Data Analysis Studies

Effects of Blast Injury on Hearing in a Screened Military Population using the Blast Related Auditory Injury Database

During deployment exposure to hazardous intensity levels of combat noise, such as blast, may compromise a Service member's ability to detect and recognize sounds, communicate effectively and reduce situational awareness. In addition, the occurrence of blast injury has been linked to an increased risk of new-onset hearing loss. Naval Health Research Center (NHRC; San Diego, California) has been analyzing data from the Blast Related Auditory Injury Database (BRAID) to help fill the current gaps in knowledge via multiple research projects.

NHRC has been researching predictors of hearing loss among those with blast injury using BRAID. Subjects for this study included only those with a qualified hearing test within a period of 12 months prior to, and following, injury (n = 1,574). Two groups were created, blast-related injury (BRI) and non-blast related injury (NBRI). The most prevalent postinjury shift of hearing thresholds occurred bilaterally for the BRI group (39 percent), followed closely by left ear unilateral shift (35 percent), and unilaterally in the left ear for the NBRI group (42 percent). Asymmetrical hearing loss was twice as common in those who suffered a blast injury compared with those who sustained an NBRI ($p = 0.01$). Flat hearing loss was rare for both groups (3 percent or less) and the difference was not significant ($p = 0.13$). After adjustment for relevant covariates and potential confounders, those who sustained a blast injury had significantly higher odds of postinjury hearing loss (odds ratio [OR]: 2.21; 95 percent confidence interval [CI]: 1.42, 3.44), low-frequency hearing loss (OR: 1.95; 95 percent CI: 1.01, 3.78), high-frequency hearing loss (OR: 2.45; 95 percent CI: 1.43, 4.20), and significant threshold shift compared with a NBRI group. An estimated 63 percent of risk for low frequency and high frequency hearing loss in these blast-injured, deployed military members could be attributed to the BRI event.

In additional work NHRC is doing, BRAID-specific audiometric thresholds are being examined. Service members with a BRI or NBRI occurring during deployment, with at least one audiogram in the 12 months prior to and following injury, were compared. Researchers calculated mean audiometric thresholds for the left and right ears at the test frequencies 500, 1,000, 2,000, 3,000, 4,000, and 6,000 hertz for audiograms prior to and following injury, and compared groups according to injury (BRI versus NBRI). In addition, low-frequency and high-frequency pure-tone averages (LFPTA and HFPTA) were compared by injury group. Overall, population mean and median threshold audiograms demonstrated hearing within normal limits (25 decibel hearing loss) at all test frequencies for both ears. We discovered that new-onset hearing loss primarily affects the frequency range of 4,000-6,000 hertz, and hearing shifts were greater in the left ear. Postinjury LFPTAs and HFPTAs were significantly higher in the BRI group than the NBRI group.

Research with the BRAID will help identify at-risk populations for early intervention and hearing loss prevention, develop supportive policies and best practice guidelines for clinicians, and allocate appropriate funds and resources.

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