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Relative Change in Hand Size Over Time: Implications for Glove-Size Schemes and Labeling for End-Users

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In 1996, the leading occupational injury treated in US hospital emergency departments was an acute hand injury. Hand injuries annually affect 30% of injured workers. Finger lacerations rank as the third highest cause of lost work days. Compensation insurance fund claims for finger and hand injuries (Calif. construction trades - direct cost only, 1998) averaged between $10,500 to $14,400 per claim respectively. Despite the high frequency, significant lost work days, and medical costs associated with these injuries, they are still etiologically poorly understood. Many of the injured workers were not wearing protective gloves at the time of injury. Appropriate glove selection and use-compliance at work is important to understand as glove use has been shown to both increase the risk of hand injury (around moving machinery parts) or reduce the risk of hand injury (handling rough material) depending on specific work place hazards and activities. This study examined one possible cause of compliance failure: the problem of appropriate glove size selection by analyzing the change in hand size over time, and it's relationship to glove-size labeling schemes.

Comparative analysis of anthropometric body segment length was conducted from equivalent United State data sources (US Military, NHANES, CAESAR). Male and female standing height, hand length, and hand circumference measures were compared at similar decade time points over the last 50 years (1950-2001). Anthropometric analysis indicates that both stature and hand size have increased in equal proportion over time. The ratio of hand length to stature has remained constant at approximately 11%, and circumference at approximately 11.5%. Male stature, however, has slowly increased from a mean of approximately 66 inches (1950) to the current mean height of approximately 70 inches. Over the same time period, mean hand length change is estimated to be approximately from 7.3 to 8 inches in males. The same general growth trends are demonstrated in females.

Allometry of body size varies over time by gender, race, and nationality. Some of the traditional dies used to construct sewn glove pattern components in the US date to hand-size schemes devised in Western Europe after the 1850s. There are no equivalent ANSI PPE design standards for uniform glove size standardization or labeling. Differing size classifications are used throughout the glove making industry. Gloves are made in limited quantities in limited size ranges. Information on determining glove fit is minimal and often qualitative. This analysis demonstrates how commercial glove-sizing schemes may slowly fall behind increasing dimensional body changes. Qualitatively based size labeling schemes will accommodate fewer workers over time if glove patterns are not changed. Results confirm the importance of using accurate anthropometric measurements to size and label gloves to better address comfort and fit. These same concerns apply to all other safety apparel design strategies.

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