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Technical Bulletin

3M™ E-A-Rfit™ Validation System assists to train and maintain proper use of hearing protection over time

Methodology

This study used the 3M™ E-A-Rfit™ Validation System to conduct fit tests on hearing protectors for a group of workers.

An electronic online survey was also utilized to collect data and included a consent form, demographic information, and attitudes, such as perceived beliefs, barriers, and self-efficacy regarding hearing protector usage. Data were collected during two plant visits (A and B, approximately 6-months apart).

The study protocol was executed according to the following plan:

Visit A - Baseline
Workers complete survey followed by a hearing protector fit test

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Visit A - Post-Intervention
Investigator provides additional training and/or offers new earplug for those who fail to achieve enough protection at baseline. (Intervention Group) Repeat fit tests and survey completed

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Visit B - Follow-up
Intervention Group is retested with field attenuation estimation system (FAES) and completes final survey

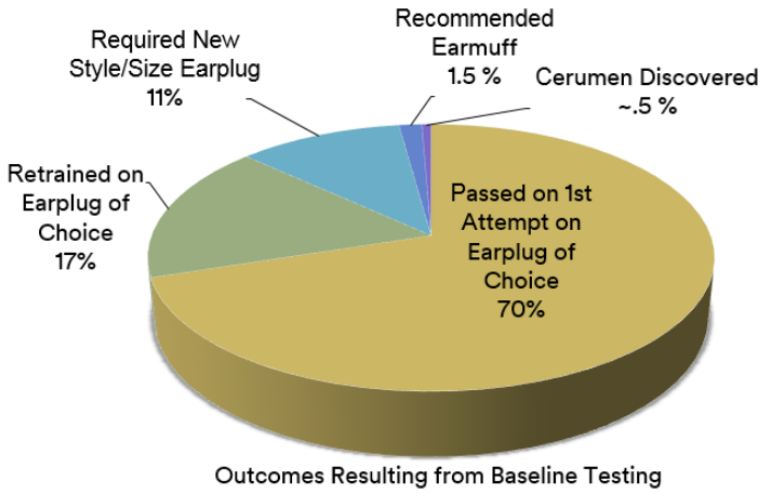
Field attenuation estimation system (FAES) is a quantitative method for individual fit testing hearing protection devices (HPDs). The measurement of attenuation for a fit tested hearing protector is displayed as a personal attenuation rating (PAR). FAES is recognized as a best practice and is becoming widely known globally. FAES language is also beginning to be included in use guidelines, standards, and regulations. In order to quantify the value of utilizing FAES within a hearing conservation program, 3M sponsored a scientific research study that sought to answer the following questions:

- For individuals at risk, did training improve their personal attenuation rating (PAR_{50})?
- Is self-efficacy (one's perception of how well one can use HPDs) a good predictor of PAR_{50}?
- Do attitudes and beliefs regarding HPDs and PAR_{50} values change over time?

Study Population

- Large US metal can and lid company in 4 plants locations.
- 327 subjects; 85% male, > 50% with 10+ years' experience, 70% of total workforce is 40 or older years of age. Workers were included in the company's hearing conservation program, but had never experienced hearing protector fit testing prior to this study.
- Protected exposure goal = 85 dB or below.

Results



Outcomes Resulting from Baseline Testing

- 28% of workers did not achieve adequate protection during baseline testing, were identified as high risk for noise-induced hearing loss (NIHL) and were included into the intervention group for additional training or alternative earplug selection.
- Average PAR values for the intervention group (n=91) increased significantly from baseline to post-intervention after training or alternative earplug selection (95% CI: 10.3 dB, 13.4 dB).
- Average PAR values for the intervention group (n=70) increased significantly from baseline to follow-up retesting 6 months later (95% CI: 6.3 dB, 11.2 dB).
- While average PAR values increased overall from baseline to follow-up for the intervention group (n=70), the average PAR values dropped slightly from post-intervention to follow-up. (95% CI: -1.3 dB, -4.9 dB).
- Study subjects measured high self-efficacy and perceived benefits scores as well as low perceived barrier scores and other than a statistically significant drop in self-efficacy post-intervention, attitudes did not change.
- High self-efficacy scores did not predict the proper use of the HPDs

Conclusion

This study concludes that the 3M™ E-A-Rfit™ Validation System can help to identify individual workers who are at risk for NIHL (low PAR). Additionally, the study highlights the benefit of training individual workers on the correct use of hearing protectors and assists with hearing protector selection. FAES and the interventions that accompany the fit-testing process assist with training and result in higher attenuation for those at risk and is maintained over time. Self-efficacy, perceived barriers/benefits for hearing protector usage are not well correlated with effective use of the HPD. Degradation of PAR from post-intervention to follow-up indicates that follow-up is important to ensure the worker has access to the assigned HPD, is comfortable wearing the hearing protectors and is continuing to use correctly.

For a free copy of the full published article, click here.

References

1. OSHA/NHCA/NIOSH Alliance (2008). *Best practice bulletin: Hearing protection-Emerging trends: Individual fit testing.* Retrieved July 24, 2015, from http://c.ymcdn.com/sites/www.hearingconservation.org/resource/resmgr/imported/AllianceRecommendationForFit-Testing_Final.pdf
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This study was supported by 3M Company – Personal Safety Division
Approved by 3M IRB HUM00060704.