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Safety Restraint System Use among Severely Head Injured Patients. J. Reed,\* A. Rae-Grant, T. Wasser (Lehigh Valley Hospital, Allentown, PA 18105-1556).

Although the state of Pennsylvania has a mandatory seat belt use law, motor vehicle accidents that result in severe head injury have not decreased. The purpose of this analysis was to examine the safety restraint system usage (SRS - seat belt and/or air bag) among severe head injury patients transported to a Level I trauma center in Eastern Pennsylvania. **Methods:** Eligible patients were a cohort of trauma patients comatose at study entry due to a severe head injury. Exclusion criteria included brain death, admission Glasgow coma scale of 8 or more, age less than 16, gunshot wound, or other major penetrating injury. Admission data included the admission date, age, sex, mechanism of injury, protective devices (i.e. none, seat belt, air bag), admission Glasgow coma scale, clinical examination, and diagnostic test results. Discharge data included discharge date, type of facility discharged to, and the discharge Glasgow Outcome Scale. **Results:** There were 725 severe head injured patients admitted between 4/12/92 and 2/18/94. Of the 725 patients, 390 (53.8%) were MVAs and 335 (46.2%) were non-MVAs. Within the 390 MVA patients, 295 (75.6%) did not employ a SRS while (24.4%) did use a SRS. Within this group of 390 MVA patients 28 (7.1%) died, 288 (73.8%) were discharged home, 6 (1.5%) were discharged to an acute care hospital, 62 (15.9%) were discharged to a rehabilitation hospital, 1 patient was discharged to a chronic care facility, and 4 patients were discharged to other facilities. **Conclusions:** In states with mandatory safety-belt use laws the use of SRS initially increases, then decreases in the absence of enforcement and typically stabilizes at 40-50%.

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Hospitalization for Non-Battle Injuries among US Soldiers in Southwest Asia, August 1990- July 1991. James V. Writer (Walter Reed Army Institute of Research, Washington, DC).

Non-battle injuries (NBI) during a deployment can be costly both to the US Army and the individual soldier. In this report, NBI among US Army soldiers serving in Southwest Asia (SWA) before, during, and after the Persian Gulf War are described. Hospitalization data were obtained from the Army's inpatient data system. Population data came from the Department of Defense's computerized personnel files. The study population was all US Army personnel in SWA, August 1, 1990 - July 31, 1991. The first diagnosis in the inpatient file was used to classify the reason for hospitalization. Any record with an injury (ICD-9: 800-995) in the 1st diagnosis field was included. Mechanism of injury was based on an Army-assigned code in the inpatient record. Injuries due to weapons of war during combat were excluded. During the study period 346,996 soldiers served in SWA; 19,926 (5.7%) were hospitalized. Of these, 4,900 (24.6%) were NBI. The highest NBI rates were during the air and ground war and in the month following the war. Fractures, strains/sprains, other/undefined injuries, dislocations, and open wounds accounted for 75.2% of all NBI. The leading mechanisms of NBI were motor vehicle accidents (10.0%), falls (10.0%), and sports (9.2%). While the NBI rate increased during the combat phase of the deployment, sports injuries decreased. Females had the highest risk for all hospitalizations (RR=1.55) but the lowest risk for NBI (RR=0.70). Reservists and National Guard called-up for duty in SWA had NBI rates higher than the regular army (RR=1.28 and RR=1.28, respectively). Rates and relative risks by other demographic factors and injury type or mechanism are reported.

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Assessment of the Relationship between Chronic Exposure of Workers to Bromine and Neuropsychological Manifestations. M. Eldan,\* R. Carel, S. Weitzman, J.R. Goldsmith (Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel).

Possible neuropsychological dysfunction in humans exposed occupationally to bromine and bromine compounds, which have been shown to be CNS toxicants, has not been systematically evaluated. The present study shows that there are associations between exposure to low levels of bromine and subtle neuropsychological dysfunctions. Exposure to bromine, of 820 workers, was assessed by measurements of serum bromine (SeBr) levels, using the x-ray fluorescence, a method which is sensitive to all forms of bromine. SeBr levels ranged from 8.3 to 428.6 ppm (mean 22.9 ppm) and were associated with several exposure criteria (such as occupation, work site and department), supporting the hypothesis that exposure to bromine can be monitored by measurement of SeBr levels. Ten tests from the Neurobehavioral Evaluation System (NES) battery, sensitive to diverse functions that are related to different areas in the brain, were used for the neuropsychological assessment. The relationship between SeBr levels, and achievements of workers in the NES tests, were analyzed by ordinary least squares regression analysis and by logistic regression analysis. The latter suggested subtle, but distinct, associations between exposure to bromine compounds, as measured by SeBr, and decreased performance of certain neuropsychological functions. The strongest association was found with the functions measured by the Symbol-Digit Coding test (odds ratio=2.34, p=0.01). When SeBr was considered as a categorical variable, a dose-response relationship was found; odds ratios ranged from 1.16 for the lowest levels of SeBr to 2.71 for the highest.

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A Study of the Immunotoxic Effects of Lead. L. Pinkerton,\* R. Biagini, E. Ward, R. Hull, M. Boeniger, T. Schnorr, M. Luster (The National Institute for Occupational Safety and Health, Cincinnati, OH 45226 and The National Institute of Environmental Health Sciences, Research Triangle Park, NC 27799).

Lead both stimulates and suppresses different aspects of immune function in animals. To date, there is limited human data on the immunologic effects of lead. In this study, 145 secondary lead smelter workers and 84 unexposed workers were evaluated to determine the immunologic effects of lead exposure. Saliva was analyzed for IgA (sIgA), and blood was analyzed for cell markers, immunoglobulins (IgA, IgG, IgM), complement, natural killer cell activity, and lymphocyte response to tetanus toxoid. The median blood lead level was 39 µg/dL (range: 15-55 µg/dL) among exposed and <2 µg/dL among unexposed workers (range: <2-12 µg/dL). The percentage of CD19+ cells was lower (13.93% vs. 16.05%) and the percentage of CD3+ cells was higher (75.15% vs. 72.74%) in the exposed group than in the unexposed group (t test or Wilcoxon rank sum test; p<0.05). The mean levels of IgA, IgG, and sIgA were also higher in the exposed group (222.59 mg/dL vs. 196.12 mg/dL, 1177.47 mg/dL vs. 1077.96 mg/dL, and 19.50 vs. 12.56 mg/dL, respectively). These preliminary results suggest that lead may affect the immune system, stimulating the production of certain immunoglobulins, increasing the proportion of T (CD3+) cells, and decreasing the proportion of B (CD19+) cells. Although extreme changes in immune parameters can reduce resistance-to disease, the clinical significance of these mild immunologic effects is unclear.

# EPIDEMIOLOGY

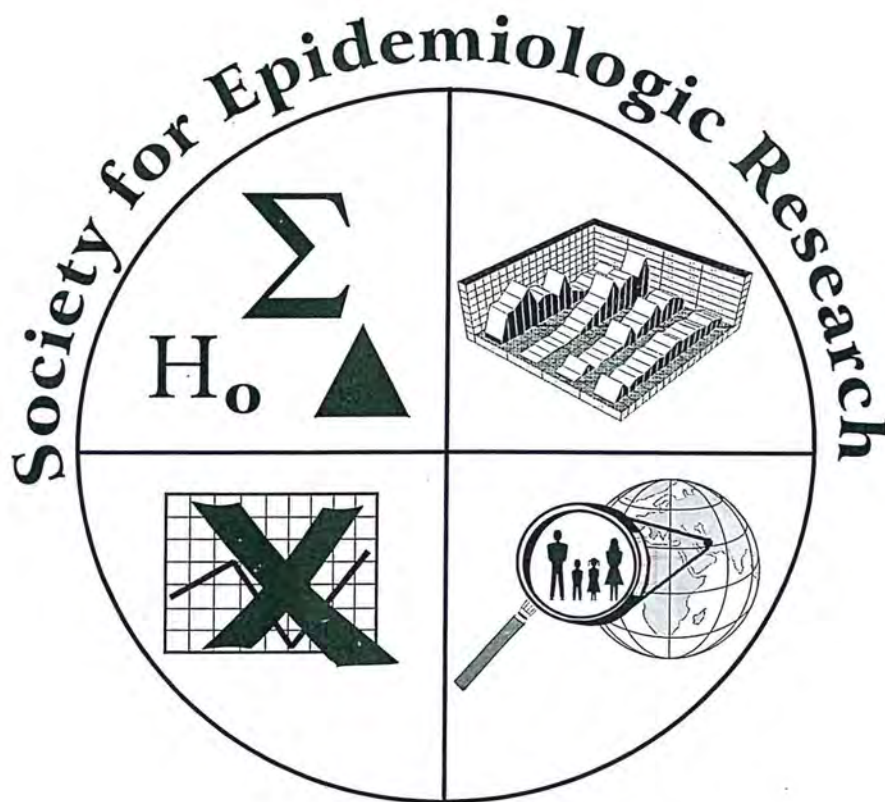
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