

## **RELIABILITY OF HAND DIAGRAMS FOR EPIDEMIOLOGIC CASE DEFINITION OF CARPAL TUNNEL SYNDROME**

Evanoff, B.A, Dale, A.M., Strickland J., Taylor B., Symanzik J., Franzblau, A.

From the Department of General Medical Sciences, Washington University School of Medicine, St. Louis, MO, USA (Evanoff, Dale, Strickland, Taylor); the Department of Mathematics and Statistics, Utah State University, Logan UT, USA (Symanzik); and the Department of Environmental Health Sciences, University of Michigan School of Public Health, Ann Arbor, MI, USA (Franzblau). This study was supported by CDC/NIOSH grant # R01OH008017-01.

### **Aims**

Hand diagrams are often used in research case definition of carpal tunnel syndrome (CTS). As described by Katz et al (1990), diagrams are completed by the subject indicating the location of symptoms, and are scored on a 4 point ordinal scale expressing the likelihood of CTS (unlikely, possible, probable, or classic). The aims of this study are to assess the interrater reliability of hand diagram scores for likelihood of CTS, and to investigate subject characteristics that may influence interrater agreement of hand diagram scores.

### **Methods**

As part of an ongoing prospective study of CTS in 1108 newly hired workers, subjects completed a self-administered questionnaire at several points in time. Subjects were asked to complete a hand diagram if they experienced symptoms of tingling, numbness, burning or pain in one or both hands lasting more than 7 days or with 3 or more episodes in the past year. On the hand diagram, subjects were asked to shade in the location of symptoms on dorsal and volar hand drawings for both hands. Three expert raters, including two Occupational Medicine physicians and one occupational therapist, independently rated each hand diagram as unlikely (0), possible (1), probable (2) or classic CTS (3). The raters were masked to subjects' medical information except for a table listing the type and general location of symptoms and the shadings drawn on the hand diagrams. Raters discussed discrepancies between scores to reach a final consensus. Weighted kappa statistics were used to assess agreement among raters. We performed logistic regression to examine potential predictors of disagreement, including age, sex, job category, and the presence of other hand symptoms by comparing cases where all three raters agreed to those with some disagreement.

### **Results**

332 questionnaires identified tingling, numbness, pain or burning symptoms in at least one hand, for a total of 664 hand diagrams scored. Subjects were predominantly right handed (90%), male (73%), with a mean age of 30 years (SD 9.0), and worked in a variety of job categories (carpenters, floorlayers, laboratory, housekeeping, food service, computer work). Full agreement of all raters was highest for a rating in the "unlikely" category (87% right hand, 93% left hand) with lower agreement for "possible" (65% right hand, 73% left hand), "probable" (50% right hand, 38% left hand) and "classic" categories (64% right hand, 62% left hand). Expert independent ratings produced kappa scores of 0.83 (95% CI: 0.78, 0.87) for right hand diagrams and 0.85 (95% CI: 0.80, 0.90) for left hand diagrams. The lowest consistency of ratings was for the category of "possible" carpal tunnel syndrome. A small percentage of hand diagrams received unique ratings from all three raters (2% right hand, 3% left hand). Agreement between raters was not affected by the subjects' age, sex, job category, race, or the presence of other diseases including diabetes and arthritis. The presence of additional hand and wrist symptoms beyond those required for the hand diagram was predictive of greater disagreement between raters.

### **Conclusions**

Overall, we found high levels of agreement between three independent raters of hand diagrams in a cohort of workers in several industries. Some differences between raters existed, particularly for certain symptom patterns. Consensus rating allowed resolution of differences. Subject's demographic and job characteristics did not affect the reliability of ratings. These data support the reliability of epidemiologic case definitions that include a self-administered hand diagram.

### **References:**

Katz JN, Stirrat CS. A self-administered hand diagram for diagnosis of carpal tunnel syndrome. *J Hand Surg.* 1990;15:360-363.

