TECHNICAL SUPPLEMENT BULLETIN:

Flagship Surgical prides itself on engineering products driven by science and utilized for clinical application. Below, please see a compilation of independent journal articles & studies, most focusing on the benefits of anti-fatigue matting (ergonomics) utilized in the work place. As evidenced in these studies, musculoskeletal disorders (MSDs) resulting from prolonged standing in the work place present not only a challenge to our health system in economic terms (workers compensation claims), but also place a significant burden upon the productivity, safety and health of the individual worker in the health-care environment.

MSDs are injuries and illnesses that affect muscles, nerves, tendons, ligaments, cartilage and joints, spinal discs, blood vessels and bones. MSDs are not usually caused by acute trauma, but occur slowly over time due to repeated trauma to the soft tissues. Work-Related Musculoskeletal Disorders (WMSDs) are MSDs that are caused or made worse by work methods and environment. WMSDs can occur when the physical capabilities of the worker do not match the physical requirements of the job. The discomfort due to a WMDS often improves following medical treatment. Changing the work environment in order to alleviate stresses which led to the symptoms will help, as well.

Work-Related Musculoskeletal Disorders (WMSDs) are preventable.

1) JAMA: Journal of the American Medical Association- Lost Productive Time and Cost Due to Common Pain Conditions in the US Workforce. November 12, 2003-Volume 290, No. 18. Walter F. Stewart, PhD, MPH; Judith A. Ricci, ScD, MS; David Morganstein, MS; Richard Lipton, MD

Results of a productivity study were reported in the Journal of the American Medical Association (JAMA): "Lost productive time from common pain conditions among active workers costs an estimated $61.2 billion per year…The majority (76.6%) of the lost productive time was explained by reduced performance at work and not work absence… Pain is an inordinately common and disabling condition in the US workforce. Most of the pain-related lost productive time occurs while employees are at work and is in the form of reduced performance… Lost productive time (in hours) is translated to dollars. This is a first step to provide employers with a more concrete understanding of the costs they face from health conditions in their workforce and to begin to consider how health care dollars can be more effectively targeted to population-specific needs. Helping employers understand the cost of health-related lost productive time may encourage them to make more effective use of the health care dollars they invest in their workforce. As the primary purchaser of health care, employers are well positioned to demand programs that reduce the impact of common treatable pain conditions in the workplace. "

2) OSHA (Occupational Safety and Health Administration) Stance on MSD:

OSHA has identified workplace risk factors that have potential to cause MSDs. These factors include: Static Posture, Contact Stress and Awkward Postures. The federal government dictates that workplace risk factors must be addressed for all workers no matter what personal risk factors pre-exist. This is evident by the creation of both OSHA and the Americans with Disabilities Act.

One of the premises that OSHA found during its first rule making hearings was that "good ergonomics is good economics." During the development phase of the first OSHA rule-making process on the "Ergonomic Standard," the following statistics were brought forth:

1) Approximately 300,000 workers could be spared from potentially disabling injuries and $9 billion could be saved each year under the proposed ergonomics program standards.

2) Each year 1.8 million Americans experience work-related musculoskeletal disorders. Roughly one-third of these injuries, around 600,000, are serious enough to require time off from work.

***Anti-Fatigue Matting as an Ergonomic and Economic Solution*: In the repealed "OSHA-Ergonomic Program Final Rule", prolonged and static standing was identified as a risk factor and anti-fatigue matting was a control method for that risk factor. OSHA has multiple ergonomic reports that recommend the use of anti-fatigue mats. These reports point out the health risks associated with standing for prolonged periods of time and the importance of anti-fatigue mats used as engineering controls. What follows are just 2 examples pulled directly from these ergonomic reports:**

Known Hazard:
"Employees have extended periods of standing which creates static loading on the muscles of the back and legs. This is consistent with the development of musculoskeletal injury and generalized fatigue. In addition this can lead to venous pooling of blood in the legs which is consistent with increased fluid pressure in the legs and the development of varicose veins."

> **Known Control: "Where employees are required to stand for long periods of time, provide anti-fatigue mats and/or shoes with well-cushioned insteps and insoles."**

Known Hazard:
"Statically standing in one posture reduces the flow of nutrients to and the removal of wastes from the muscles, tendons and vertebra. This can lead to venous pooling of blood and an increase in pressure of the lower extremities. Additionally, it creates a contact stress to the bottoms of the feet. Statically standing in one place for prolonged periods of time increase the risk of development of MSDs of the legs and feet such as pain, fatigue and varicose veins."

> **Known Control: "Where employees are required to stand for long periods of time, provide anti-fatigue mats and/or shoes with well-cushioned insteps and insoles."**

3) OSHA Hospital eTool: Surgical Suite Module

Static and Awkward Postures: Medical staff in a surgical setting often assume prolonged awkward postures. Typically, employees vary in height which may require work surfaces at differing heights to minimize awkward postures.
Potential Hazards:

a) **Standing in static postures continuously during lengthy surgical procedures causes muscle fatigue and pooling of blood in the lower extremities.**
b) **Standing on hard work surfaces such as concrete creates trauma and pain to the feet.**
c) **Awkward postures resulting from prolonged standing, trunk flexion, neck flexion and arms held higher than the optimal working height.**

Possible Solutions:

a) **Use anti-fatigue mats.**
b) **Use height-adjustable work tables and surfaces.**
c) **Provide stools, where possible.**
d) **Use shoes with well-cushioned insteps and soles.**
e) **Provide a footrest bar or a low stool, allowing employees to continually alter their posture by raising one foot.**

4) OSHA: eTool- Prolonged Standing Module

Employers have the primary responsibility for protecting the safety and health of their workers.
Employees are responsible for following the safe work practices of their employers.
Employers should consider implementing recommended safe work practices, including:

a) **Provide anti-fatigue mats. Anti-fatigue mats help contract and expand muscles of the person standing on them increasing blood-flow and reducing fatigue.**
b) **Provide stools or a foot rest bar. This provides workers an opportunity to shift weight from the feet while still maintaining reach and accessibility.**

5) *MRO Today* (manufacturing publication): August/September 2000- Don't Stand for Pain: Anti-fatigue Matting Plays an Important Role in Practical Ergonomics.

"We've all felt it—foot, leg and back pain resulting from long days of standing and working. It's one of the most common causes of physical fatigue in the workplace. In fact, apart from headaches, low back pain is the largest cause of pain and physician contact in the United States. Anti-fatigue matting may very well be the simplest and most effective way to reduce standing worker fatigue. Here's why it works: Constricted

muscles and reduced blood flow triggers physical fatigue. Because constricted areas force the heart to work harder to pump the blood, the body runs out of energy. The result is pain, discomfort and fatigue. Anti-fatigue mats encourage subtle movement of leg and calf muscles. This promotes an easier flow of blood back to the heart.

Lower the pain, lower the costs: How can anti-fatigue matting save your employer money? Aches and pains from long-term standing are categorized by the Occupational Safety and Health Administration (OSHA) as Cumulative Standing Trauma (CST). CST cases are often overlooked, but cost U.S. industry billions of dollars each year in reduced or lost production, increased workers compensation costs, higher insurance rates and employee absenteeism."

6) 3M Technical Bulletin, December 1, 2001--Anti-Fatigue Mats: An Ergonomic Solution in the Workplace.

You may already know that the Number 1 job-related injury and illness problem reported in the United States is musculoskeletal disorders (MSDs), but do you know which simple ergonomic measures can significantly reduce the occurrence of MSDs?

Musculoskeletal disorders and ergonomics are not one and the same. MSDs are the result of incompatibilities between the work conditions, work demands and the worker capabilities. Ergonomics is the science of fitting workplace conditions and job demands to the capabilities of workers. In other words, MSDs are often the result of poor ergonomics, whereas good ergonomics is the solution to reducing MSDs.

OSHA defines MSDs as "injuries and illnesses of the muscles, nerves, tendons, ligaments, joints, cartilage and spinal discs." The severity of MSDs can range from mild periodic symptoms to severe chronic and debilitating injuries or conditions. MSDs of the feet, legs and lower back can be contributed to prolonged standing on hard flooring. Think of the last time you stood in a long line waiting. Did your feet, legs and back have pain or discomfort? How long did it take to become uncomfortable: 10, 20 or 30 minutes? Now think of jobs that require standing for eight hours a day and how uncomfortable those workers are.

For the worker, the effect of MSDs is more than pain or discomfort. At work MSDs most likely will reduce their productivity, increase their chances to make mistakes reducing their quality and increase their absenteeism. For the employer, MSDs will likely reduce productivity, reduce product quality, increase worker absenteeism, increase OSHA recordables, increase worker lost time and increase overtime. These changes result in increased costs of worker compensation along with other medical insurance premiums.

Work related MSDs currently account for one-third of all occupational injuries and illnesses reported to the Bureau of Labor Statistics, constituting the largest job-related injury and illness problem in the United States. Several personal risk factors can determine a person's risk of MSDs, including age, physical condition, heredity, certain diseases, anthropometry (weight, height and body mass index and obesity), and life's exposures (sprains, strains or fractures that happen before they reach working age).

Diabetes (can deteriorate the biosystem including the musculoskeletal system) and Osteoarthritis (commonly affects the cartilage in the weight-bearing joints and is the most common form of arthritis) are two conditions that have symptoms of an MSD. For people with diabetes and osteoarthritis, workplace conditions (like prolonged standing) can further exacerbate these symptoms of an MSD. An estimated 16 million people in the U.S., (half of whom are unaware of their condition) have diabetes. Osteoarthritis affects more than 40 million Americans.

These two examples alone point out that workers—and employers—may not be aware of the need to pay greater attention to workplace MSDs. Employers need to be aware that their ergonomics program has to address all workers—healthy workers as well as those with underlying personal risk factors.

7) AORN (American Association of PeriOperative Nurses): Position Statement on Ergonomically Healthy Workplace Practices.

Perioperative registered nurses, along with other health care professionals, are routinely faced with a wide array of occupational hazards that place them at risk for work-related musculoskeletal injuries. Musculoskeletal disorders (MSDs) represent one of the most frequently and costly occupational issues in nursing. Multiple occupational hazards create a risk of musculoskeletal injuries that include, but are not limited to, muscles, nerves, tendons, ligaments, joints, cartilage and spinal discs.

Contributing factors that can bring about injury include duration, frequency and magnitude of ergonomic stressors. Examples of ergonomic stressors encountered during patient handling tasks include:

a) **static posture (standing for long periods of time in one position)**
b) **awkward posture (holding retractors during a surgical procedure, lifting or holding patient extremities)**
c) **overexertion**
d) **carrying heavy instruments and equipment**
e) **repetitive motion (passing instruments, opening suture packs)**
f) **forceful tasks**

Among occupations at risk for strains and sprains, in April 2002 the Bureau of Labor Statistics ranked RNs number six. The rate of overexertion injuries among hospital nurses almost doubles that of workers in private industry. In 1990, the national goal was to decrease these injuries in nursing personnel from 12.7 injuries per 100 full-time nurses annually to 9. According to one source, however, the rate had actually increased to 17.8 injuries per 100 nurses by 1995.

Among nurses, back, shoulder and neck injuries are the most prevalent MSDs. In 2001, nurses in the private sector had 11,800 MSDs, most of which (almost 9000) were back injuries. Likewise, more than a third (36%) of the injuries requiring time away from work were back injuries. Studies of back-related workers compensation claims show that nursing personnel have the highest claim rates of any occupation or industry. A recent study found that slightly more than half of all nurses (52%) complain of chronic back pain. According to an older study, 12% of nurses who intended to leave the profession cited back injuries as either a main or contributing factor.

Perioperative registered nurses are also prone to pain and fatigue from static posture during surgical procedures. Static posture puts an increased load or force on muscles and tendons that impedes the flow of blood needed to bring nutrients and carry away waste products of metabolism. The longer the posture must be maintained, the more the potential for fatigue and muscle-tendon strain.

Pain and fatigue can be the result of standing in one place for long periods of time. Employees that experience pain and fatigue are:

a) **less productive**
b) **less attentive**
c) **more prone to make consistent mistakes**
d) **more susceptible to injury, and**
e) **more likely to affect the health and safety of others.**

Research from the University of Pittsburgh has shown that there is a direct relationship between safety and productivity in the workplace.

Position Statement:
AORN is committed to the attainment and maintenance of an ergonomically healthy workplace to protect all employees in the perioperative setting. Therefore, AORN believes that every organizational perioperative setting should be ergonomically safe to decrease or prevent injury to the health care worker. Safe working conditions must be a top priority for all health care organizations. Each organization's leadership team should assess, identify, develop and implement risk reduction strategies for injury prevention using an ergonomic approach. AORN supports research that is directed toward creating and maintaining equipment and work tasks to conform to the capability of the perioperative health care worker. AORN further supports collaboration with the National Institute for Occupational Safety and Health Association, Occupational Safety and Health Association and state and local regulation to promote ergonomic safety in the perioperative environment.

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