

5-2014

Affects of Occupational Noise Exposure and Hearing Loss

Susan Taylor Smith
University of Arkansas, Fayetteville

Follow this and additional works at: <http://scholarworks.uark.edu/rhrcuht>

Recommended Citation

Smith, Susan Taylor, "Affects of Occupational Noise Exposure and Hearing Loss" (2014). *Rehabilitation, Human Resources and Communication Disorders Undergraduate Honors Theses*. 18.
<http://scholarworks.uark.edu/rhrcuht/18>

This Thesis is brought to you for free and open access by the Rehabilitation, Human Resources and Communication Disorders at ScholarWorks@UARK. It has been accepted for inclusion in Rehabilitation, Human Resources and Communication Disorders Undergraduate Honors Theses by an authorized administrator of ScholarWorks@UARK. For more information, please contact scholar@uark.edu, cmiddle@uark.edu.

Running Head: OCCUPATIONAL HEARING LOSS

Affects of Occupational Noise Exposure and Hearing Loss

Susan Taylor Smith

Honors Thesis

University of Arkansas

April, 24, 2014

Table of Contents

Abstract	3
Introduction	4
Review of Literature	5
Method	8
Participants	8
Materials	8
Procedure	8
Summary	8
Results	9
Demographics	9
Use of Hearing Protection... ..	9
Perception of Need.....	9
Reasons for Not Wearing Hearing Protection.....	10
Observation.....	10
Discussion	12
Conclusion	13
Limitations and Future Direction	14
References.....	15

Abstract

The purpose of this study was to investigate the local prevalence of ear protection worn by the facilities management personnel at the University of Arkansas while working with loud equipment. The facilities management personnel who work in noisy environments were observed and surveyed to determine the prevalence of the use of hearing protective devices while on the job. There were thirty nine participants that completed the questionnaire and nine workers were observed while working with loud equipment on the University of Arkansas campus. The results of this study, both observation and questionnaire, showed that only about 60% of individuals working with loud equipment actually wear ear protection and 97% of those individuals think it is important to wear ear protection. The contrast of individuals' view of perceived importance versus protection being worn on campus is an interesting dynamic and leaves room for much improvement. Findings are discussed.

Introduction

Hearing is one of our most vital senses, which means it is extremely important to take care of our ears and all the parts that make up the hearing mechanism. Research has shown that chronic exposure to loud noises along with other factors contributes to hearing loss over time (“Hearing Loss,” 2011). It has come to my attention that most University of Arkansas lawn care technicians do not wear protective hearing devices to protect their ears while on the job. There is no cure for noise induced hearing loss (NIHL); once noise has caused the hearing loss it is permanent.

Occupational hearing loss is damage to the inner ear from noise or vibrations due to certain types of jobs or entertainment (Zieve, 2010). According to University of Maryland Medical Center, sounds above 90 decibels may cause vibrations intense enough to damage the inner ear, especially if the sound continues for a long time (Zieve, 2010). Lawn care workers should take special consideration in choosing to wear hearing protective devices next time they go out to mow the lawn or blow the leaves because the American Speech-Language-Hearing Association (ASHA) reports that a lawn mower is approximately 106 decibels which exceeds the safe noise range (“Noise,” 2009). This is a problem facing the University of Arkansas lawn care technicians because most of the workers do not wear the required hearing protective equipment. The Occupational Safety and Health Administration (OSHA) requires employers to provide hearing protection equipment to employees who work in areas that exceed acceptable noise levels; however, most workers do not use hearing protection devices often if even at all (Lusk, Ronis, & Kerr, 1995). It is important for people to know how important something as simple as an ear plug is, and how it can save their hearing in the long run. All of this information goes to

show that individuals need to wear hearing protective devices in order to preserve their hearing capabilities while working with loud machinery and equipment.

Review of the Literature

The literature shows that noise induced hearing loss (NIHL) is becoming one of the largest health problems affecting young and old people today. There are multiple occupations that expose people to loud noises affecting one's hearing. In particular, lawn care employees are exposed to noise levels above the recommended level when working with lawn mowers, leaf blowers, chain saws, etc which can be associated with noise induced hearing loss. According to the National Institutes of Health, occupational noise exposure is the most common cause of NIHL (National Institutes of Health [NIH], 1990, p. 3-4). Le Prell (2011) found that 16% of disabling hearing loss in adults can be attributed to occupational noise exposure (p. 25). NIHL is completely preventable if people take the necessary actions to protect their hearing. The lawn care services industry is rapidly growing in the United States which means there are more people being exposed to high levels of noise and can in turn affect their hearing.

NIHL can be caused by sudden exposure to loud noise such as an explosion or gunfire, or it can come on slowly from chronic exposure to loud noises like in an occupational or industrial setting (Amirabadi, 2012, p. 105). John May (2000) explains NIHL as a phenomenon which usually progresses over 10-15 years of intensive noise exposure and then tends to progress more slowly from then on (p. 116). People can lower their chances of acquiring NIHL by lowering their exposure to loud noises in the work place by using hearing protective devices (HPD).

According to Daniel (2007), at least 1 million people of the 30 million exposed to loud noise levels daily experience tinnitus to the extent that it interferes with their daily lives (p. 226).

Tinnitus refers to the ringing in the ears. Some of the risk factors associated with NIHL include age, gender, race, HPD use, smoking, lack of exercise, and low intake of vitamins and minerals (Daniel, 2007, p. 227-228). Research also shows that there is a positive correlation between SES and HPD use (Daniel, 2007, p. 228). People also experience a temporary threshold shift (TTS) after being exposed to loud noise. TTS is transient sensorineural hearing loss lasting for seconds up to hours following exposure to a loud noise and most people recover almost entirely within 24 hours (Amirabadi, 2012, p. 106).

The Occupational Safety and Health Administration (OSHA) has standards set for occupational noise levels and the procedures that should be followed to protect employers and their employee's hearing capabilities while at work. OSHA requires that employers provide hearing protection equipment to the employees who work in areas exceeding the acceptable noise levels set by OSHA (Lusk, Ronis, & Kerr, 1995, p. 635). Unfortunately employees do not always take advantage of hearing protection devices that are provided for them to use. The NIOSH defines hazardous noise as sound that exceeds 85 decibels (dB) over a typical 8-hour day (Centers, 1998). In the lawn care industry, there is a lot of equipment that produce noise louder than the recommended 85 decibels (dB). For example, the noise level of a lawn mower is 101 dB, a leaf blower is 110 dB, and a chainsaw is 120 dB (Common, 2013). With that being said it is extremely important for all employees whom work in a noisy environment to wear hearing protection.

NIHL affects all aspects of a person's life and has personal and professional costs associated with it. Exposure to loud noise over time can create physical and psychological stress, reduce one's productivity, interfere with communication and concentration, and loud noise also contributes to workplace accidents and injuries by making it difficult to hear warning

signals (Occupational Noise Exposure). NIHL also limits a person's ability to hear high frequency sounds, understand speech, and seriously impairs one's ability to communicate (Occupational Noise Exposure). The effects of hearing loss can interfere with a person's social and emotional wellbeing. It can affect a person's ability to enjoy socializing with friends, playing with one's children or grandchildren, or participating in other enjoyable social activities. NIHL can also lead to psychological and social isolation (Occupational Noise Exposure). All of these side effects to NIHL bring out the immense importance to using HPDs. NIHL is permanent and cannot be regained.

The lawn care industry has grown immensely over the past few decades. According to the Bureau of Labor Statistics there were 1,249,700 lawn care workers in 2010 (Grounds, 2012). The Bureau of Labor Statistics also says that overall employment of grounds maintenance workers is projected to grow 20 percent from 2010 to 2020, faster than the average for all occupations (Grounds, 2012). This goes to show that there will be more workers exposed to loud noise. The need for HPD use among lawn care workers is astronomical. If lawn care workers would wear HPDs the number of people with NIHL would decrease little by little each year. There will be more workers hired to keep up with the increasing demand for lawn care services; all the more reason to educate workers on the importance of HPDs and the effects of NIHL. The questions to be addressed in this study are (1) do University of Arkansas facilities management personnel wear hearing protection while working with loud equipment (2) do individuals in lawn care perceive there is a need to utilize ear protection while working with loud equipment, and (3) if individuals do not utilize hearing protection why not.

Method

Participants

The survey group was composed of the employees of the University of Arkansas Facilities Management team that are exposed to loud noise while on the job. These participants were surveyed to examine the prevalence of the use of hearing protective devices (HPD), the noticeable effect on their hearing, and the perceived importance of wearing hearing protection while working with loud equipment.

Materials

This study was an observation study to determine if individuals using loud equipment such as lawn mowers, leaf blowers, etc. are wear ear protection. Data was recorded on an observation form that showed whether or not these individuals wore a form of ear protection. An electronic questionnaire was distributed to facilities management personnel.

Procedures

Workers were observed around campus to observe whether or not individuals who are using loud equipment were wearing ear protection devices. I also distributed a short questionnaire electronically to the supervisor of the facilities management personnel here at the University of Arkansas.

Summary

The purpose of this study was to investigate the local prevalence of ear protection while on the job of the facilities management personnel at the University of Arkansas. This study has allowed me to further understand the use of hearing protection and its effects on an individual's

hearing. The questions that were addressed in this study are (1) do University of Arkansas facilities management personnel wear hearing protection while working with loud equipment (2) do individuals that work with loud equipment perceive there is a need to utilize ear protection while working with loud equipment, and (3) if individuals do not utilize hearing protection why not.

Results

Demographics

Thirty nine individuals completed the questionnaire. Because the questionnaire was anonymous, there is no way of knowing the age or gender of the individuals that participated in this study.

Use of Hearing Protection

One of the questions of this study is whether or not University of Arkansas facilities management personnel wear hearing protection while working with loud equipment. To answer this question participants were asked directly, “Do you wear ear protection when working around loud noises?” All thirty nine participants answered this question. Of the thirty-nine responses, 62% said yes they do wear ear protection and 38% said no they do not. These results were surprising because there was a preconceived notion that majority of people do not wear hearing protection when working with loud machinery.

Perception of Need

To investigate whether or not individuals that work with loud equipment perceive there is a need to utilize ear protection while working with loud equipment, the participants were asked

directly, “Do you think it is important to wear ear protection when working with loud noises?” All thirty nine participants answered this question, 97% said yes they think it is important to wear hearing protection, and only 3% said no. The response to this question was also surprising based on the response to the question pertaining to actual use of hearing protection. 97% of the participants think it is important to wear ear protection when working with loud machinery, but only 62% actually wear ear protection.

Reasons for Not Wearing Hearing Protection

The last question of this study is if individuals do not utilize hearing protection why not. To answer this question participants were asked directly, “If you said you do not wear ear protection, why not?” There were four answer choices available for the participants to choose from: they hurt my ears, I can’t hear my coworkers, I wear them around my neck but not in my ears, or they get in the way/annoying. Only six out of the thirty nine participants responded to this question. Of the six responses, 33% answered because they can’t hear their coworkers and 67% answered that the ear protection gets in the way or is annoying.

Observation

Another part to my research was observing University of Arkansas facilities management personnel while they were working with loud equipment on campus. An observation was made that the workers tended to wear hearing protection more than originally thought. Of the nine workers observed, 6 wore hearing protection while working with loud machinery such as weed-eaters, leaf blowers, and lawn mowers. This was surprising because the hypothesis of this study was that majority of the University of Arkansas facilities management personnel do not wear hearing protection. The results of the observation were satisfactory knowing how important it is

to wear hearing protective devices while working with loud machinery. One’s ability to hear is precious and cannot be regained once it has been damaged. The majority of University of Arkansas workers that do wear hearing protection while on the job should be applauded.

Figure 1. Observation Chart

Work Activity	Where Observed	Protection Y/N	Time of Day	Length of Time
Weed-eating	Maple Hill Lawn	Yes – ear plugs	11 am	10 minutes-Fall 2013
Mowing Lawn	Grad-Ed Lawn	No	9:45 am	10 minutes-Fall 2013
Leaf Blower	Reid Hall Lawn	Yes – ear plugs	10:45 am	10 minutes-Fall 2013
Mowing Lawn	Reid Hall Lawn	Yes – ear plugs	1 pm	10 minutes-Fall 2013
Mowing Lawn	Old Main Lawn	No	12:15 pm	10 minutes-Fall 2013
Leaf Blower	Grad-Ed Lawn	No	10:30 am	10 minutes-Fall 2013
Mowing Lawn	Greek Theater	Yes – ear plugs	11:45 am	10 minutes-Fall 2013
Leaf Blower	Old Main Lawn	Yes – ear plugs	12:30 pm	10 minutes-Fall 2013
Weed-eating	Old Main Lawn	Yes – ear plugs	1:15 pm	10 minutes-Fall 2103

Discussion

According to the National Institutes of Health, occupational noise exposure is the most common cause of noise induced hearing loss (NIHL) (National Institutes of Health [NIH], 1990, p. 3-4). University of Arkansas facilities management personnel are exposed to noise levels that exceed 85 dB on a daily basis. The noise level of a lawn mower is 101 dB, and a leaf blower is 110 dBs all of which can cause NIHL when exposed 8 hours a day over a number of years (Common, 2013). With that being said it is extremely important for all individuals who work with noisy equipment to wear ear protection. The University of Arkansas must offer ear protection to its workers because of the OSHA regulation that requires employers to provide hearing protection to employees that work in loud environments exceeding the acceptable noise levels set by OSHA; however, it is up to the worker to actually wear the ear protection (Lusk, Ronis, & Kerr, 1995, p. 635).

Through personal observation of facilities management personnel on the job and the facilitation of the electronic questionnaire, the data shows that only 60% of individuals actually wear hearing protection while working with loud machinery. It is important to make the 40% of individuals that choose not to wear ear protection aware of the potential for hearing loss down the road if they don't already suffer from hearing loss. John May (2000) explains that NIHL usually progresses over 10-15 years of loud noise exposure. In the questionnaire the participants were asked directly "If they have noticed any problems with their hearing" and all thirty nine individuals answered, 36% said yes and 64% said no they haven't noticed a problem with their hearing. The participants were also asked "If they had any problems with their hearing before they began working with loud equipment." Only one person didn't answer this question, but of the thirty eight responses, 13% said yes, and 87% said no. It would have been helpful to ask how

long each participant has been working with loud equipment in correlation to whether or not they have noticed a change in their hearing.

According to Daniel (2007), at least one million people of the 30 million exposed to loud noise levels daily experience tinnitus, the ringing in the ear sensation. On that note, the questionnaire should have asked whether or not the participants have ever experienced tinnitus. To further that interest, it could have asked if they have experienced tinnitus, for how long because severe tinnitus can have an impact on one's life. Tinnitus is just one of the many effects that coincide with NIHL. NIHL is completely preventable if individuals take the necessary precautions to protect their hearing.

Conclusion

In conclusion, these results show that only 60% of individuals who work with loud equipment actually wear hearing protection. These results are conclusive with the fact that a lot of workers exposed to loud noise on the job do not wear hearing protection. Yes, a little over half of individuals do but that is not close enough. It would be nice to see every person who works with loud equipment to wear hearing protection. People take for granted their hearing capabilities and disregard those little orange ear plugs or bright yellow ear muffs. It is extremely important to educate the individuals who work with loud equipment on the effects of occupational hearing loss as well as noise induced hearing loss because hearing is not something that can be regained once it is lost.

Limitations and Future Directions

There was limited access to University of Arkansas facilities management personnel, which led to a very small number of participants. The link to the online questionnaire was

posted on the Hearing Loss Association of America Facebook page to try and get more participants. Therefore, the results do not completely show an accurate representation of whether or not the University of Arkansas personnel that work with loud equipment wear hearing protection while on the job. The online questionnaire only had seven multiple choice questions in order to keep participant attention and interest, which limited the depth of information that could have been gathered in an interview. Lastly, there was no definitive proof of hearing loss in any of the participants.

For future research on this topic, interviewing University of Arkansas facilities management personnel would be useful in gathering more conclusive data and in getting more informative responses to each question. Knowing age and gender of the participants would be interesting for age and gender comparisons. Also, evaluating the prevalence of hearing protection use in different career fields would be useful in future research.

References

- Amirabadi, M. (2012). Noise Exposure: A Continuous Dilemma of the Industrial Environments and Modern World. *International Journal of Occupational and Environmental Medicine*. 3(3). p. 105-106
- Centers for Disease Control and Prevention/NIOSH (1998). Criteria for a Recommended Standard: Occupational Noise Exposure Revised Criteria. Cincinnati, Ohio: US Department of Health and Human Services.
- Common environmental noise levels (2013). Retrieved from Center for Hearing and Communication website: <http://www.chchearing.org/noise-center-home/facts-noise/common-environmental-noise-levels>
- Daniel, E. (2007). Noise and hearing loss: a review. *Journal of School Health*. 77(5). p. 225-231
- Grounds maintenance workers (2012). Occupational Outlook Handbook. Retrieved from the Bureau of Labor Statistics Website: <http://www.bls.gov/ooh/building-and-grounds-cleaning/grounds-maintenance-workers.htm>
- Hearing loss. (2011). *The Mayo Clinic*. Retrieved on December 12, 2012 from <http://www.mayoclinic.com/health/hearing-loss/DS00172>
- Le Prell, C. (2011). Noise-induced hearing loss: The potential for otprotection. Perspectives on Hearing and Hearing Disorders: Research and Diagnostics. 15(1). p. 25-33
- Lusk, S. L., Ronis, D. L., & Kerr, M. J. (1995). Predictors of hearing protection use among workers: Implications for training programs. *Human Factors*. (37)3. p. 635-640.

May, J. J. (2000). Occupational hearing loss. *American Journal of Industrial Medicine*. 37(1). p. 112-120

National Institutes of Health [NIH] (1990). Noise and Hearing Loss. NIH Consensus Development Conference Consensus Statement 1990, Jan 22-24; 8 (1).

Noise. (2009). American Speech-Language-Hearing Association. Retrieved on December 12, 2012 from <http://www.asha.org/public/hearing/noise/>

Occupational noise exposure. Retrieved from the U.S. Department of Labor website: <http://www.osha.gov/SLTC/noisehearingconservation/>

Zieve, D. (2010). Occupational hearing loss-overview. University of Maryland Medical Center. Retrieved on December 12, 2012 from <http://www.umm.edu/ency/article/001048.htm>