Lend Me Your Ears: Noise Induced Hearing Loss in the US Coast Guard

2010 - 2011

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EXECUTIVE SUMMARY:

The U.S. Coast Guard is a multi-mission military organization with nearly 60,000 active duty, reserve and civilian personnel. Hazardous noise exposure is pervasive in Coast Guard workplaces and, according to Veteran’s Administration data, noise-induced hearing loss (NIHL) is consistently among the top ten occupational diseases for Coast Guard personnel. The effects of NIHL are permanent and irreversible, and not only affect the individual’s quality of life but also their ability to complete the mission effectively and safely.

Coast Guard policy and OSHA regulations require the implementation of a Hearing Conservation Program (HCP) when employees are exposed to hazardous noise. The HCP includes: identification and labeling of hazardous noise sources; personal noise monitoring of exposed personnel; institution of engineering controls to abate noise; hearing protection devices (HPD) provided for all exposed personnel; training on noise and hearing loss prevention; and audiometric testing of hearing acuity for exposed personnel. Generally speaking, the Coast Guard does not routinely assess noise sources or conduct personal noise monitoring. Anecdotal evidence indicates the Coast Guard relies heavily on HPDs, rather than engineering controls, and that HPD use is inconsistent and ineffective among Coast Guard personnel. A recent study of noise-exposed Coast Guard personnel revealed significant deficiencies in the HCP: less than 60% of study participants were enrolled in the HCP and less than 40% had an audiogram within the previous year.

A systems thinking approach was used to evaluate the Coast Guard’s Hearing Conservation Program and identify possible leverage points to improve the program and reduce hearing loss among service members. The following interventions are proposed: 1) Develop and implement a strategy for noise monitoring to ensure noise sources and noise exposures among Coast Guard personnel are characterized; 2) Increase audiogram compliance for worker populations with known noise exposure and improve interventions to address identified hearing loss; 3) Include noise engineering controls during acquisitions for new equipment and renovations for existing equipment to reduce hazardous noise exposure; and, 4) Select fleet-wide hearing protection and communications devices to provide protection in operational environments where engineering controls are not feasible. The conclusion will be an improved Hearing Conservation Program and a decrease in the number of Coast Guard personnel suffering hearing loss.

INTRODUCTION/BACKGROUND:

The U.S. Coast Guard is a multi-mission military organization with nearly 60,000 active duty, reserve and civilian personnel. Hazardous noise is pervasive in Coast Guard workplaces, from sources including cutters, small boats, aviation platforms, industrial processes, and equipment and facilities maintenance activities.

According to Veteran’s Administration data, noise-induced hearing loss (NIHL) is consistently among the top ten occupational diseases diagnosed among retired and separated Coast Guard
personnel. The effects of NIHL are permanent and irreversible, and not only affect the individual’s quality of life but also their ability to complete the mission effectively and safely.

Coast Guard policy\(^1,2\) and Occupational Safety and Health (OSHA) regulations for general industry\(^3\) require the implementation of a Hearing Conservation Program (HCP) when employees are exposed to hazardous noise, defined as “environments or equipment that produce continuous noise levels at or above 85 dB(A) time weighted average (TWA) and impact noises exceeding 140 dB(A)”\(^2\). The Coast Guard HCP includes: 1) identification, assessment, and labeling of hazardous noise sources; 2) determination of extent and disposition of exposed personnel; 3) institution of engineering controls to abate noise; 4) providing and requiring the use of hearing protection devices (HPD) for all personnel exposed to hazardous noise; 5) education and advising personnel concerning hearing conservation; and 6) monitoring of employee hearing losses.

In practice, there are several notable deficiencies in the HCP. First, the Coast Guard does not have a schedule in place for the routine identification, assessment, and labeling of noise sources, or for required employee exposure monitoring. These basic industrial hygiene (IH) services are typically completed on a “by request” basis, leaving huge gaps in the organization’s understanding of the scope of the noise problem. Additionally, the Coast Guard does not have a data management system in place to store and analyze data on noise exposure. This data gap makes the noise problem effectively invisible to managers and senior leaders and contributes to the lack of motivation to implement long-term solutions.

Second, the Coast Guard relies heavily on the use of hearing protection devices (earmuffs, ear canal caps, and earplugs) to reduce hazardous noise exposure and prevent hearing loss. While HPDs offer protection when used appropriately and consistently in high noise, protection diminishes greatly when employees wear improperly fitted or inadequate HPDs for a given noise level, or are inconsistent with HPD use\(^4\). OSHA regulations require the utilization of engineering controls to reduce sound levels below 85dB(A) TWA before relying on HPDs to reduce exposure. Where engineering controls are not feasible (in aircraft or other operational environments, for example), fleet-wide solutions that offer communications capabilities in addition to hearing protection are preferred over HPDs alone.

Finally, Coast Guard policy includes the requirement to provide audiometric testing annually for all personnel exposed to hazardous noise for hearing loss. A 2009 study of small boat operators exposed to hazardous noise revealed that only 57% of study participants were enrolled in the HCP and 39% received their required audiogram within the past year. This indicates that the majority of noise-exposed personnel are not being properly monitored for hearing loss. In addition, if audiometric testing reveals an employee has suffered hearing loss, this is supposed to be documented in their medical record and the employee “counseled concerning the potential seriousness of repeated unprotected exposures to excessive noise and provided additional information on hearing protection and avoidance of hazardous noise exposures”\(^1\). In the absence of any other intervention to reduce the employee’s exposure (relocation to a non-noise hazardous work environment or reducing the noise source with engineering controls), or actively monitoring the use and efficacy of HPDs, the audiometric testing simply documents the employees hearing loss over the course of the employee’s career.
**Problem Statement:** The Coast Guard is not effectively addressing occupational noise induced hearing loss among its members because of an incomplete industrial hygiene program and reliance on HPDs and medical monitoring to protect employees from hearing loss.

**Behavior Over Time Graph:**

The Coast Guard does not have a database(s) or data tracking mechanism for tracking noise exposure data (IH surveys), the number of personnel exposed to noise, number of audiograms, hearing loss cases, Veteran’s Administration benefits claims, implementation of engineering controls, HPD use, or training. It is therefore not possible to create a behavior over time graph for this particular problem.

**Desired Variables:**

1. Number of industrial hygiene noise surveys;
2. Number personnel exposed to hazardous noise;
3. Number of audiograms;
4. Number of hearing loss cases;
5. Number/amount paid in VA claims;
6. Number of platforms/product lines/processes with engineering controls implemented;
7. Percentage of hazardous noise-exposed personnel using proper PPE;
8. Percentage of hazardous noise-exposed personnel receiving Hearing Conservation Training.

**Causal Loop Diagrams and applicable Archetypes:**

The archetype used to evaluate the Coast Guard’s Hearing Conservation Program was the “shifting the burden” model. The quick fixes identified in the diagram include HPDs and medical monitoring, and the long-term solutions include engineering controls and fleet-wide hearing protection and communications solutions. The quick-fixes in this model divert time and resources from the long-term solutions, and the ineffective industrial hygiene program hides the problem from senior leadership.
Personnel exposed to hazardous noise

Noise-induced hearing loss

Pressure to reduce hearing loss

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Quick fix: HPDs

Commitment to conduct workplace noise monitoring

Employee’s knowledge/understanding of noise exposure and hearing loss

Long-term corrective measures: Engineering controls to reduce noise exposure

Long-term corrective measures: fleet-wide PPE & communications equipment

Quick fix: Medical monitoring

Hearing Conservation Program (HCP)

“Noise is pervasive; we have to protect people with PPE!”

“Problem solved – employees are protected and we can intervene if they lose their hearing.”

“Engineering Controls cost time/money! Operations can’t wait while we invest in the long-term solution!”

Evaluate HPD effectiveness and use in the field to document problems with using this control.

Implement noise monitoring, exposure assessment and industrial hygiene data management/analysis.

Analyze audiogram and VA Claims data to document hearing loss and use of resources.

Resources for research and implementation of long-term solutions
10 Essential Environmental Health Services:

This project is primarily intended to address a leadership issue in the Coast Guard, linking to an Essential Services (ES) gap where appropriate. ES #1, 2 and 9 are most applicable to this problem. ES #1, Monitor Environmental and Health Status to Identify and Solve Environmental Health Problems, covers the need to improve the noise monitoring and medical monitoring components of the HCP. ES# 2, Diagnose and Investigate Environmental Health Problems and Health Hazards in the Community, and ES# 9, Evaluate the Effectiveness, Accessibility, and Quality of Personal and Population Based Environmental Health Services, address the lack of data management and analysis for industrial hygiene and hearing conservation data.

Figure 1: 10 Essential Environmental Public Health Services

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Project Logic Model:

Goal: Reducing noise-induced hearing loss among CG members.

Resources/Inputs
- Alignment of leadership
- Personnel
  - HQ’s
  - HSWL
  - Operational Partners
- Funding
  - Exposure assessment/data collection
  - Audiograms & data management
  - Training materials
  - Noise warning meters
- Partners
  - Operational partners

Activities
- Exposure Assessment
  - Develop strategy
  - Develop exposure monitoring procedures
  - Conduct monitoring
  - Recommend appropriate controls
- PPE Guidelines
  - Select appropriate PPE
  - Work with operational partners to ensure compatibility with operations
  - Develop guideline documents & distribute to the field
- Improve risk communication
  - Medical monitoring program, audiogram delivery & tracking
  - Improve audiogram review
  - Training & education materials
  - Hazardous noise warning technology
- Implementation of engineering controls
  - MOU
  - IPT for new platforms
  - Product line management for platform rehabs

Outputs
- # Exposure assessments
- # appropriate controls identified
- # guideline documents distributed to the field
- % of noise exposed workers provided audiograms
- # of audiograms properly screened by medical professionals
- % of noise exposed workers receiving noise training and educational materials
- # of noise exposed workers aided by hazardous noise warning technology
- # of new platforms with noise control engineering built into the design
- # of existing platforms with noise engineering included into rehab plans

Short & Long Term Outcomes, Impacts.
- Hearing Conservation Program
  - Better understanding of noise exposure and controls in use
- Risk Communication
  - Improved understanding of individual exposure & injury status
  - Improved organizational understanding of hearing loss
  - Improved communication of noise hazards
- Engineering
  - Increased partnerships with operational community
  - Increased implementation of engineering controls
- Behavior
  - Increased use of PPE when necessary (i.e., increased protection)
  - Increased medical monitoring and early intervention to prevent hearing loss
- Results
  - Reduced incidence of hearing loss among CG members
PROJECT DELIVERABLES:

Project Goal
To reduce occupational noise induced hearing loss among Coast Guard employees by improving the Hearing Conservation Program.

Proposed Interventions
By 2020, the Coast Guard will improve the execution of the hearing conservation program according to the following measures:

1. Number of industrial hygiene noise surveys will increase over 2010 levels;
2. Number personnel exposed to hazardous noise will decrease compared to 2010 levels because of the increased use of engineering controls to reduce exposure;
3. Percentage of noise-exposed employees receiving annual audiograms, including review by medical personnel, will increase over 2010 levels;
4. Number of hearing loss cases, evaluated using results of annual audiograms, will be reduced compared to 2010 levels;
5. Number/amount paid in VA claims for hearing loss will begin to decrease over 2010 levels (though this measure will lag over time as VA claims from retired/separated employees over the next 10-20 years will reflect the hearing conservation program in its current state);
6. Number of platforms/product lines/processes with engineering controls implemented will increase over 2010 levels; and,
7. Percentage of hazardous noise-exposed personnel using proper HPDs will increase over 2010 levels.

NEXT STEPS:

1. By 2012, the Coast Guard will develop and implement a strategy for noise monitoring to ensure noise sources and noise exposures among Coast Guard personnel are characterized.
   Activities:
   • 2011 – kick-off an Integrated Product Team to develop the three essential elements of an industrial hygiene program: policy, standardized methods, and data management.

2. By 2015, the Coast Guard will increase audiogram compliance for worker populations with known noise exposure and improve interventions to address identified hearing loss.
   Activities:
   • 2011/2012 – use the new Electronic Health Record system to increase visibility/accountability and increase audiogram compliance.
3. By 2015, the Coast Guard will have a formal process in place to include noise engineering controls during acquisitions for new equipment and renovations for existing equipment to reduce hazardous noise exposure.

Activities:
- 2011-2015 – continue to develop partnerships with operational commands, Coast Guard acquisitions, etc.

4. By 2015, the Coast Guard will select fleet-wide hearing protection and communications devices to provide protection in operational environments where engineering controls are not feasible.
- 2011-2012 – continue working with Office of Boat Forces on their selection of a new boat crew communications system.

LEADERSHIP DEVELOPMENT OPPORTUNITIES:

Stephanie C Griffin

It has been an honor to participate in the EPHLI program over the past year. The experience has been intellectually challenging, eye-opening, and very gratifying. The EPHLI curriculum gave me a much-needed opportunity to pause and reflect on my career, my development as a professional, and how I can best contribute in my workplace. The Leadership Project gave me a reason and opportunity to dissect an issue that has long been on the “too hard” list for the Coast Guard. I hope that I am able to take the results of the project and continue to make positive change in our hearing conservation program. It has been a pleasure working with so many passionate and talented professionals over the past year, including my coach, Keith Keene, and mentor, Steve Hicks. I am so grateful to everyone in the cohort and on the EPHLI staff for sharing their knowledge, enthusiasm, and humor with me over the past year.
ABOUT THE EPHLI FELLOW(s)

Stephanie Griffin is a Lieutenant Commander in the United States Public Health Service, currently assigned as the senior Environmental Health Officer at US Coast Guard Headquarters in Washington, DC. Stephanie has served with the Coast Guard since 2002 as a Safety and Environmental Health Officer in Ketchikan, Alaska and Cleveland, Ohio. She earned a M.S. in Industrial Hygiene in 2007 from the University of Washington where she studied noise and hearing protection use in industry and construction. Stephanie also holds a B.S. in Environmental Health Sciences from Salisbury University. She is a Registered Environmental Health Specialist and Certified Industrial Hygienist.
REFERENCES


