

August 3, 2001

The Honorable Elaine L. Chao
Secretary of Labor
OSHA Docket Office
Docket No. S-2777A
U.S. Department of Labor
200 Constitution Avenue
Room N-2625
Washington, D.C. 20210

RE: Ergonomics Comments - Docket No. S-277A

Dear Secretary Chao:

On behalf of the Society of Diagnostic Medical Sonography (SDMS), we thank you for the opportunity to present these comments regarding ergonomics and work-related injury among sonographers, the healthcare professionals that provide ultrasound services. We appreciate what a difficult task it was for the Occupational Safety and Health Administration (OSHA) to formulate the ergonomics rule issued in November, 2000 and applaud the tremendous work of the professionals who crafted that regulation given the complexity of issues and opinions surrounding its development. SDMS was disappointed when Congress chose to overturn this rule as work-related injury literally cuts short the professional life of sonographers, nevertheless we are vested in the success of this new process.

SDMS is the largest professional association for sonographers in the world with a membership of approximately 12,000. As the largest representative body for the providers and users of ultrasound services, we have long been dedicated to seeking effective methods to reduce work-related injury among all providers of ultrasound providers, both physician and non-physician. SDMS worked with OSHA throughout the prior rulemaking by submitting written comments on the proposed ergonomics rule and appearing as a witness before the OSHA ergonomic panel convened in April 2000. SDMS is committed to continuing to work with the Agency in a cooperative manner so that an acceptable solution is found to protect American workers from work-related injury.

SDMS agrees that any new regulation put forth by OSHA should focus on prevention and be based on sound science. In addition, a regulation should be flexible, clear, feasible, and incentive driven. To this end, our comments focus on four main issues:

- (1) Describing work-related injury generally and among sonographers;
- (2) Documentation of work-related injury in the sonographer workforce;
- (3) Ergonomics solutions and feasibility; and
- (4) The role of the government in addressing workplace injury.

I. Background

It is well-documented that more than eighty percent (80%) of ultrasound professionals sustain some level of work-related injury during their professional careers. Twenty percent (20%) of these professionals ultimately must retire from the profession due to physical incapacity directly related to these injuries. The continual loss of these professionals functions to exacerbate the already existing shortage of experienced sonographers across the country; further decreasing access to these important health care services.

Ultrasonography is a diagnostic medical procedure that uses high frequency sound waves (i.e., ultrasound) to produce dynamic visual images of organs, tissues, or blood flow inside the body. This type of procedure is typically referred to as a sonogram or ultrasound examination.

Ultrasound procedures may be rendered by physicians or specially-trained non-physician providers. A Diagnostic medical sonographer^{1/} is the proper term to describe a non-physician professional who practices diagnostic medical sonography.^{1/} The profession of diagnostic medical sonography has been in existence for over thirty years, and generally is described to have three clinical specialty areas: vascular sonography, cardiac sonography, and diagnostic medical sonography.

Vascular Sonography: refers to the use of ultrasound technology to evaluate the anatomy and hemodynamics (i.e., blood flow) of cerebral, peripheral and abdominal blood vessels. Providers of vascular sonography procedures are referred to as Avascular technologists.@

Cardiac Sonography: refers to the use of ultrasound technology to evaluate the anatomy and hemodynamics of the heart, its valves and related blood vessels. Providers of

^{1/} Sonographers provide these healthcare services in hospitals, clinics, and outpatient centers.

cardiac sonography are referred to as Acardiac sonographers,@ and typically perform Aechocardiography@ procedures.

Diagnostic Medical Sonography: refers to the use of ultrasound in specific medical specialties or to evaluate the anatomy and physiology of specific organs and systems. These examinations may focus on:

§ Abdomen - including all of the soft tissues, blood vessels and organs of the abdominal cavities, including, for example, the liver, spleen, urinary tract, and pancreas;

§ Breast Sonology - breast tissue for masses and cysts;

§ Obstetrics/Gynecology - female reproductive system;

§ Urology - male reproductive system;

§ Neurosonology - brain and spinal cord; and

§ Ophthalmology - eyes, including the orbital structures and muscles.

II. Ergonomics Injury and Its Etiology in the Sonography Workforce

Occupational injury among sonographers has been described using many terms: Work-Related Musculoskeletal Disorder (WRMSD), Repetitive Strain Injury (RSI), Musculoskeletal Injury (MSI), Repetitive Motion Injury (RMI), Overuse Syndrome, and Cumulative Trauma Disorder (CTD) (hereinafter referred to as WRMSD). Based on our considered experience with WRMSD, SDMS believes that these terms more accurately describe such injuries, rather than the term Aergonomics injury@ because these other terms describe the causative nature of the injury. In fact, the term Aergonomics injury@ is a misnomer since ergonomics are part of the solution, not part of the problem. By definition ergonomics is the study and science of fitting the job to the worker (anatomically, physiologically, and psychologically) in order to enhance human efficiency and well being. OSHA has shown that there are three primary risk factors that contribute to musculoskeletal disorders or repetitive strain injuries: posture, force and repetition. The process of performing diagnostic medical sonography, which is referred to as Ascanning,@ encompasses all three risk factors. As the illustrations found at Appendices 1 through 4 depict, scanning places great physical demands on the sonographer, both in terms of excessive reach and twisting of the body and the extreme exertion of force in order to obtain diagnostic images.

Sonographers use special ultrasound equipment to direct high frequency sound waves into specific areas of a patient=s body. Scans take 15 to 45 minutes to complete. To perform an examination, the sonographer uses a transducer, which is a hand-held instrument that produces sound waves and is attached to an ultrasound machine by a long, heavy transmission cord. For most studies, the sonographer must rest the transducer transmission cord across their shoulders and nape of their neck to aid in directing the transducer and to avoid contact with the patient=s body. (See, Appendix 2). The transducer must be gripped

tightly so that downward force can be exerted onto the body. (See, Appendix 4). Depending on the study, it has been estimated that the sonographer must exert between four (4) and forty (40) pounds of force in order to compress body fat and/or move bowel gas out of the field of view.

Sonographers must maintain various tortuous body positions to achieve the angles with the transducer necessary to assess the structures being evaluated, to analyze blood flow, and capture this information on videotape. There is no opportunity for the sonography to relax from these static postures or he or she risks the quality and accuracy of the examination. For example, most examinations require the sonographer to lean across the patient's body without shoulder or elbow support to view organs on the patient's left side. (See, Appendix 3). This positioning requires sonographers to repeatedly twist their head and neck in order to view the dynamic image on the monitor located to the left of the sonographer. (See, Appendices 2 and 3).

The sonographer also must constantly adjust the position of the ultrasound machine in order to accommodate the different sizes of patients and the various positions the sonographer must assume while performing an ultrasound procedure because the monitor and the controls cannot be detached or adjusted. (See, Appendix 1). Ultrasound machines weigh between 300 and 600 pounds. It is this constant abduction and elevation of the scanning arm and the muscular forces needed to maneuver the transducer and the machine, as well as the head and neck twisting, that leads to neck and shoulder injuries.

III. Documentation of WRMSD Injury in the Sonographer Population

Studies in the late 1990s showed that the incidence of WRMSD in the U.S. Sonographer workforce to be an alarming 81 percent, with half of this population describing their pain as severe. More recent estimates suggest that the prevalence rate is increasing both in severity and frequency of injury. Some 20 percent of the over 80 percent of U.S. sonographers scanning in pain are forced to end their ultrasound career due to WRMSD.

In 1997, the British Columbia Ultrasonographers Society, (BCUS) the Healthcare Benefit Trust of Vancouver Canada and the Health Sciences Association of British Columbia conducted the Work Health & Ergonomic Survey to determine the incidence of WRMSD in the sonography workforce in Canada and the United States, and to document effective techniques to prevent these injuries.^{1/}

^{2/} British Columbia Ultrasonographers Society et al., Sonographer's Work, Health & Disability Survey Report (1999); Carmel Murphy & Andre Russo, An Update of Ergonomic Issues in Sonography (2000). Attached at Appendix 5. SDMS would be happy to provide a copy of the survey tool upon request.

The purpose of the survey was to:

- § Document the prevalence of WRMSD across large sample of sonographers;
- § Correlate the presence of WRMSD with work and personal factors;
- § Develop instruments, protocols and methods to quantify risks factors associated with WRMSD in the sonography population;
- § Design and test interventions to decrease risk factors;
- § Recommend work load/procedural changes to prevent injury; and
- § Recommend modifications or redesign of equipment and/or the work environment to reduce WRMSD among sonographers.

SDMS conducted the U.S. arm of the study using the same survey tool and study design. A random sample of 3,000 sonographers was drawn from the database of the American Registry Diagnostic Medical Sonographers (ARDMS) and received the 125-question survey.^{1/} This database was used to draw the sample because it contains sonographers from all the various clinical specialty areas, and therefore, provided a reasonable cross-sample of subjects.

A total of 1,621 sonographers from the U.S. and Canada responded to the survey. The response rate from U.S./SDMS portion was 33%, the Canadian Society Diagnostic Medical Sonographers had a response rate of 39%, and the BCUS documented a 92% response rate.

The combined U.S./Canadian results of the survey showed that 84% of the 1,621 respondents reported experiencing pain while scanning. The average length of time these individuals reported scanning in pain was 5 years, and the average length of time in the profession was 11 years. Based on these numbers, 8 out of every 10 sonographers surveyed had been

^{3/} Ian Pike et al., The Prevalence of Musculoskeletal Disorders and Related Work and Personal Factors Among Diagnostic Medical Sonographers, 13 J.D.M.S. 219 (1997). Attached at Appendix 6.

scanning in pain for half of their career. Twenty percent (20%) of those reporting in pain were forced to withdraw from the profession due to their physical symptoms.

The incidence of WRMSD among sonographers outside the United States and Canada also is well-documented. Studies in Australia have shown incident rates of WRMSD between 77.85% and 95.4%,^{4/} and a study in Italy revealed a WRMSD prevalence rate of 80% among sonographers.^{5/} Several other independent U.S. surveys all substantiate a WRMSD incidence rate between 80-91% (average 84.5%) across the United States sonographer workforce.^{6/} A review of the literature also reveals research documenting the presence of WRMSD injuries among sonographers in Italy, Israel and Great Britain.

The consistent finding of WRMSD among sonographers across the globe supports the conclusion that these injuries are work-related and not lifestyle-related. The life-style and

^{4/} See, e.g., Val Gregory, Occupational Health and Safety Update: Report on the Results of the Australian Sonography Survey on the Prevalence of Musculoskeletal Disorders Among Sonographers, *Sound Effects* 42 (Dec. 1999). Attached at Appendix 7.

^{5/} See, e.g., Nicola Magnavita et al., Work-Related Musculoskeletal Complaints in Sonologists, 41 *Journal of Occupational and Environmental Medicine* 981 (1999). Attached at Appendix 8.

^{6/} See, e.g., Martin Necas, Musculoskeletal Symptomatology and Repetitive Strain Injuries in Diagnostic Medical Sonographers, 12 *J.D.M.S.* 266 (1996); Annette C. Smith et al., Musculoskeletal Pain in Cardiac Ultrasonographers: Results of a Random Survey, 10 *Journal of the American Society of Echocardiography* 357 (1997); Lindsey V. Kayman et al., Recommendations for Preventing Repetitive Strain Injuries in Sonographers, 3 *Journal of Healthcare Safety, Compliance, and Infection Control* 351 (1999); Heidi E. Vanderpool et al., Prevalence of Carpal Tunnel Syndrome and Other Work-Related Musculoskeletal Problems in Cardiac Sonographers, 35 *Journal of Occupational and Environmental Medicine* 604 (1993). Attached at Appendix 9.

non-work-related activities of sonographers in all these countries is varied. Some are physicians while others are non-physicians. The only common thread shared by all the subjects surveyed is they all perform ultrasound exclusively at the worksite, and use the same type of equipment manufactured by the same companies as sonographers here in the United States. Moreover, most of the injuries reported by this international sample involved the neck and shoulder and the wrist and elbow. In summary, regardless of geographic location, WRMSD injuries are documented in the sonography workforce. It is unlikely these injuries are related to non-work factors given the different lifestyles found in various countries. Rather, similarities in the workplace are the only common risk factors in each sample suggesting the source of the injuries must be job-related.

SDMS also documented WRMSD in a separate independent survey. During 1999 and 2000, SDMS conducted its second Sonographer Benchmark Survey (ASBS@) to gather quantitative and qualitative information about the practice of sonography and the professionals working in this clinical specialty.^{1/} More than 10,000 sonographers completed the survey tool. Respondents reported pain in several anatomical sites, with the neck, shoulder, wrist, and lower back being reported most frequently. (See, Appendix 10). Twenty-eight (28) percent of the respondents reported that their careers changed due to occupational injury. Typical changes included decreasing from full-time to part-time employment or moving from a hospital-based ultrasound laboratory to an office-based position in order to accommodate their physical limitations. One in five sonographers reported being forced to file workers compensation claims. Seventy-three (73) percent of these claims were accepted upon medical review.

The potential impact of WRMSD among sonographers is even more critical given that the number of studies being performed by sonographers has increased significantly over the past 8-years. The American Healthcare Radiology Administrators Utilization of Imaging Staff Survey showed a 9.1% increase in patient volume per sonographer per year in U.S. hospitals and a 15.6% increase in non-hospital sonographer procedures between 1992 and 1995. The SDMS 2000 SBS data showed a similar increase in patient volumes per sonographer per year both in hospital and non-hospital settings. Since 1992, there has been a 55.5% increase in the number of ultrasound studies performed per sonographer per year. (See, Appendix 11). The alarming reality of this dramatic increase in study volume, is that these additional studies are being done in the same 8-hour workday by virtually the same number of staff. Sonographers are being forced to increase the number of hours they spend scanning. Longer periods of scanning means greater wear and tear on a sonographer's body.

^{1/} This first survey was completed in 1992.

The SBS data suggests that there has been a rise in WRMSD injury across the sonography workforce. This trend can be explained by the increase in the number of continuous hours spent scanning and the number of procedures performed by an individual sonographer without the implementation of safeguards to protect sonographers from these greater physical demands. The survey results did not show any significant lifestyle changes in the sonographer population between the 1992 survey and the 2000 survey that would account for the higher incident rate. Significantly, the incidence of non-work-related MSD has remained stable, or has been reduced, during this time frame.

IV. Ergonomics Solutions

The financial impact of work-related injury to the U.S. economy and the personal cost to the injured individuals is unacceptable. Injured sonographers alone can cost employers over a million dollars each year through:

- § Loss of revenue: \$520,000 per year or \$10,000 per week chargeable revenue per injured sonographer.
- § Worker=s compensation: \$32,000 per injury or \$2,700 per month.
- § Replacement staff: \$60,000-80,000 per year or \$5000-6500 per month
- § Medical bills: \$20,000 per year or \$1700 per month for the average shoulder injury (this does not include surgical treatment).

Today, we have the benefit of outcomes data that shows that the risk and incidence of WRMSD caused by repetitive stress on a body area can be reduced through a combination of the use of (1) proper body mechanics and postural alignment, (2) equipment that is designed to reduce excessive force and strain on the body during scanning, and (3) staggered work schedules that ease the constant wear on the body.

The solution to decreasing the incidence and cost of WRMSD is multi-faceted and should focus on prevention and elimination of the root cause of an injury once discovered. To reach these goals there must be a working partnership between employers and employees to establish and maintain sound ergonomics policies and programs, improvements in ultrasound equipment technology, and continued outcomes-based research to identify best practices.

Successful ergonomic programs balance the anatomical, physiological and psychological demands placed on the worker and the needs of the employer to run an efficient and prosperous business. The current, prevailing AStandard of Care@ for many WRMSD includes surgery and immobilization of the injured area, often at the expense of the employer=s worker compensation program. Despite the cost in pain and suffering to the employee and lost productivity to the employer, the injured employee typically returns to the same work environment that lead to the injury following recovery.

Multiple studies have shown that properly implemented ergonomics programs reduce workers= compensation costs, absenteeism and turnover as well as increase worker efficiency, product quality and employee morale. For sonographers, it is critical that an ergonomics program focus on allowing the sonographer to maintain good ergonomic position while scanning and that ultrasound equipment be Asonographer friendly.@ For example, ultrasound machines should be adapted to make the monitor and keyboard of the ultrasound machine adjustable and removable so that the equipment may be placed in positions that permit the sonographer to maintain good body mechanics.^{1/} Some less substantial changes that are still effective in helping to reduce injury include providing sonographers with ergonomically correct furniture such as narrower, height-adjustable stretchers, ergonomically designed chairs, and better-configured examination rooms that ease scanning. Despite the relative cost of supplying ergonomically correct furniture as compared to the cost of ergonomic injury, however, our members report that many employers are unwilling to consider even these easily accomplished measures.

As discussed above, the data suggests that another major contributing factor to the development of WRMSD injury is the length of time a sonographer scans without sufficient time for their bodies to relax. Nevertheless, despite the benefit of this knowledge, work trends show just the opposite. Sonographers are being worked harder and longer to overcome sonographer staffing shortages and the increased demand for ultrasound services. The SDMS 2000 SBS survey showed that 50.2% of sonographers receive no break or only one break in an eight-hour day, in order to accommodate add-on or extra patients into an already full schedule. (See, Appendix 12).

Technological advances also have had the unintended consequence of increasing scanning workloads. Many of the support and administrative tasks related to ultrasound procedures have been automated. As a result, sonographers have been freed from these duties, which once required them to break from scanning (providing rest periods, albeit, out of business necessity), and this open time has been filled with more patients. Without education and

^{8/} Medical facilities and physicians, as the purchasers of ultrasound equipment and employers of sonographers, are in the best position to demand manufacturers offer such equipment.

national guidelines, SDMS fears working conditions will continue to diminish until employers accept the human and business costs of WRMSD.

Several SDMS members are experts in WRMSD injury prevention training, and have found that there are useful and cost-effective solutions available to employers of sonographers to reduce the risk for occupational injury among their workforce. These prevention measures can be grouped into ASonographer Solutions@ and AEnvironmental/Employer Solutions.@

Sonographer Solutions include:

- § Awareness of body mechanics,
- § Training in correct postural alignment,
- § Retraining of exam technique to include proper postural alignment, and
- § Fitness commensurate with the demands of the profession.

Environmental/Employer Solutions include:

- § Ergonomically designed ultrasound equipment,
- § Appropriately adjustable ancillary equipment,
 - S Examination table
 - S Chair
 - S Monitor
 - S Support Cushions for scanning arm
- § Employer support of worker safety,
 - S Appropriate scheduling/workload guidelines
 - S Mandatory breaks

The costs of these solutions are not prohibitive when compared to the cost of an occupational injury, replacement staff, and loss of revenue.

- § Ergonomic Examination Table: reduces excessive twisting and bending resulting in neck and back and extreme shoulder abduction.

Cost: \$5,200 = Ultrasound Reimbursement: less than 2 days work

§ External monitor: reduces excessive bending, reaching, twisting of spine and suboptimal shoulder positioning.

Cost: \$200 = Ultrasound Reimbursement: 1-1.5 exams

§ Fully adjustable chair: reduces excessive abduction, internal rotation of arm/shoulder; provides adequate back support.

Cost: \$600 = Ultrasound Reimbursement: 2-3 patient studies

§ Set of support cushions for scanning arm: provides muscle recovery time from prolonged static positioning.

Cost: \$200 = Ultrasound Reimbursement: 1-1.5 ultrasound studies

V. Role of the Government in Addressing Workplace Injury

The cost of WRMSD is real and will continue to increase unless prevention of these injuries becomes a national priority. These costs come in the form of dollar output to treat injuries and compensate for lost work time as well irreparable changes to worker's lifestyle and ability to earn a livelihood. As the Agency charged with protecting the nation's workforce, OSHA is uniquely positioned to help educate employers that implementation of ergonomics standards will not cost them money but rather SAVE them money by determining the root cause of a WRMSD and finding solutions to avoid future injuries. These programs also increase employee awareness of ergonomics, and their role in preventing harm to themselves..

Given the magnitude of WRMSD, SDMS believes that it is critical for OSHA to establish some minimum ergonomic standards, and to assist employers and employees to work together to meet these requirements. The government should be the catalyst for this process by working with stakeholders representing industry and employees to set ergonomic standards including thresholds regarding when, and to what extent, particular industries are required to implement ergonomics prevention programs. Jobs could be classified according to their level of risk for the purpose of requiring some type of safety program to be established and a timetable for implementation of such a program. Governmental involvement also may take the role of offering some type of business incentives or public recognition for companies and industries that implement successful ergonomic programs.

Historically in the U.S., the cost of rehabilitating injured workers has been borne primarily by the insurance industry, both workers' compensation carriers and health insurers. To some extent, therefore, employers have had the opportunity to free ride on this system. It is time we refocus the responsibility for workers' health back to the site where injuries can be prevented. In this way, both employers and employees are obligated to identify potential risks, making it possible to implement prevention measures before employers and insurers are faced with expensive workers' compensation and health care claims. This on-going process of the evaluation of workplace safety has the added incentive of increasing employee morale, improving efficiency and/or adding competencies through updating the work environment. Changing the focus of occupational safety to that of prevention through education and training empowers both the employer and the employee to control outcomes. In the end, employers benefit through increased employee retention, retention of more experienced staff, improved productivity and performance quality, lower medical and workers= compensation costs, and happier, healthier employees. Employers argue they cannot afford to implement work injury prevention programs, but in the long run, they cannot afford to ignore this growing problem.

WRMSD is causing a critical sonographer-staffing crisis as more and more individuals are forced to leave the profession due to scanning-related injuries. We believe that OSHA and the Labor Secretary have a responsibility to work together with employers, employees, and manufacturers to address ergonomic injuries and prevention. By expecting employers of sonographers to address occupational injury, ergonomics and injury-prevention will become an integral part of equipment buying decisions, work-site design decisions, and staffing decision-making.

SDMS believes that the changes it has suggested are practical, first steps to preventing the number of occupational injuries among providers of diagnostic ultrasound services. We appreciate the opportunity to provide these comments and are hopeful they will be given useful to your decision-making.

Sincerely,

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