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 (PAR50)?
- Is self-efficacy (one’s perception of how well one can use HPDs) a good predictor of PAR50?
- Do attitudes and beliefs regarding HPDs and PAR50 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**

- Required New Style/Size Earplug: 11%
- Retrained on Earplug of Choice: 17%
- Passed on 1st Attempt on Earplug of Choice: 70%
- Recommended Earmuff: 1.5%
- Cerumen Discovered: ~.5%

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.

References