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COP

Lower Back Pain Prevention for Sonographers

Many adults suffer from lower back pain, regardless of occupation. According to the CDC in 2018, 28% of men and almost 32% of women aged 18 years or older had lower back pain in the past three months.¹ It is such a common problem that 5% of all medical visits occurring outside of the hospital setting are for lower back pain.² There are roughly 130 million visits for health care services related to lower back pain every year.³ Reducing time away from work due to work-related injuries is a focus of the US Office of Disease Prevention and Health Promotion's Healthy People 2030 project.⁴ Specifically noting that in 2020 there was a rate of 82.9 nonfatal work-related injuries resulting in one or more days away from work per 10,000 full-time private industry workers.⁴ Healthy People 2030 aims to reduce that rate to 63.8 per 10,000.⁴ The most efficient and impactful way to achieve this outcome is by preventing these injuries before they occur. Every dollar invested in injury prevention generates twice as much or more in return.⁵ Data shows that healthcare workers have more missed days of work than any other profession surveyed.⁶ Sonographers in particular experience a very high rate of injury.³ Therefore, my community outreach project will focus on reducing the number of work-related injuries for sonographers by providing health education on scanning ergonomics, stress reduction, and exercises such as stretching, yoga, Pilates, and core strengthening exercises.

Lower back pain has many etiologies, including but not limited to, everyday accidents or repeated stress put on the spine over time. When repeated stressors lead to a musculoskeletal injury (including anything causing back pain) because of the work one does, they are called work-related musculoskeletal disorders (WRMSDs).^{3,7,8} According to the National Safety

Council, WRMSDs are the most common causes of disability, early retirement, and limitations to gainful employment.^{5,9} WRMSDs account for 33% of all work-related injuries with the estimated cost being over \$50 billion a year in the United States when workers' compensation and loss of productivity are considered.^{3,5,7} Loss of productivity can be measured in several different ways; a couple of common measurements are presenteeism and absenteeism. Presenteeism is defined as continuing to work, despite pain, with a decrease in overall productivity; and absenteeism, is defined as time away from work.^{3,5}

Workplace injuries are a costly problem for employers and employees of all industries and reducing these injuries, and thus reducing days away from work due to those injuries, is a priority for many different stake holders. The occupation that experiences more days away from work than any other occupation is healthcare workers.⁶ This is supported by data that was released in 2022 from the US Bureau of Labor Statistics about time missed from work in different industries or occupations, showing that healthcare workers had the highest rates of absence and lost worktime of all industries and occupations surveyed.⁶ Within the classification of healthcare workers is the specialty of medical imaging, specifically sonographers. Sonography is recognized by the Department of Occupational Safety and Health Administration as a profession susceptible to musculoskeletal injuries,³ with data showing that WRMSDs occur in up to 90% of sonographers.³ Injuries experienced by sonographers may occur due to a combination of risk factors associated with the job including exertion of force over an extended period of time, repetition of movement, awkward or sustained postures, and contact pressure needed for quality image acquisition.^{3,7} With this data in mind, it is reasonable to expect the rates of time missed due to injuries and total costs for sonographers may be higher than the data for healthcare workers in general.^{3,7}

There is no single intervention that can solve this problem, but there is evidence that a combination of interventions can help reduce the occurrence of WRMSDs leading to lower back pain. Exercise or exercise therapy combined with education is a moderately effective way to prevent low back pain¹⁰ and has been shown to be more effective than rest and medication.⁹ Conversely, interventions including back braces, insoles, and education alone have little to no benefit in preventing lower back pain.^{2,10}

Using proper ergonomics is part of a multipronged approach for sonographers to reduce WRMSDs leading to lower back pain.^{9,11} Having proper ergonomics while performing an ultrasound is multifaceted and includes proper posture and using an ultrasound machine that has an ergonomic design.^{3,7} While not every ultrasound machine is designed with the proper ergonomics of the sonographer in mind, every sonographer can take steps to adjust their body during an ultrasound to be as ergonomically optimized as possible. Some of those solutions are to use foot and elbow supports when appropriate, moving the patient closer to the sonographer when appropriate, and taking time to optimize the settings of the machine they are using.⁸ Some things to avoid are excess reach and abduction of both arms, working with the arm behind the midline, prolonged awkward or static posture, sustained reaching, bending and twisting of the trunk, and excess neck flexion, extension, or rotation.⁸ WRMSDs among sonographers are often the result of repetitive movements and static sustained poor postures, specifically, back pain has been found to be associated with repeated twisting of the trunk combined with the abduction of the arm.^{3,7}

In reality, it is impossible to have perfect ergonomics for every ultrasound a sonographer completes. There is often limited space in hospital rooms and that area is often taken by other life supporting equipment; these constraints make it nearly impossible for an ergonomically sound

ultrasound to be performed in the inpatient setting. To perform an ultrasound, it takes several clicks of buttons and turning knobs, which requires repeated interactions with the machine's keyboard or touch screen which contributes to poor ergonomics that cannot be avoided. However, some ultrasound manufacturers are starting to test artificial intelligence in their systems to cut down on the repetitive interactions between the sonographer and the ultrasound machine.¹² Furthermore, having robust ergonomic practices and policies may be protective against reports of WRMSDs leading to lower back pain in sonographers.¹³ Failure to implement these ergonomic practices may ultimately mean less money to the bottom line for all stakeholders including the individual, organization, state, and insurance companies. In a survey of over 4000 sonographers, it was revealed that workplaces with more ergonomic policies and practices had a “protective” effect (odds ratio less than 1) against sonographers reporting WRMSDs.¹³ Conversely, those who had more interrupted workflows were more likely to report WRMSDs.¹³

Stress reduction has proven to be beneficial for many individuals. In the workplace, stress reduction techniques may reduce the number of WRMSDs leading to lower back pain.⁹ Work-related stressors including increased and heavy workloads, lack of control of workflow, or inconsistent schedules can cause workers to physically tense up or lose focus on the job increasing the likelihood of injury.^{3,5} Studies show that mindfulness, stress reduction/management counseling can help prevent low back pain.^{2,3,9} Mindfulness is the practice of choosing to pay attention to one's present experience without connecting it to emotion or thoughts that might come up about or, as a result of, the experience.¹⁴ This non-judgmental awareness encourages one to accept the moment for what it is (just a moment), including those moments that are considered unpleasant.¹⁴ Regular practice of mindfulness can help reduce

stress, increase one's sense of wellbeing, and increase psychological flexibility.¹⁴ Practicing mindfulness can be done formally, with someone guiding one's session, or informally.¹⁴ Informal mindfulness involves weaving mindfulness skills into everyday life.¹⁴ Informal mindfulness is something sonographers can practice every day, without interruption to their current workflow, that may help reduce the occurrence of WRMSDs. A few opportunities to incorporate informal mindfulness into a sonographer's daily activities include while performing the ultrasound itself, walking to and from patient rooms, during the write-up portion of the scan, or whenever the sonographer finds a moment that works for them. The most comprehensive prevention of WRMSDs leading to lower back pain includes both mental and physical interventions.

Sonographers can also incorporate micro-breaks into each of their studies by taking a moment to adjust their body to a more comfortable position while making a measurement. These micro-breaks add up over the course of an ultrasound and can provide working muscles increased recovery time which can reduce the incidence of WRMSDs.³ Employers and institutions must prioritize a safe work environment and culture for employees in order to prevent lower back pain from work related injuries.⁷ Safe work environments can include building more breaks into daily schedules, reducing daily quotas, and providing periodic training around injury prevention.^{3,11} Studies show that regular breaks of over five minutes are associated with lower incidence of WRMSDs.³ On the state level, current Oregon law conditions that employers are required to give two 10 minute paid rest breaks, and one 30 minute unpaid meal break, to employees who work six hours and one minute to ten hours per shift.¹⁵

Another critical part of preventing lower back pain involves physical interventions, including improving core strength and stretching. Yoga is an example of structured movements that include both of these critical components in its practice through a series of poses.² Yoga is

effective for strengthening and stretching the muscles that support the back which helps improve overall stability and mobility, which in turn, helps prevent lower back pain.¹⁶ Studies have shown that yoga has the dual benefit of helping to strengthen and relax strained muscles, this can help strained muscles recover faster which may prevent injury over the short and long term.¹⁷ One example of a yoga asana, or pose, is the Ardha Shalabhasana (which is a pose where one lays on their back while gently pulling their knee in towards their chest).¹⁷ This pose helps shift one's center of gravity slightly to the hips by relaxation of the hip flexor and back extensor muscles; which in turn reduces injury inducing strain on the back.¹⁷

There are several different ways to stretch and strengthen one's muscles, one of the more structured solutions is Pilates. Pilates is a blend of yoga, gymnastics, and martial arts which is designed for physical and mental conditioning.¹⁸ Studies show that Pilates is effective at strengthening the transverse abdominal muscles, (along with many other benefits, including strengthening and stretching other muscle groups) which are deep core muscles.¹⁸ These muscles have a stiffening effect on the lumbar region of the spine which helps to stabilize the area which in turn may lead to improvement in functional activities. These effects, along with an increase in self-confidence during movement, may help reduce the risk of lower back injury.¹⁸

It is understood that not everyone has the time, or the desire, to perform a structured exercise program like the ones described above. There is data to support that even a single back extension stretch in a group setting can reduce the occurrence of lower back pain.² Building strength in the core muscles can help with proper posture and lessen the risk of lower back pain in the future.¹⁹ Some exercises one can add into their daily routine include plank, side plank, bird dog (being on hands and knees with opposite arm and leg extended), supine toe touches (lying supine with feet and arms up in the air and trying to touch), and seated twists (balancing while

seated with legs off the ground and twist to tap both hands on alternating sides of the body).¹⁹ All of these exercises can be adapted to one's ability level; making them accessible to beginners and more experienced participants alike. It is important to note that these exercises do not need to be performed as a group to help strengthen one's core muscles. One may choose an individual exercise to do on its own, or a few to do as a group; either option is effective at strengthening the deep core muscles and thus, may help reduce the occurrence lower back pain.

In conclusion, it is critical that all the steps outlined above be viewed as a whole instead of individual prevention strategies for lower back pain. Data shows that exercise and education combined is the most effective way to prevent lower back pain leading to missed time from work. To obtain the greatest effect from the steps outlined in this paper one must be consistent with all the prevention strategies. Sonographers are asked to do a very physically demanding job which can open one up to workplace injury resulting in time away from work. Therefore, providing health education to sonographers including information on ergonomics and stress reduction, and exercise recommendations including stretching, core strengthening exercises, yoga and Pilates may help reduce days of work missed due to injury. Starting new habits of stress reduction techniques, stretching, and strengthening core muscles can be viewed as an investment in one's career, with the payout being a longer career with less lower back pain. Building these solutions into the scanning curriculum before bad habits form may help prevent injuries in current and future generations of sonographers. Shifting the norms around the culture of injury prevention in sonography will take time, but it is a worthwhile change for everyone involved leading to longer careers and improved patient care.

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