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Implementing an Effective Hearing Conservation Program for Dental Students

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INTRODUCTION

According to the Centers for Disease Control (CDC), approximately 10 million individuals living in the United States have noise-induced hearing loss.[1] Of these individuals, many have developed noise-induced hearing loss from exposure to occupational noise. One such occupation at risk for noise-induced hearing loss consists of the individuals in the field of dentistry.

Occupational noise exposure in dentistry is a result of the equipment and machinery used in clinics. Clinical headpieces, turbines, drills and other types of equipment are all responsible for emitting loud noises. Studies have found that dental instruments and dental environments exceed the Occupational Safety and Health Administration's (OSHA) standards for daily permissible noise level exposure, and hearing loss of dental professionals is most likely correlated with noise levels present in the clinic.[2–4]

To this day, there are no studies that have been conducted to identify whether dentists are aware that they are exposed to potentially dangerous levels of noise on a daily basis. Although the American Dental Association has repeatedly stated that dental professionals should implement the use of personal hearing protection for prevention, there is still no large emphasis on the importance of hearing conservation. Educational intervention can be used to increase awareness of noise exposure and hearing protection. As audiologists, we are responsible for educating the public about hazardous noise exposure and the preventative measures they can take to avoid noise-induced hearing loss. The purpose of this study is to determine the impact of hearing conservation education on the attitudes and beliefs toward noise and hearing protection in dental students, the future of dentistry.

METHOD

A 30-minute hearing conservation education program was given to 24 dental students at the University of the Pacific in San Francisco, California. The educational program is an adaptation of HearForever's "Best Practices in Hearing Conservation Seminar," which is based off of OSHA's occupational noise standards.[5] The education consisted of the following topics: (1) How we hear, (2) What noise-induced hearing loss (NIHL) is, (3) Relevance of NIHL for dental professionals, and (4) How to protect your ears. Specifically, subjects were educated on the auditory system and

the sections of the system that are affected by loud sounds, what noise-induced hearing loss is, when it can occur and what causes it, the proper usage of hearing protection, and the long-term consequences of noise-induced hearing loss.

Participants were given a pre-survey and post-survey, both containing the same questions. The survey items were based off the Beliefs about Hearing Protection and Hearing Loss (BAHPHL) model.[6] This model was developed by the National Institute for Occupational Safety and Health, focusing on beliefs, attitudes, and behavioral intent. The Likert scale was used for evaluation, ranging from "strongly disagree" to "strongly agree." The BAHPHL questionnaire includes seven subscales; severity of the consequences of hearing loss, hearing loss susceptibility, behavioral intentions, social norms, preventative action benefits, self-efficacy, and preventative action barriers. 31 questions were posed to the subjects within these seven topic areas. Survey questions were modified from the survey used in 2004, created by Svensson et al.[7]

RESULTS

The results of the pre- and post-surveys were evaluated using a Wilcoxon signed-rank tests and found significant shifts in attitudes and beliefs for most survey questions. The following figures are histograms that represent the participant responses on the pre-survey (blue bars) and the post-survey (red bars).

Hearing Loss Susceptibility

Two questions were aimed to determine the participants' awareness of their susceptibility to hearing loss, results shown in Figure 1. There was a significant difference ($p<0.001$) from pre-survey to post-survey for the question, "I believe dental professionals are exposed to hazardous noise levels."

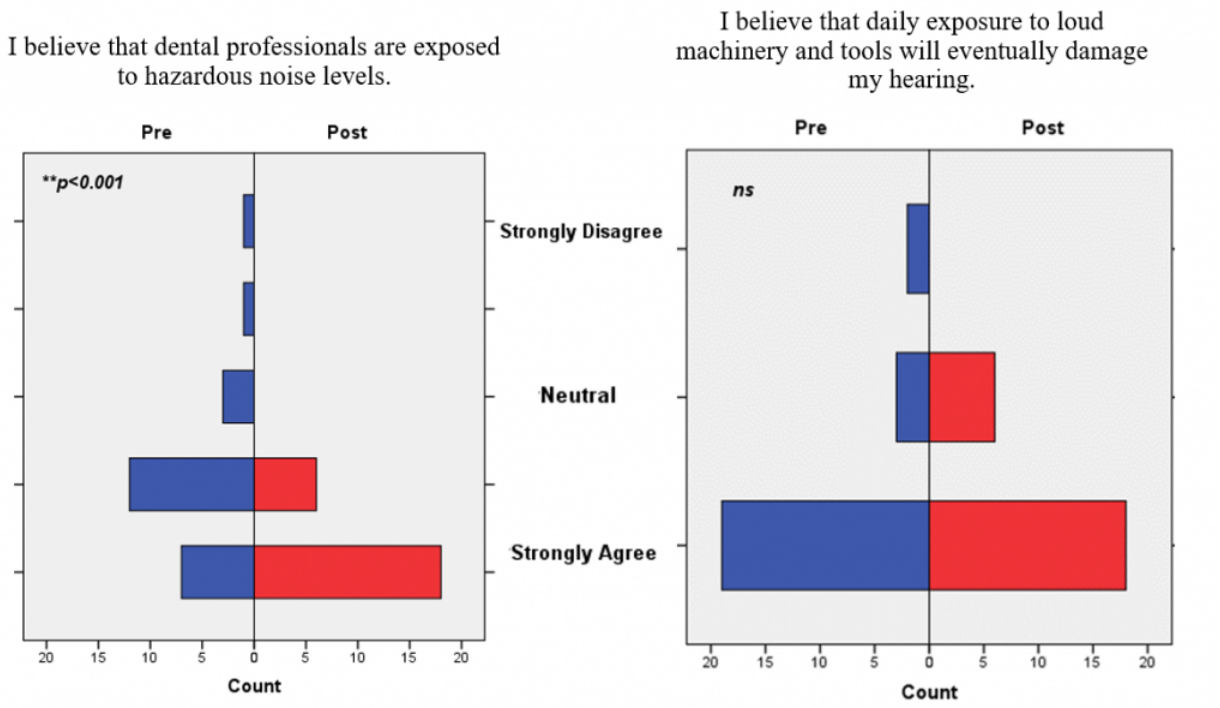


Figure 1. Hearing loss susceptibility.

For the second question, "I believe that daily exposure to loud machinery and tools will eventually damage my hearing," there was no significant change in responses from pre-survey to post-survey. Most participants responded with "Strongly Agree" for both pre-survey and post-survey.

Consequences of Noise-Induced Hearing Loss

The purpose of two questions were to see if participants were aware of the consequences of noise-induced hearing loss. Figure 2 shows that there is a significant difference (p<0.001) from pre-survey to post-survey for both questions, indicating an improved awareness of the consequence of noise-induced hearing loss.

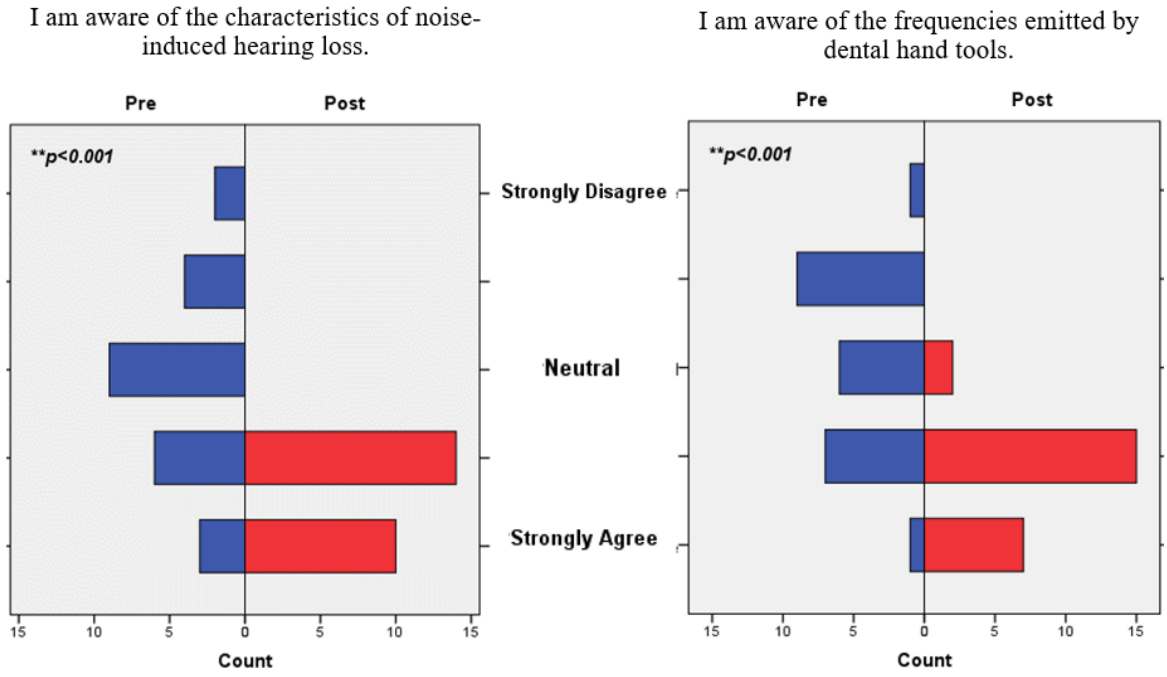


Figure 2. Consequences of noise-induced hearing loss.

Preventative Action Awareness

Awareness of preventative action was measured using two questions, shown in Figure 3. Significant differences (p<0.001) were found for both questions before and after the education program. These results show that participants had a higher awareness of the need for preventative action against noise-induced hearing loss.

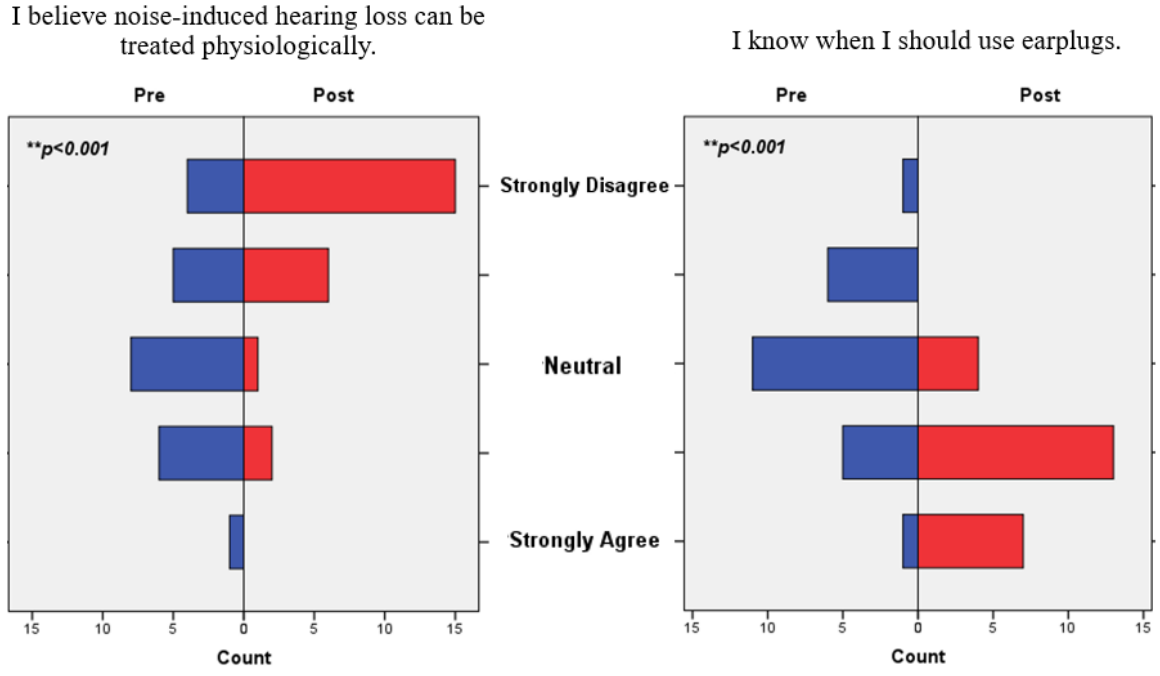
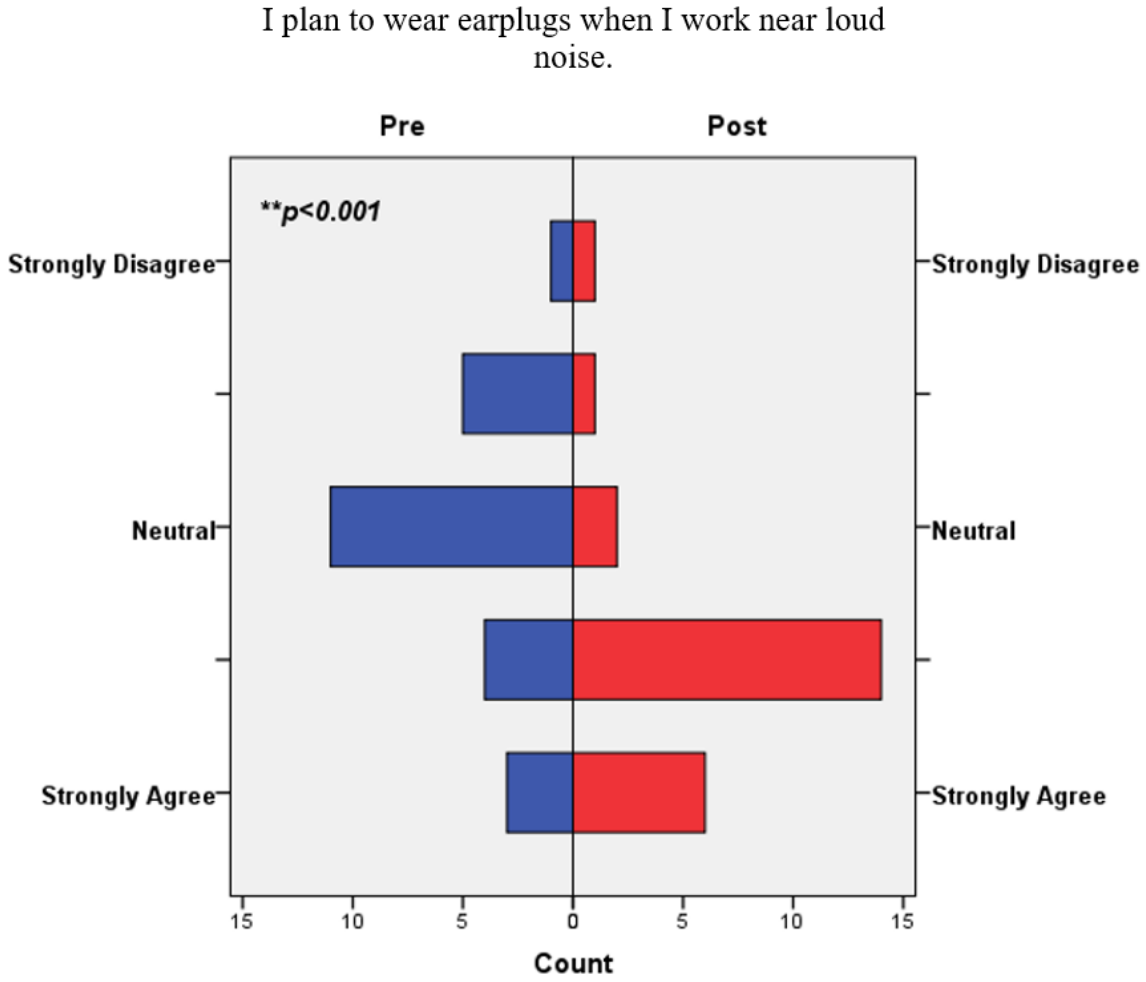


Figure 3. Preventative action awareness.

Behavioural Intentions

The question “I plan to wear earplugs when I work near loud noise” highlighted whether participants’ behavioral intentions changed before and after the education program. Figure 4 shows that participants are more likely to wear earplugs when they work in hazardous noise levels after completing the program ($p<0.001$).



CONCLUSION

The results of this study revealed that our hearing conservation education was effective in changing the attitudes and beliefs of dental students on hearing protection and occupational noise exposure. Education on preventing occupational noise-induced hearing loss is crucial in reducing incidence amongst dental professionals. This is important because research has shown that dental professionals are indeed exposed to hazardous noise levels. By targeting dental students, we hope to create attitudes and beliefs that promote preventative action towards hearing conservation that will be maintained throughout their careers.

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