OCCUPATIONAL HEALTH

SPECIAL INTEREST GROUP

A Pilot Survey on Prevalence of Work-Related Musculoskeletal Injuries in Sign Language Interpreters

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BACKGROUND AND PURPOSE

Sign language is the fourth most used language in the United States, following English, Spanish, and Chinese.[1] It is used by the deaf and individuals who are hard of hearing as a primary means of communication, as well as by hearing people who service the deaf and hard of hearing. Sign language interpreters play an important role in legal proceedings, theaters, school settings, and more. They translate speech into sign language and back again. It has been estimated that 16 million hearing-impaired Americans use the services of sign language interpreters each year.[2] The act of signing can be a physically demanding task as interpreters are required to perform forceful, complex, and repetitious movements combined with awkward postures of the neck, shoulder, arm, hand/wrist, and fingers.[3] Often, sign language interpreting will also involve high static loading of back and neck muscles to help the interpreter stand or sit upright while working.[4] The amount of time an interpreter signs for can be extensive and without rest. Sessions can vary from approximately 20 minutes to 50 minutes with certain tasks requiring longer periods and often having no formal predetermined rest breaks.[4] This can be taxing on the neck, back, and upper extremities and it is possible that continued interpreting without adequate care or rest could lead to permanent damage of soft tissue and nerves as well as an inability to work.[1] Work-related musculoskeletal disorders (WRMDs) of the hand and wrist are reported to be associated with the longest absences from work across multiple fields.[5] Absences from work result in a loss of productivity and an inability to carry out activities of daily living. This inability to function is a considerable burden to the interpreter, the interpreter's employer and the deaf community.[6]

A major challenge for the rapidly growing sign language interpreter profession is how to mitigate the work-related risks to help build a healthy work force of interpreters capable of handling the increasing workload.[6] It is important to identify the frequency with which musculoskeletal disorders appear in this population, in order to target additional awareness and risk reduction efforts.[1] In a survey of 1,398 interpreters conducted by Johnson et al,[7] 74% reported symptoms such as pain or stiffness in the neck and 70% reported symptoms in the hand/wrist region. A survey of 71 interpreters by Freeman and Rogers[3] showed 38% reported their most painful symptoms were associated with maintaining a static posture and were present in their back, neck and/or shoulders, while the remaining 62% reported most painful symptoms occurred in hands, wrists, and/or fingers.

A review of the literature yields very little in terms of studies attempting to isolate specific aspects of the job that cause or might exacerbate pain. A systematic review by van der Windt et al[6] on occupational risk factors of shoulder pain found the available evidence was not consistent for most risk factors, not of generally high methodological quality and the strength of these associations was modest. Pope et al[8] noted complaints of pain to be higher in workers of various occupations who associated their work activities with stress or worry, or reported the work to be monotonous. From these previous reports, it is clear that more needs to be known about the prevalence, specifics, and occupational risk factors of musculoskeletal injury to sign language interpreters. Treatment protocols and preventative measures need to be developed for this specific and overlooked worker group.

Physical therapists are health care providers who not only treat WRMDs but also provide consultation to patients and their employers on safe work practices, including prevention strategies.[3] The aim of this survey is to identify the prevalence of musculoskeletal pain experienced by a community of sign language interpreters as a result of their work and to identify the need for educational materials that might be developed to help this population reduce risk of injury.

METHODS

A survey (Table 1) was designed using SurveyMonkey to elicit responses from interpreters regarding their present or previous experiences with WRMDs, as well as demographic and job-specific information on work demands, duration, and experience. The survey used a variety of multiple choice, dichotomous, and Likert-type items. The survey was reviewed and approved by Bellarmine University IRB Committee (IRB #417). Respondents were sign language interpreters recruited from the Centers for Accessible Living (CAL) in Louisville, KY. A 23-item survey was sent via e-mail to all sign language interpreters employed by CAL. Eighteen (n=18) interpreters responded to the survey (response rate 51%); all were volunteers, and written informed consent was obtained. All 18 respondents were considered active interpreters and all were female.

FINDINGS

Demographics and Work Experience

Eighteen (100%) of the interpreters were active signers, and all were female. According to the survey (see Table 1), 17 (94.4%) interpreters reported their ethnicity as white and one (5.6%) interpreter reported her ethnicity as black. Four (22.2%) interpreters were between 20 and 30 years old, 7 (38.9%) were between 30 and 40 years old, 3 (16.7%) were in the 40 to 50 age range, and 4 were over the age of 50 (Figure 1). Eleven (64.6%) of the interpreters reported regularly participating in physical activity for exercise, 6 reported they did not regularly partici-

Table 1. Overview of Survey Results

Participant	Gender	Age (yrs)	Race	Active Interpreter (Y/N)	Yrs As An Active Interpreter	Job Satisfaction	Job Setting	Hrs Signing Per Day	Pain in last Year (Y/N)	Initial Pain Onset	Pain (0-10) at Worst	Area(s) of Body Affected	Onset of pain
Participant 1	Female	30-40	White	Yes	10-20 years	Excellent	School/classrooms	10+	Yes	1+ years	5	Elbow/Forearm, Hand/Wrist, Fingers	1 hour into signing
Participant 2	Female	30-40	White	Yes	5-10 years	Great	School/classrooms	10+	Yes	2-4 weeks	3	Neck, Shoulder, Upper Back, Low Back	1 hour into signing
Participant 3	Female	30-40	White	Yes	10-20 years	Excellent	Other	10+	No	N/A	0	(none)	N/A
Participant 4	Female	30-40	White	Yes	10-20 years	Excellent	Other	10+	Yes	1+ years	8	Neck, Hand/Wrist, Upper Back	45 minutes into signing
Participant 5	Female	20-30	White	Yes	0-2 years	Great	Other	10+	Yes	1-3 months	4	Shoulder, Hand/Wrist, Upper Back, Low Back	30 minutes into signing
Participant 6	Female	Over 50	White	Yes	20+ years	Great	[Skipped]	10+	Yes	1+ years	4	Neck, Shoulder, Elbow/Forearm, Hand/Wrist, Fingers, Upper Back, Low Back	1 hour into signing
Participant 7	Female	20-30	White	Yes	0-2 years	Good	Other	10+	Yes	3-6 months	3	Shoulder, Elbow/Forearm, Hand/Wrist, Fingers	1 hour into signing
Participant 8	Female	Over 50	White	Yes	20+ years	Excellent	Other	10+	Yes	1+ years	3	Neck, Shoulder, Elbow/Forearm, Hand/Wrist, Fingers, Low Back	1 hour into signing
Participant 9	Female	40-50	White	Yes	5-10 years	Excellent	School/classrooms	10+	Yes	1+ years	5	Neck, Shoulder, Hand/Wrist	45 minutes into signing
Participant 10	Female	40-50	White	Yes	5-10 years	Great	Other	8 - 10	Yes	1-3 months	3	Neck, Upper Back	1 hour into signing
Participant 11	Female	Over 50	White	Yes	10-20 years	Good	School/classrooms	10+	Yes	1+ years	6	Neck, Shoulder, Elbow/Forearm, Upper Back	[Skipped]
Participant 12	Female	Over 50	White	Yes	20+ years	Poor	School/classrooms	10+	Yes	1+ years	10	Neck, Shoulder, Elbow/Forearm, Hand/Wrist, Upper Back, Low Back	45 minutes into signing
Participant 13	Female	30-40	White	Yes	10-20 years	Good	Other	10+	Yes	1+ years	2	Neck, Shoulder	1 hour into signing
Participant 14	Female	30-40	Black or African American	Yes	10-20 years	Excellent	School/classrooms	10+	Yes	1+ years	6	Neck, Elbow/Forearm, Hand/Wrist, Fingers, Low Back	1 hour into signing
Participant 15	Female	40-50	White	Yes	10-20 years	Good	School/classrooms	10+	Yes	1+ years	10	Neck, Shoulder, Elbow/Forearm, Hand/Wrist	45 minutes into signing
Participant 16	Female	20-30	White	Yes	2-5 years	Good	Other	10+	Yes	1+ years	2	Hand/Wrist	1 hour into signing
Participant 17	Female	20-30	White	Yes	0-2 years	Excellent	Other	10+	Yes	6-12 months	6	Hand/Wrist, Fingers, Low Back	1 hour into signing
Participant 18	Female	30-40	Black or African American	Yes	2-5 years	Great	School/classrooms	10+	Yes	1+ years	5	Shoulder, Hand/Wrist, Feet/Ankles	45 minutes into signing

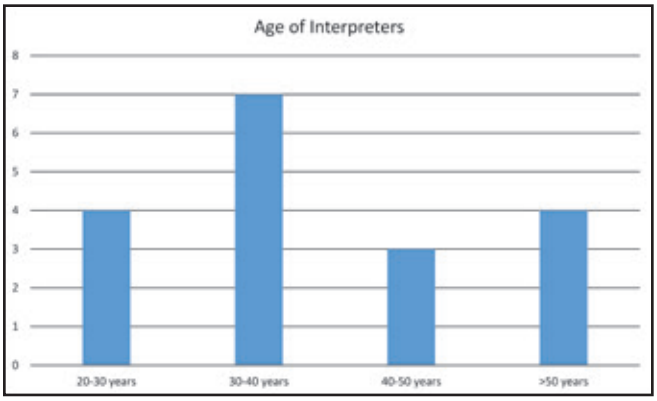

Figure 1. Age of interpreters.

pate in any physical activity for exercise, and one interpreter declined to respond to this question. Data are presented in Table 1. The most common type(s) of exercise reported were walking (84.6%), running (30.8%), swimming (30.8%), weight lifting (23.1%), yoga/Pilates (23.1%), biking (15.4%), and dance, with one (7.7%) interpreter reporting regularly participating in horseback riding. Three (16.7%) interpreters reported a length of career in signing between 0 and 2 years, 2 (11.1%) reported signing between 2 and 5 years, 3 (16.7%) reported signing between 5 and 10 years, 7 (38.9%) reported signing between 10 and 20 years, and 3 (16.7%) reported signing for over 20 years (Figure 2).

Job Details

Seventeen interpreters (94.4%) reported signing >10 hours per week with one (5.6%) reporting signing 8 to 10 hours per week. In regards to the question of overall job satisfaction all interpreters were generally satisfied with their current job, with only one (7.7%) interpreter indicating "poor" satisfaction.

Signs and Symptoms of WRMDs

Seventeen interpreters (94.4%) reported experiencing pain associated with their work activities over the previous year. The interpreters who reported experiencing pain reported symptoms in the following anatomical location(s): hand/wrist (76.5%), neck (64.7%), shoulder (64.7%), elbow/forearm (47.1%), upper back (41.2%), lower back (41.2%), fingers (35.3%), and feet/ankles (5.9%) (Figure 3). Interpreters described the nature of their symptoms as aching (77.8%), pain (55.6%), stiffness (55.6%), tingling (50%), numbness (33.3%), weakness (22.2%), cramping (22.2%), burning (16.7%), and/or swelling (11.1%) (Figure 4). When asked to rate their pain levels when at its most severe (between 0 = "no pain" and 10 = "you need to go to the emergency room"), 11.1% rated it as a 2/10, 22.2% rated it as a 3/10, 16.7% rated it as a 5/10, 16.7% rated it as a 6/10, and 11.1% reported it as a 10/10. Ten (55.6%) interpreters reported time of onset of symptoms to be when signing for an hour or greater, 5 (27.8%) reported symptom onset at 45 minutes, and one (5.6%) reported symptom onset at 30 minutes (Figure 5). Two interpreters did not respond to the time of onset of symptoms question. When prompted to select the primary motion(s)

Figure 2. Years of experience as a sign language interpreter.

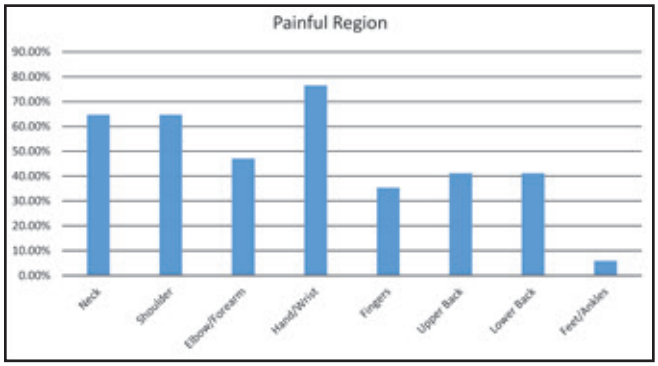

Figure 3. Painful body region(s) reported.

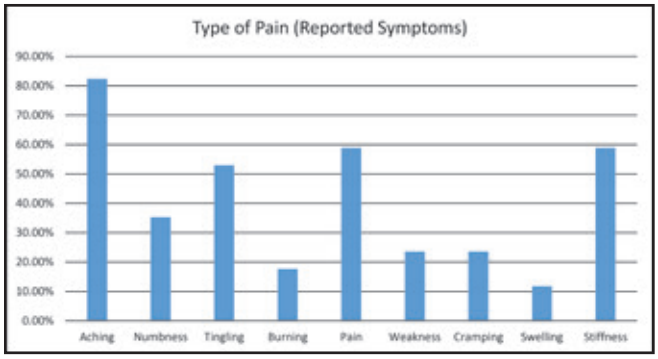

Figure 4. Type(s) of pain (symptoms reported).

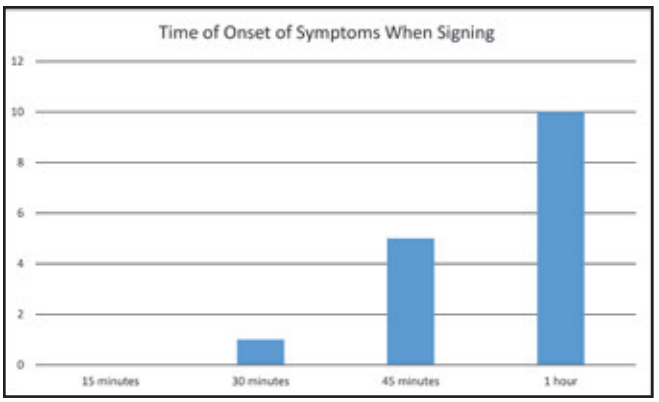

Figure 5. Time of onset of symptoms when signing.

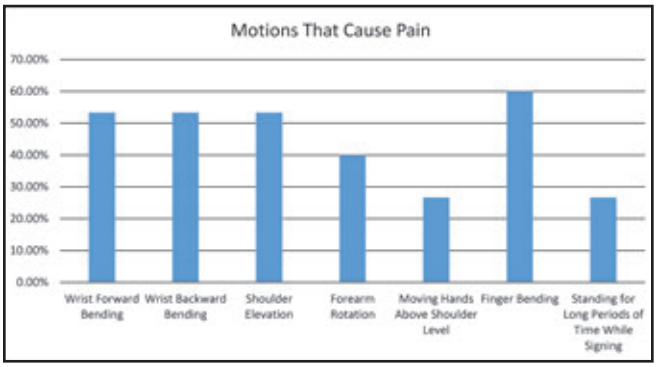

Figure 6. Motions that cause pain.

or activities that cause pain, 15 interpreters responded, and 3 did not respond to the question. The motions that were most frequently reported as causing pain were finger bending (flexion) (60%), followed by wrist forward bending (flexion) (53.3%), wrist backward bending (extension) (53.3%), shoulder elevation (53.3%), forearm rotation (40%), moving hands above shoulder level (26.7%), and standing for long periods of time while signing (26.7%) (Figure 6).

Loss of Time at Work

Three (17.6%) of the interpreters reported they had lost time at work due to their work-related pain, while 14 (82.4%) reported they had not lost time at work due to their pain. One interpreter failed to answer this question.

Intervention

Eight (53.3%) interpreters reported having sought treatment for work-related musculoskeletal problems from a health professional. Of those who sought treatment, 4 (50%) reported seeing a chiropractor, 3 (37.5%) a physical therapist, 2 (25%) orthopaedic physicians, 2 (25%) a primary care physician, and 1 (12.5%) had received treatment from an occupational therapist. Ten (55.6%) interpreters reported previously attending an educational workshop on workplace ergonomics. In a separate question, 8 (44.4%) reported having attended a workshop specifically on stretching techniques. Of the 12 who reported having not attended an educational workshop on ergonomics, stretching, or both, all (100%) responded they would be interested in attending a workshop focusing on proper workplace ergonomics and stretching techniques to help prevent musculoskeletal overuse injuries in the future.

DISCUSSION

This pilot study is a preliminary, community-based investigation on the prevalence of musculoskeletal injuries experienced by sign language interpreters from a local organization in a defined geographic region (metropolitan area in the Midwest). Seventeen (94.4%), of the 18 interpreters surveyed, reported experiencing pain associated with their work over the previous year. A wide range of ages responded to the survey, with the majority being between 30 and 50 years old (55.6%), and having been actively working as an interpreter for 10 to 20 years (38.9%). All of the interpreters who had been actively interpreting for less than 2 years, as well as the interpreters who have been actively interpreting for more than 20 years, reported experiencing work-related musculoskeletal pain in the previous year. Therefore, interpreters are reporting work-related injuries whether they are relatively

new to interpreting or have been doing the job for over two decades. This demonstrates that years spent interpreting may not be a strong risk factor for developing a work-related injury. Future research is needed to investigate the rate at which each of these groups are experiencing injuries, as well as examining the types of injuries between them. Another important implication might be to address any pre-existing risk factors (eg, prior surgery, medical history, etc.) that are beyond the scope of the current study. Similarly, it will be important to decipher between interpreters who only sign at their jobs and those who may continue signing to a deaf child or spouse at home.

Interpreters were asked about job satisfaction in order to determine if any correlation exists between it and the severity of injury report. One participant (5.6%) reported poor job satisfaction, with the rest of the interpreters reporting either good, great, or excellent (94.4%) job satisfaction. A strong relationship between report of pain and job satisfaction cannot be made based on this data; however, it may be worthy to note that the single interpreter (participant 12) that selected the lowest job satisfaction option ("poor"), was one of the two interpreters who also reported the highest pain severity option ("10"). Future research is needed on the possible psychosocial connections that job satisfaction, job demands, work setting, work stress, personality factors, etc. can have on reported pain severity for a sign language interpreter.

Ten (58.8%) of the interpreters in our study reported their onset of symptoms typically occurred after 1 hour of signing, 5 (29.4%) reported symptoms occur following 45 minutes, and 1 (5.9%) reported an onset after 30 minutes (see Figure 6). Previous research has demonstrated that limiting the length of time spent signing without a break with a job rotation strategy, when possible, may be an important preventative strategy to reduce risk of injury.[10] Ansesio-Cuesta et al[10] developed an algorithm used to design a rotation schedule for job positions with high repeatability. This is relevant because sign language is comprised of highly repetitive motions, and interpreters' exposure to repetitive movements is a significant risk factor that can lead to WMSDs of the neck, shoulders, elbow, hand/wrist, and back. Unfortunately, a job rotation strategy may not be applicable or realistic for all interpreters. Implementation of a rotation schedule should not replace the redesign of jobs to reach acceptable risk levels.[10] Other preventative measures including educational and prevention programs developed by health and safety professionals, such as physical therapists, need to be used in conjunction with a rotation schedule to prevent work-related musculoskeletal injuries in sign language interpreters.

Employers of sign language interpreters could benefit from a reduction in time lost by their employees at work due to pain. Fourteen (82.4%) interpreters reported having previously lost time at work due to work-related pain. David et al[11] describes the development of the Quick Exposure Check (QEC) for assessing exposure to risk factors for work-related MSDs.[11] This may be a useful tool in developing an intervention protocol for a sign language interpreter based on the setting and his or her individual and psychosocial risk factors. The QEC involves both an Occupational Safety and Health practitioner and the worker (in this case the interpreter) in the assessment and has "fair to moderate" levels of inter- and intra-observer reliability.[11] The QEC was designed for industrial work sectors; however, it seems to have potential as a useful tool in developing treatment interventions for sign language interpreters. Perhaps developing a tool specific to sign language interpreting should be considered to address the specific nature of the job.

Along with job rotation strategies and screening tools, physical therapists could develop additional preventative measures in this worker population and provide treatment interventions including but not limited to therapeutic exercise; stretching, strength, and/or endurance training; therapeutic modalities; and patient education. A randomized controlled trial conducted by Chao, et al[12] compared the effects of various treatment interventions on groups of computer workers with work-related neck and upper extremity pain, and showed biofeedback training produced favorable outcomes in reducing pain and improving muscle activation of neck muscles in patients with work-related neck and shoulder pain.[12] Continued research in this area may provide effective plans of care for treatment of sign language interpreters.

Future research is needed on the effectiveness of physical therapist directed interventions for sign language interpreters. While the sample in the current pilot survey was small, and may not be generalizable to other geographical regions, it does indicate a need for education of the general public in the role physical therapists have in addressing WRMDs.

The current pilot study was not without limitations. The findings suggest a high prevalence of WRMDs in sign language interpreters; however, the study was unable to control for several confounding variables. In order to provide a more detailed and valid analysis of work-related injuries in sign language interpreters, it is necessary for other contributing factors to be assessed. This includes but may not be limited to information such as individual medical history and general health or physical activity levels, tobacco use, sleep habits, and mental health. Also, all collected data was based on subjective report. Objective measurements such as range of motion and muscle testing, postural alignment as well as a field observation of signing movements, may improve the validity of these findings. Second, the sample size was small and homogenous in nature, thus limiting the interpretation of the results. A larger number of respondents would ensure greater confidence in the results that can be better generalized across the profession. Also, all respondents were female and all worked in the same community for the same employer. Although this survey could not account for gender-based differences, it may be important to note the Registry of Interpreters for the Deaf reports 84% of its members are female.[13] A longer response period may also provide a more accurate understanding of the prevalence of these injuries. For instance, the timing of the administration and response to the survey may yield different findings such as certain times of year (graduation season, school summer breaks, etc.) when sign language interpreters are more/less active. Third, the non-response of some survey items could lead to a non-response bias of the current findings. It is unclear as to why 4 questions had at least one interpreter decline to answer. These questions, or the survey directions, may have been unclear to some interpreters.

CLINICAL APPLICATIONS

The American Physical Therapy Association's vision statement for the physical therapy profession is "transforming society by optimizing movement to improve the human experience."[9] It further explains, "The complex needs of society…beckon for the

physical therapy profession to engage with consumers to reduce preventable health care costs and overcome barriers to participation in society.[9]" A strong link between physical therapists and sign language interpreters is in the best interest of both professions if there is any prevalence of WRMDs in these workers. This pilot survey study suggests that work-related musculoskeletal pain experienced by sign language interpreters may be a prevalent concern in this occupation. A major challenge for the rapidly growing sign language interpreter profession is how to mitigate the work-related risks associated with this occupation appropriately to help a healthy work force of interpreters maintain capability to handle an increasing workload. This survey is important in linking physical therapist practice with sign language, as it shows that ASL interpreters could benefit and are willing to participate in preventative interventions. Physical therapists are health care providers who not only treat WRMDs but also advise patients and their employers on safe work practices, including prevention. Physical therapists, as movement experts, can make a positive impact on their communities and society by developing and providing educational material, group workshops and individual treatment plans that instruct these workers on preventative strategies to protect their bodies.

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