSE: Agree. Change made.

Page 4: The 5th category of 'frequent' factors is very different from the other four, and seems out of place. The deaths in these categories aren't different, in cause, from the first four categories, just in circumstances. Why is driving singled out as a special category? Is it really the 5th most significant category of cardiac deaths? (See also Ques #2 below.)

RESPONSE: As mentioned in Ques #2 comment below, the 5th case was highlighted because the sudden death of a FF could risk the lives of other FF and civilians. The selected cases were not we the most "frequent", but rather cases that illustrated an important point. Therefore, to make this point clearer, I have added the following text to case 5. "This case illustrates that sudden incapacitation by a fire fighter while performing critical functions (e.g. driving, fire suppression, rescue, etc.) jeopardizes the safety not only themselves, but other fire fighters and civilians.

In addition, on page 2, I modified 2) to emphasize that the cases are to highlight important findings, not necessarily the most common or most frequent.

Page 5: Case 1 doesn't mention 'over 45' as a risk category, while Case 3 does. Shouldn't they be consistent?

RESPONSE: Agree. Change made to include age over 45 in case 1.

Page 5: typo in Case 2 -- there's a ')' after 128 steps that doesn't belong.

RESPONSE: Agree. Change made.

Page 5: two references for 2003 ed. of NFPA 1582 which should probably be 2007.

RESPONSE: Agree. Change made.

Page 7: reference to 2003 ed. of NFPA 1582.

RESPONSE: Agree. Change made.

Page 7: 51 is 39 percent of 131, not 40 percent.

RESPONSE: Agree. Change made.

Page 8: It doesn't sound like a significant problem if there were only four cases identified where access or function of AED contributed to deaths. I think you can probably mention that AED wasn't even available in a large number of other cases, which is why this appears fourth on the list of significant categories of cardiac deaths.

RESPONSE: No Change made. As mentioned earlier, the cases were selected based on their importance, not the most common or frequent. I think the absence of AEDs during FD resuscitation efforts is an important issue to raise.

Page 8: reference to 2003 ed. of NFPA 1582.

RESPONSE: Agree. Change made.

Page 9: The USFA report is referenced here as 2004 and listed on the reference page as 2002.

RESPONSE: Agree. Change made to 2002.

Page 10: four references to 2003 ed. of NFPA 1582.

RESPONSE: Agree. Change made.

Page 11: typos -- 8th bullet misspells 'participate' and second to last bullet point uses 'FF' instead of spelling out the word 'firefighter' (or 'fire fighter').

RESPONSE: Agree. Change made.

Page 14: Reference 2007 edition of NFPA 1582.

RESPONSE: Agree. Change made.

Answers to Specific Questions:

1) Does the background section appropriately summarize the current literature regarding heart disease and firefighting?

It includes everything I've ever heard about, and probably more.

2) Do the case reports identify the important findings from the NIOSH cardiovascular disease investigations?

I have a bit of a problem with the fifth category -- sudden death while driving. I didn't think it fit when I first saw it on page 4. It wasn't until the discussion on page 8 that I understood (or think I understand) that the issue isn't driving as much as it is the risk to others if a firefighter could be a victim of a sudden incapacitating event. For that reason, I think the fifth category should be generalized (not specifically focusing on driving) to something like -- the sudden death (or incapacitation) of a firefighter that could result in injury to other firefighters or civilians. The case report used is a good illustration of that danger from a cardiac event.

RESPONSE: See discussion and change listed in 4th point.

3) Are these findings adequately discussed in the section "Data from the NIOSH CVD investigations?"

Yes, I thought this section was very good. One question I had, though, was whether NIOSH's focus on cardio-related deaths of younger firefighters might have skewed these results at all? Should that be mentioned in the 'Limitations' section?

RESPONSE: NIOSH did not prioritize young (<40) fire fighters until 2005. No change needed.

4) Are the conclusions supported by the body of the document?

Yes.

5) Are the recommendations appropriate?

Yes.

6) Are there any additional recommendations you think should be included in this document?

No.

Reviewer # 9

I have reviewed the document you sent me.

I have a few observations.

1. The entire report is written with a connotation of career firefighters. ie references to work, shift, and on-duty.

RESPONSE: Somewhat agree. In the background section that describes the association of shiftwork and heart disease, I will mention that this is not an issue for volunteer fire fighters. However, 2 of the 5 case studies are volunteers, we mention the NVFC's Heart Healthy program, and the Alert was reviewed by the NVFC.

2. The NFFF has some great materials with the "Everyone Goes Home" Program. Should it be added to page 4.

RESPONSE: Agree. A new paragraph was added to describe the NFFF, the Everyone Goes Home Program, and its training materials on health and wellness.

3. Case 5 makes no mention if any medical evaluations were available to the department.

RESPONSE: Somewhat agree. The purpose of Case 5 was to demonstrate that sudden incapacitation for a fire fighter can put others at risk, not to raise the issue of medical evaluations. A sentence was added at the end of case 5 to clarify this issue.

4. Under the areas that discuss smoke and the elements found in it, should cyanide be included???

RESPONSE: Agree. Paragraph added to discuss hydrogen cyanide.

I really appreciate the opportunity to review the report and only offer these items as suggested elements to consider.

Reviewer # 10

I've reviewed the draft Warning regarding cardiovascular deaths in FF's and offer the following comments:

1) First, it's overall a terrific document. My only over-arching issue with it is the question of its target audience. If it's for fire departments, officers, and firefighters, I'm worried that the technical level of some of the research findings (both current and from the literature) may exceed typical comprehension level for this audience. I'm sure you have some line fire officers and/or firefighters reviewing it as well.

RESPONSE: The document is primarily addressed to the fire service. However, I believe the technical aspects of the Alert are important for skeptics who may challenge the importance of preventing on-duty sudden cardiac deaths among fire fighters. The fire officers and fire fighters reviewing the document did not express this concern. No change.

2) With respect to your section on Data from the NIOSH CVD investigations, I wonder if in addition to the great discussions you already have, you should also include a Subsection on working alone. In one of the vignettes you present here (Case 4) help was delayed by the fact that he was alone at HQ because he'd made his last emergency response call alone. In another of our cases, everyone left the victim to put all the apparatus in their respective bays after a response. He died alone and was found dead hours later by police investigating open apparatus bay. Were these the only 2 cases, or is that another thing that maybe happens a little too frequently in the VFD world, and decreases survivability in this population?

RESPONSE: No change. Only a few of the NIOSH investigations involved a fire fighter returning from an emergency incident to the fire station alone. More frequently, the FF returned home and then died, sometimes alone.

Going through page-by-page:

3) Bottom of page 1: It looks like "This document... that appears as the last sentence of the last paragraph should actually be starting a new paragraph that is followed by the list. It doesn't make sense in its current position.

RESPONSE: Agree. Change made.

4) Page 2: Middle of paragraph on Carbon Monoxide: The sentence that begins 'these studies...' shouldn't be left to stand alone without more explanation and some perspective. Simply indicating that high CO levels have been found inside SCBA masks will terrify some and cause others to not bother wearing them.

RESPONSE: The entire background section was modified and this change was made.

5) Page 2: 2nd column, beginning of 7th line: e.g. should actually be i.e.

RESPONSE: No change.

6) Page 3: 1st column, line 14: I can't find a previous use of SMR, so it should be spelled out here

RESPONSE: Agree. SMR spelled out.

7) Page 3: Bottom of 2nd column: Isn't 2-in, 2-out for IDLH entry actually HAZWOPER (29CFR 1910:120) rather than the respiratory standard (1910:134) which IS the proper reference for respiratory clearance for SCBA discussed earlier in the paragraph?

RESPONSE: No change. 1910.134 is the appropriate reference.

8) Page 4: Middle of column 1: Though you've already discussed NFPA standards, would it be useful to add after the Joint Labor-Management W-F Initiative that the last 2 revisions of 1582 have been consistent with the provisions of the W-F initiative?

RESPONSE: Agree. Change made.

9) Page 6: Column 2. The previous vignettes have had brief explanations of the message(s) they were being used to illustrate. This one doesn't have a message paragraph at the end.... Access to AED's? Not allowing fire personnel to be performing duties alone in HQ, on apparatus, or on-scene?

RESPONSE: Agree. A brief explanation of the message was given.

"Rapid access to an AED is probably the single most important determinant of outcome for an out-of-hospital cardiac arrest with ventricular fibrillation [Stiell 1999a,b]."

10) Page 7: Case 5: Message paragraph for vignette?

RESPONSE: Agree. "This case illustrates that sudden incapacitation by a fire fighter while performing critical functions (e.g. driving, fire suppression, rescue, etc.) jeopardizes the safely not only themselves, but other fire fighters and civilians."

11) Page 7: Bottom of column 1: FD's not providing med eval's are also not following NFPA 1582... NFPA are voluntary standards, but are also considered consensus standards with legal implications for industries that choose not to follow them....

RESPONSE: Agree. Added the NFPA to the sentence and as a reference here.

12) Page 7: Near bottom of column 2: [IAFF/IAFC 1997] reference might also include NFPA 1583.

RESPONSE: Agree, Reference to NFPA 1583 added.

13) Page 8: Bottom of paragraph on AED's: AHA 2000 is out of date. Suggest referencing AHA 2005 ECC Guidelines

RESPONSE: Agree. Change made

14) Page 8: Section on Carbon Monoxide: although environmental tobacco smoke is listed in the second paragraph as an 'unrecognized source' of COHB in FF's, I'd suggest the first paragraph ought to indicate that low levels of COHB in the 2.5-5.0 range are

typical for cigarette smokers, and is an excellent reason for FF's to quit smoking (and one reason why smoking is Category A condition in candidates)

RESPONSE: The section on CO was modified as was the section on ETS. The primary reason for smoking cessation is its association with CAD, not that this would increase CO levels slightly. No change.

15) Page 10: For both candidates and members, insert "and essential job tasks" in the second bullet(s)... i.e., "Ensure that the physicians conducting the post-offer/pre-placement medical examinations are knowledgeable about the physical demands and essential job tasks of firefighting and the consensus guidelines....etc.

RESPONSE: Agree. Change made.

16) Page 10: For both Candidates and members: consider deleting the bullet regarding keeping information confidential. This is law anyway, and doesn't reinforce the point of the paper at all.

RESPONSE: Agree. This bullet removed.

17) Page 10: Consider adding a bullet in column 2, under members recommending explicitly that members be restricted from duties that cannot safely be performed. Throughout the paper, this is implicit when you talk about using the standard, but I think this is a huge point that the fire service simply hasn't gotten its arms around: Not only do physicians need to know what they are clearing FF's to do in the line of duty, but they must know what to restrict them FROM doing to prevent CV deaths.

RESPONSE: Agree. Change made.