

Solutions for Prolonged Standing in Perioperative Settings

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ABSTRACT

Prolonged standing during surgical procedures poses a high risk of causing musculoskeletal disorders, including back, leg and foot pain, which can be chronic or acute in nature. *Ergonomic Tool 4: Solutions for Prolonged Standing in Perioperative Settings* provides recommendations for relieving the strain of prolonged standing, including the use of anti-fatigue mats, that are based on well-accepted ergonomic safety concepts, current research and access to new and emerging technology.

Static postures are described as physical exertions wherein the same physical posture is maintained throughout the exertion. Such exertions increase the load and forces on the musculoskeletal system. Static work postures such as prolonged standing and trunk and neck flexion have been identified as tasks at high risk for causing acute and chronic musculoskeletal disorders. Perioperative team members are frequently required to maintain static postures during surgical procedures and often must stand in one place for extended periods. These care providers must maintain the integrity of the sterile field, so it is often difficult for them to temporarily relieve an uncomfortable position by sitting or significantly shifting their weight. Lack of flexibility in altering body positions is believed to contribute to fatigue and health problems. Factors such as OR bed height, environmental layout, demands of the surgical procedure, and human requirements for stretching and relaxing muscles regularly need to be considered in addressing this critical ergonomic problem in the perioperative setting.

HEALTH RISKS ASSOCIATED WITH PROLONGED STANDING

Although the focus of ergonomic interventions is on musculoskeletal outcomes, the ramifications of prolonged standing encompass many physical demands and can cause serious health problems. The risks associated with prolonged standing have been a documented occupational safety and health issue dating back to the 18th century, when Bernardino Ramazzini linked prolonged standing and awkward postures with common disease states. In the 1990's, researchers brought attention to prolonged standing in the nursing profession. Cook et al recognized that standing for long periods was a common factor in groups of workers, including nurses, who experienced high incidences of leg pain. In a study of work postures in the surgical setting, researchers concluded that improvement was needed in the work postures of instrumentation nurses and specified the effects of static work postures as the reason.

In 2001, Beynon and Reilly compared the difference in spinal shrinkage in nurses performing simulated nursing activities with and without a seated break. Although not specific to perioperative nurses, this study suggested that the potential for back problems caused by spinal loading may be decreased if nurses take a seated break during their work shifts. Prolonged standing also has been identified as a problem in the United Kingdom and has resulted in the promulgation of health and safety regulations concerning the provision of seating for workers. Even with regulations to protect workers, this major safety and health issue in the United Kingdom (i.e., an estimated one-third to one-half of all workers spending more than four hours per day either standing or walking) goes unenforced, although there has never been a prosecution for a breach of these health and safety regulations.

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The hazards associated with prolonged standing in the nursing profession include:

- leg pain
- spinal compression,
- chronic venous insufficiency,
- increased risk of carotid atherosclerosis and thus increased risk of heart attack and stroke, and
- impaired circulation with resultant swelling of the lower extremities.

These hazards also can lead to varicose veins, decreased oxygenation of and supply of nutrients to affected muscles with resultant fatigue and pain, and adverse birth outcomes.

When a person is maintaining an upright posture and standing in one position without the relief of walking periodically, circulation of the blood and other body fluids is compromised. The resultant pooling in the lower legs and feet causes swelling that may progress to inflammation of the veins and varicose veins. It is not surprising, then, that the earliest and most common symptoms from prolonged standing are discomfort and fatigue in the feet and legs (i.e., shins, calves, knees, thighs), but pain and discomfort may also be felt in the hips, neck and lower back. For women, standing for long periods (four or more hours per day) appears to worsen existing lower back conditions. Researchers have found the highest incidences of lower back pain in workers who stand for more than four hours per day.

As well as musculoskeletal implications, the weight of the body plus any load being carried or held can result in injurious compressive forces on the joints, leading to joint damage and arthritis. It is also suggested that the immobilization or locking of the joints in the spine, hips, knees and feet that can occur during prolonged standing can facilitate degeneration in the tendons and ligaments and even rheumatic diseases. Plantar fasciitis, heel spurs and other foot problems are also linked to standing for long periods.

Musculoskeletal risks from standing for long periods are of concern for the entire perioperative team, but scrubbed team members are at higher risk because they are often required to stand for much longer periods and are not able to alternate between standing and sitting in a chair that is lower than the sterile field. Consequently, this prevents them from taking breaks from their standing position and results in stressful static loads. The deleterious effects of prolonged standing have been described as aging a person by 20 years and as equivalent to the damaging cardiovascular effects of smoking, high blood pressure and high cholesterol level.

The AORN Ergonomic Tool 4: Solutions for Prolonged Standing in Perioperative Settings helps perioperative team members make decisions about how to minimize risks associated with prolonged standing. Evaluation and ergonomic intervention is required if a perioperative care provider is required to stand in the same position:

- for 2 hours or more,
- for more than 30% of the workday, or
- while wearing a lead apron.

Interventions to minimize risk include measures such as propping alternating feet on foot stools, using anti-fatigue mats, using sit/stand tools, and limiting standing times. Flooring and shoe features influence the effects of standing for long periods. Additionally, regular contraction and relaxation of muscles is beneficial.

PROLONGED STANDING LIMITS

To control for the deleterious effects of prolonged standing, some researchers recommend standing during no more than 30% of a typical eight hour workday for any worker. The

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Occupational Health Centre for Ontario Workers recommends limiting prolonged standing for pregnant workers to two hours, and floor matting should be provided. The AORN guidance statement recommends limiting prolonged standing in the perioperative setting to two hours.

ANTI-FATIGUE MATS

The foot/floor interface influences body discomfort and fatigue, thus affecting worker performance and productivity. Consequently, flooring materials influence the effects of prolonged standing. Flooring properties of elasticity, stiffness and thickness influence standing comfort. Generally, when a person stands for long periods, softer floors provide less muscle fatigue and more comfort than hard floors, especially for the lower extremities and lower back. Floor material that is too soft, however, will affect stability and may increase muscle demands and fatigue. Flexible flooring materials (eg. wood, cork, carpeting, rubber) will provide for safer standing than inflexible ones but are not feasible in a surgical environment because of infection control issues.

Harder flooring materials, often found in surgical suites, can be covered with anti-fatigue mats to reduce their injurious properties. Anti-fatigue mats are designed to cause a slight postural sway that induces minor activation of the leg muscles, improving blood flow and thus decreasing fatigue and reducing blood pooling. To reduce the possibilities of slipping and tripping, experts recommend choosing mats with tapered edges that do not slide on the underlying floor surface and that have a top antiskid coating. If standing stools are used to adjust worker height so the worker can more easily and safely perform tasks, placement of anti-fatigue matting on the stools will decrease ergonomic risk. Purchasing agents for the facility where the caregiver is employed will most likely select the types of anti-fatigue mats and flooring used by the facility. When anti-fatigue mats are in use, infection control measures must be considered. Mat selections may be made based on infection control factors rather than prolonged standing implications.

OTHER CONSIDERATIONS

In the perioperative work environment, ergonomically unfavorable static postures (eg. prolonged standing) and dynamic activities (eg. lifting) may cumulatively increase the ergonomic risk of the work environment. The deleterious effects of prolonged standing can be accentuated by other static loading tasks that are found during surgical procedures, such as trunk and neck flexion as well as lifting for prolonged periods. To decrease the effects of prolonged standing, surgical team members should take care to avoid awkward postures.

Finally, as in any sterile procedure, infection control must be rigorously maintained. Infection control issues for nondisposable materials such as anti-fatigue matting and sit/stand stools must be addressed.

CONCLUSION

The nature of perioperative work does not allow for elimination of the risks for musculoskeletal disorders; however, Ergonomic Tool 4 offers measures individuals can incorporate into their work to reduce risks of musculoskeletal disorders and other health effects of prolonged standing in the perioperative setting. The risks associated with prolonged standing are a well-documented occupational health and safety issue in the perioperative area. Some of this tool's recommendations are dependent on the purchasing decisions of the health care organization, and some are dependent on individual perioperative team members' choices and awareness of the risks.

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