Frost FP, Nielsen VK et al. Occurrence of carpal tunnel syndrome among slaughterhouse workers. Scand J Work Environ Health 1998;24(4):285-292.

Design: Retrospective cohort study

Population/sample size/setting:

- 743 slaughterhouse workers (618 men, 125 women) and 398 non-slaughterhouse workers (348 men, 50 women) identified from the Danish Central Personal Register, who had worked between 1986 and 1993
- The group classified as non-slaughterhouse workers included 99 workers who had worked in the slaughterhouse, but not in pig slaughtering or meat processing tasks; the slaughterhouse group included 10 chemical factory workers who had been slaughterhouse workers

Main outcome measures:

- The exposure of interest was work on the slaughterhouse floor: killing, cutting open, deboning, packing, and casing
- Ergonomic observations were done using video recordings at the actual slaughterhouse; in addition, wrist exertion during deboning tasks was done in similar slaughterhouses by the same observers in a separate study
- Video recordings were done from 2 positions to register frequencies and angles of dorsal and palmar flexion and ulnar deviation; times to perform the tasks were also reported, and varied from about 3-4 seconds to about 5 minutes
- CTS definition was either (1) nocturnal symptoms of median nerve entrapment with current symptoms in at least 1 of the 3 radial fingers on physical examination, together with a positive nerve conduction study, or (2) previous operation for CTS
- Physical examinations were done by physicians who were not aware of the work of the subjects; however, the examinations were done at the workplace
- Because deboning had been shown to involve considerable force exertion by the nondominant as well as the dominant hand, three outcomes were examined: CTS in at least 1 hand, CTS in the dominant hand, and CTS in the nondominant hand
- 50 cases of CTS were identified, 44 in slaughterhouse workers (SHW) and 6 in non-SHW
- Adjusted odds ratios were elevated for SHW (OR=4.24) compared to non-SHW
- For non-deboning SHW, the OR was 3.25; for deboning SHW, the OR was 5.53
- The elevation of the OR for deboning SHW appeared to arise from the increased OR for CTS in the non-dominant hand for deboning (OR=7.82) compared to non-deboning (OR=3.41)

Authors' conclusions:

- Forceful and repetitive manual movements are a risk factor for CTS

- Nondominant hand exertion for deboning tasks (measured in a separate ergonomic study) involves tearing, lifting, turning, and holding body parts of 6-12 kg; even though no detailed ergonomic measurements of the nondominant hand in non-deboning tasks was carried out in this study, the non-deboning tasks appear to involve less strenuous use of the nondominant hand

Comments:

- Exposure classification (video recordings and force measurements) was done in the SHW in a manner that allows more precision than self-report; even though no observations were made of the non-SHW workers, only 17% of them reported repetitive manual movements, and large bias is unlikely
- Similarly, outcome classification (symptoms plus nerve conduction *or* prior CTS surgery) is done in a manner that is more precise than self-report of symptoms
- The cycle times of both the deboning and the non-deboning tasks were recorded, but not analyzed; it may be that the number of cases for each category were not large enough to allow for robust calculation of odds ratios
- Similarly, the time proportion of wrist deviation from neutral position was not translated into an odds ratio relating CTS to the exposure of interest
- Although there appears to have been a missed opportunity to relate cycle times and wrist position data to CTS, the SHW tasks collectively appear to have involved intense hand exertion and repetition
- Because of the paced nature of the work, it appears likely that at least 6 hours per day were done performing the SHW tasks

Assessment: Adequate for an evidence statement that repeated exertion of forceful hand deviation from neutral is an important risk factor for CTS