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A SELF STUDY GUIDE

ERGONOMICS IN HEALTHCARE

Registered Nurses

ERGONOMICS IN HEALTHCARE

OVERVIEW

In the healthcare sector today, ergonomic risks present significant occupational hazards and are a source of work-related injuries and illnesses, lost days from work, as well as direct and indirect associated costs for both the employer and healthcare worker; moreover, they can also adversely affect safe patient care. The dynamic nature of the hospital environment makes it a dangerous workplace setting. In addition, there are a number of specific ergonomic risks inherent to the operating room (OR) practice setting; these risks include hand fatigue, which may often be overlooked. For these reasons, it is imperative that all members of the perioperative team remain aware of the ergonomic hazards in the OR, as well as best practices to reduce the associated risks in order to promote a safe environment of care for both patients and staff. This continuing education activity will provide a review of the causes, incidence, and associated costs of ergonomic injuries in healthcare. The unique characteristics of the OR, including design, equipment, and workflow and their ergonomic challenges to perioperative personnel will be discussed. Hand fatigue and the role of ergonomically designed gloves in minimizing muscle effort and reducing the ergonomic burden on the hands of healthcare workers will also be explored. Finally, best practices and other evidence-based techniques to reduce ergonomic-related injuries will be outlined.

OBJECTIVES

After completing this continuing education activity, the participant should be able to:

1. Describe the causes and incidence of ergonomic injuries and their associated costs in healthcare.
2. Discuss the unique characteristics of operating room design, equipment, and workflow and their ergonomic challenges to healthcare providers.
3. Describe the role of ergonomically designed gloves in minimizing muscle effort and reducing ergonomic burden on hands.
4. Identify best practice techniques to reduce ergonomic-related injuries.

INTENDED AUDIENCE

The information contained in this self-study guidebook is intended for use by healthcare professionals who are responsible for or involved in the following activities related to this topic:

- Educating healthcare personnel.
- Working in the operating room and other surgical environments.
- Establishing institutional or departmental policies and procedures
- Decision-making responsibilities for safety and infection prevention practices.
- Maintaining regulatory compliance.
- Managing employee health services.

INSTRUCTIONS

Ansell is a Recognized Provider of continuing education by the California Board of Registered Nursing, provider #CEP 15538 and the Australian College of Perioperative Nurses (ACORN). This course has been accredited for 2 (two) contact hours. Obtaining full credit for this offering depends on completion of the self-study materials on-line as directed below.

Approval refers to recognition of educational activities only and does not imply endorsement of any product or company displayed in any form during the educational activity.

To receive contact hours for this program, please go to the "Program Tests" area and complete the post test. You will receive your certificate via email.

AN 85% PASSING SCORE IS REQUIRED FOR SUCCESSFUL COMPLETION. Any learner who does not successfully complete the post-test will be notified and given an opportunity to resubmit for certification.

For more information about our educational programs or perioperative safety solution topics, please contact: Ansell Healthcare Educational Services by e-mail at edu@ansellhealthcare.com

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As employees of Ansell Mrs. Ouellet, Mrs. Richardson, Mrs. Taylor and Ms. Werner have declared an affiliation that could be perceived as posing a potential conflict of interest with development of this self-study module. This module will include discussion of commercial products referenced in generic terms only.

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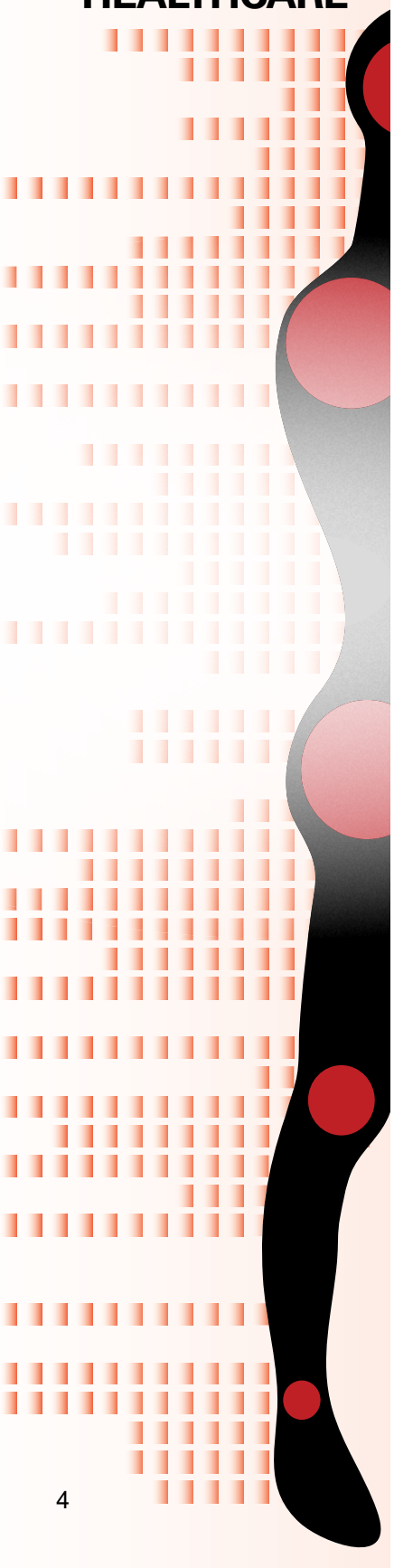


INTRODUCTION

The dynamic nature of the hospital environment, combined with serious hazards, such as lifting and moving heavy patients and equipment and slips, trips, and falls (STFs), make it a dangerous workplace setting.[1] In addition, there are specific hazards inherent to the operating room (OR) practice setting. Because ergonomic-related injuries adversely affect healthcare workers (HCWs) and safe patient care, perioperative nurses and other personnel involved in surgical patient care must remain aware of the clinical and economic implications of ergonomic-related injuries, as well as best practices and solutions available today to make the OR a safer environment of care.

CAUSES OF ERGONOMIC RELATED INJURIES

The two leading causes of work related ergonomic injuries among hospital workers are:[2]

- Overexertion and bodily reaction (48%), including motions such as lifting, bending, or reaching, often related to patient handling.
- STFs (25%).

Fatigue is another cause of ergonomic-related injuries and staff accidents in the OR.[3, 4] In particular, hand fatigue, due to the tedious, repetitive tasks involved in performing surgical procedures, can be exacerbated by the use of gloves that are thick, rigid, slippery, ill-fitting or uncomfortable.[5]

In the surgical practice setting, fatigue is primarily related to the work schedule and sleep, but the degree to which comfort has been incorporated into the design of the OR features and equipment may also be a factor.

INCIDENCE OF ERGONOMIC RELATED INJURIES

UNITED STATES

In 2011, hospitals in the United States reported 253,700 work-related injuries and illnesses; this is a rate of 6.8 work-related injuries and illnesses for every 100 full-time employees, which is almost double the rate for private industry as a whole.[6]

Compared to other occupations, nursing personnel are among those at highest risk for musculoskeletal disorders (MSDs); on the United States Bureau of Labor Statistics (BLS) list of occupations at-risk for sprains and strains, nursing personnel, nurse aides, orderlies and attendants are listed as first and registered nurses (RNs) are sixth, compared to truck drivers (second); laborers (third); stock handlers and baggers (seventh); and construction workers (eighth).[7]

Data from the U.S. Bureau of Labor Statistics for 2009 show that the incidence rate of lost-workday injuries from STFs on the same level in hospitals was 38.2 per 10,000 employees; this was 90% greater than the average rate for all other private industries combined (20.1 per 10,000 employees).[8]

In addition, strains and sprains represent 54% of injuries that result in days away from work; strains also account for the largest share of workers' compensation claim costs for hospitals.[9] In 2011, hospitals in the United States reported 16,680 cases in which workers missed work because of a musculoskeletal injury related to patient interactions; nurses and nursing assistants both accounted for a substantial share of this total. Since the majority of musculoskeletal injuries in the hospital setting are cumulative, any steps taken to minimize risks during patient handling activities will provide significant benefits for hospital workers.

EUROPE

Within the workplace across Member States, the true extent of MSDs and their related costs are difficult to assess and compare, due to the various organizations of insurance systems, the lack of standardized assessment criteria, and questions about the validity of the reported data.[10]

ASIA/PACIFIC

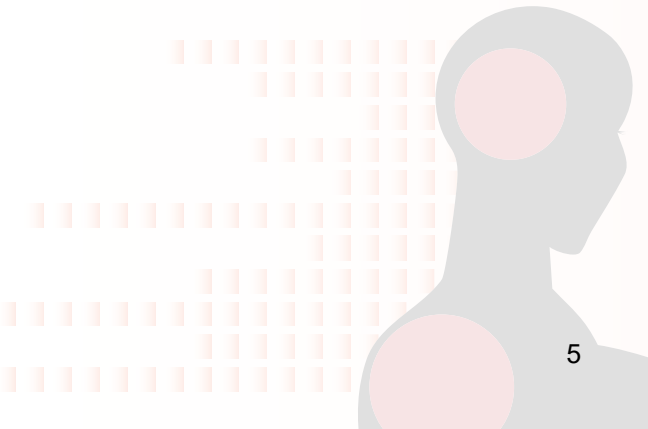
In the Asia/Pacific region, there is no standard method of tracking occupational ergonomic-related injuries. For 2011-2012, 19,248 successful workers' compensation claims for serious injuries or illness were made by the healthcare and community services sector; of these claims, over half (52%) were muscular stress related to manual moving or repetitive movement; 18% were for slips, trips, and falls.[11]

In Singapore, data from the Ministry of Manpower for 2010 to 2011 reported a 295 temporary disablement rate per 100,000 persons employed in the healthcare sector; this report identified STFs as one of the top three incident types that accounted for over half (56%) of temporary disablements in 2011.[12]

A study in the International Journal of Occupational Safety and Ergonomics noted that Korean (93.6%), Australian (92.6%), and Japanese (78.4%) nurses incur a very high MSD burden when compared internationally.[13]

AUSTRALIA

According to Safe Work Australia, MSDs is the most common work-related condition in Australia despite the fact there are known methods to eliminate or minimize them. Data indicates 28% of the claims were from the healthcare industry with 17% from nursing professionals and 17% from health and welfare support employees. In the healthcare and social assistance industry 362 claims are reported per week, 29% involve upper limbs and 29% involve the back, while 41% of the claims are due to muscular stress while handling objects.[14]



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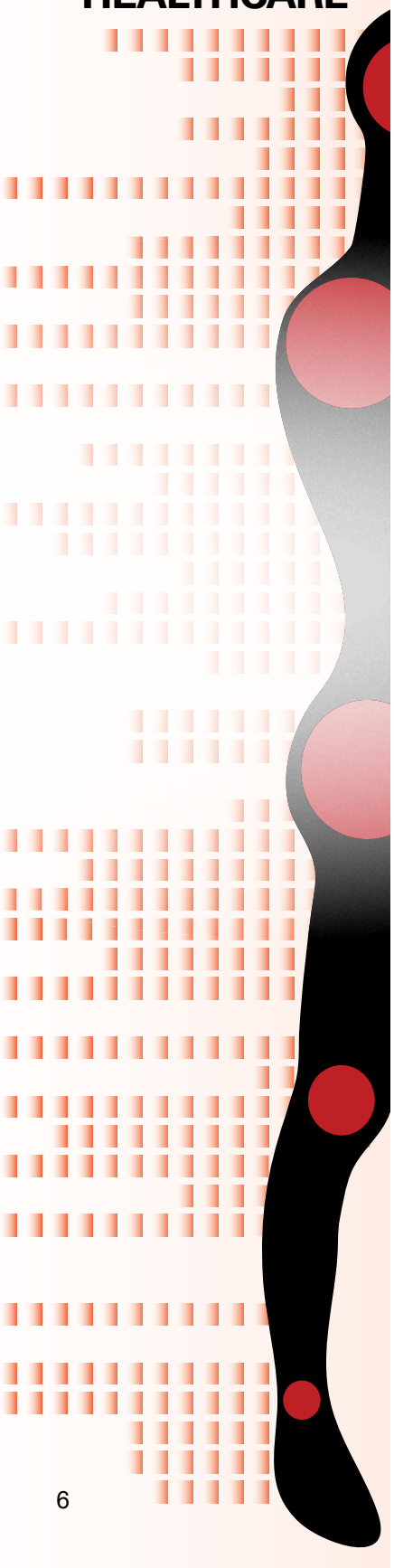


ASSOCIATED COSTS OF ERGONOMIC INJURIES

In the United States, occupational ergonomic injuries are costly to hospitals both directly and indirectly,[15] as described below.

- $15,860 USD: this was the average reported workers' compensation claim for a hospital injury between 2006 and 2011.[16] Another source cites an average cost of $22,300 USD for claims involving lost time, in comparison to $900 USD for claims not involving lost time.[17] The average hospital in the United States incurs $0.78 USD in workers' compensation losses for every $100 USD of payroll; nationwide, the annual expense totals $2 billion USD.[18]
- 24% of nurses and nursing assistants changed their shifts or took sick days to recover from an unreported injury.[19]
- $27,000 to $103,000 USD are the estimated costs associated with replacing a nurse; these costs include separation, recruiting, hiring, orientation, and training.[20]

Some estimates also include lost productivity while a replacement nurse is hired and trained.

- 8 out of 10 nurses (80%) report that they frequently work with musculoskeletal pain.[21]
- Safer caregivers result in happier patients. Studies have demonstrated higher patient satisfaction levels in hospitals where fewer nurses are dissatisfied or burned out.[22]

Work-related slips, trips, and falls are also associated with serious, disabling injuries that can impact a HCW's ability to do his/her job; these incidents often result in costs associated with:

- lost workdays;
- decreased productivity; and
- expensive worker compensation claims.[23]

In Europe, some studies have estimated the cost of work-related upper extremity MSDs at between 0.5% and 2% of the Gross National Product.[24] More recent data from Austria, Germany, or France have demonstrated an increasing impact of MSDs on costs. For example, in France, 2007 data show that work-related MSDs resulted in nearly 7.5 million lost work days, with approximate costs of €736 million.[25]

In Australia for financial year 2012–13, work-related injury and disease cost the Australian economy $61.8 billion, representing 4.1% of the Gross Domestic Product.[26]

The healthcare and social assistance industry is the largest employing industry in Australia. It is rapidly expanding and is projected to continue to do so as the population both grows and ages, amplifying any current work health and safety issues and trends. It has a large number of work-related injuries and illness reported each year.[27]

- Since 2009–10, it has the highest number of claims among all Australian industries
- It employs 12% of the Australian workforce but accounts for 16% of serious workers' compensation claims in 2014–15
- 51% of accepted claims in the health and social assistance industry was for body stressing
- Since 2003 there have been 35 fatalities reported

Work-related injuries were associated with:

- Lifting, pushing and pulling;
- Fatigue:
- Slips, trips and falls; and
- Work design and repetitive actions[28].

ERGONOMIC CONSIDERATIONS IN THE O.R.

UNIQUE CHARACTERISTIC OF O.R. DESIGN, EQUIPMENT AND WORK FLOW

The surgical practice setting presents additional, unique challenges in regards to ergonomic-related injuries; the occupational hazards inherent to the perioperative practice setting include, but are not limited to transferring, positioning, and repositioning patients; reaching, lifting, and moving equipment; lifting and holding patient extremities for prepping; standing for long periods of time; and holding retractors for extended time periods.[29, 30] Other hazards include instrument placement and design, forward leaning awkward postures, neck posture and screen positioning, OR bed height, and foot pedal positioning, as outlined below:[31]

- Standing for Long Periods of Time and Fatigue:
  - Standing for extended time periods can lead to discomfort in the legs, knees, feet, and lower back; joint locking, as well as varicose vein development.[32]
  - Maintaining static postures can result in surgical fatigue syndrome, which weakens coordination and also decreases reaction times.[33, 34]
- Instrument Design and Placement:
  - Awkwardly sized surgical instruments and other tools force upper arm movement away from the midline and flexion/ulnar wrist deviation, which can lead to upper body discomfort.[35, 36]
  - Increased instrument weight and distance from hand to tool tip can result in neck and shoulder strain.[37]

- Forward Leaning Postures:
  - Forward leaning postures during open surgical procedures increases lower back muscular activity, prolongs static flexion of the neck and lower back, and leads to neck and lower back pain.[38]

- Neck Posture and Screen Positioning:
  - Looking down during open surgical procedures leads to neck flexion and increased pressure in the cervical spine.[39]
  - During minimally invasive procedures, neck discomfort is highly dependent upon screen positioning; this can lead to repetitive extension when the screen is positioned above the line of vision.
- OR Bed Height:
  - Surgical operating beds are often set too high, which can lead to shoulder shrugging and discomfort.
  - If operating beds are adjustable, they are typically fitted to the primary surgeon, despite surgical team members being various heights.[40]
- Foot Pedal Placement:
  - Foot pedals with small surface areas limit the range of motion and also create a static posture.
  - Discomfort may occur if the tension is high or the positioning is held for an extended period of time.

ERGONOMIC RISK: HAND FATIGUE

As noted above, hand fatigue is one factor related to ergonomic injuries in the OR practice environment; in this regard, the demanding, tedious, and/or repetitive actions required during surgical procedures increase the susceptibility of the muscles, nerves, and tendons in the hands, wrists and arms to strain, which can be aggravated by wearing gloves that are thick, rigid, slippery, ill-fitting or uncomfortable.[41]

When considering the role of ergonomics in hand fatigue and the impact of ergonomically designed gloves, it is helpful to first briefly review the relevant anatomy of forearm and hand; the following four main muscle groups are involved:[42]

FOREARM MUSCLES

The two primary muscle groups needed for hand and finger exertions include the powerful forearm flexor muscles, located at the top of the forearm, and the extensor muscles,[43] which are located in the back of the forearm (see Figure 1).

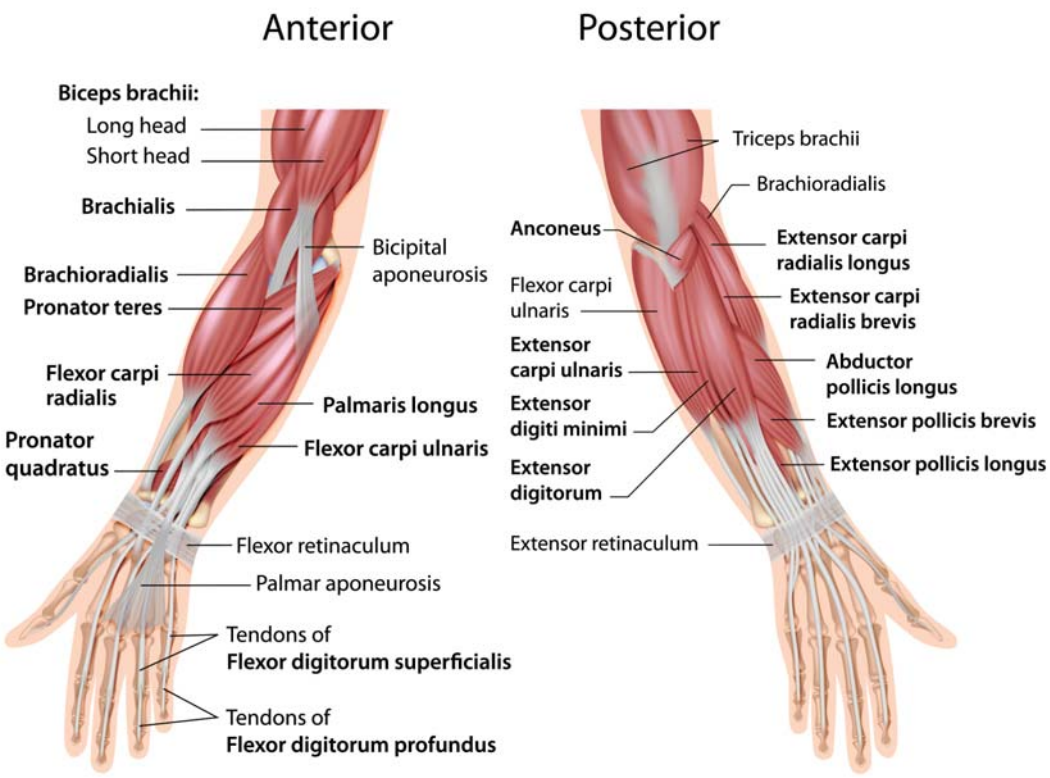


Figure 1 – Muscles of the Forearm (Right Hand)

Over 14 extrinsic flexor and extensor muscles traverse the length of the forearm; these muscles originate at the elbow and insert at the hand. Together, these large muscle groups provide grip strength and general range of motion, essentially all gross motor skills controlled with the hands. Examples of forearm flexor and extensor muscle use in the healthcare setting include lifting or moving heavy objects and manipulating large equipment.

HAND MUCSLES

The primary, smaller hand muscles are the interosseous and thenar muscles; these muscles originate and insert within the structure of the hand (see Figure 2).[44]

Figure 2 – Muscles of the Hand

The interosseous muscles, which lie between the metacarpal bones in the hand, are important for movement of individual fingers; the thenar muscles are located in the fleshy muscular area at the base of the thumb on the palm side of the hand. Together, these muscle groups are responsible for allowing pinching and gripping tasks performed by any of the fingers and/or the thumb. These small muscles are most susceptible to fatigue; they are responsible for numerous tasks that require fine motor skills and dexterity across a wide variety of applications, eg, the manipulation of small instruments and hand pieces and daily writing and typing tasks.

CARPEL TUNNEL

Another important structure in the anatomy of the hand as it relates to ergonomics is the carpal tunnel; this is a narrow passageway of ligament and bones at the base of the hand (see Figure 3).[45] The median nerve and tendons housed here are involved in almost every aspect of hand movement; therefore, they are especially prone to strain and injury.

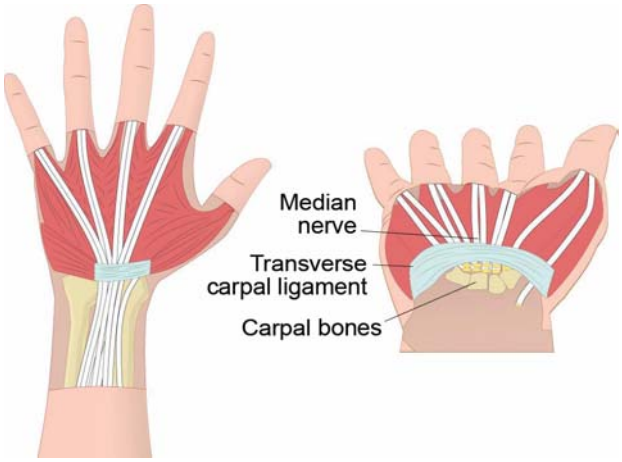


Figure 3 – Carpal Tunnel

EFFECTS OF HAND FATIGUE[46]

When HCWs perform demanding, tedious, or repetitive job tasks, the muscles, nerves, and tendons in their hands, wrists and arms are susceptible to strain. This strain can be the result of either bare-handed or gloved operations; however, it can be exacerbated by glove use when the gloves are thick, rigid, slippery, ill-fitting, or uncomfortable. Moreover, when a person wears a glove that restricts hand movement, he or she must exert more muscle effort in order to perform tasks, thereby increasing the risk of strain. Over time, strain caused by repetitive motion or prolonged exertion can lead to muscle fatigue, pain and even injury.

In the case of carpal tunnel syndrome, the repetitive stress leads to swelling and inflammation of tendons, which then creates pressure on the nerves. The affected person becomes symptomatic, with symptoms including burning, tingling, or numbness in the palm and fingers that generally start out gradually. As the symptoms progress, the individual may experience a decrease in grip strength, which makes it difficult to carry out basic manual tasks. Without treatment, carpal tunnel syndrome can result in significant, permanent muscle loss at the base of the thumb.[47] In other overuse injuries, the swelling of nerves, tendons, and ligaments can result in similar sensations of pain, tingling, weakness, and numbness in the fingers, hand and wrist, which can also radiate into the arm, thus making manual work difficult or even impossible to conduct.

ERGONOMICS IN HEALTHCARE

ROLE OF ERGONOMICALLY DESIGNED GLOVES

Key considerations related to glove use as a strategy to address hand fatigue are:[48]

- The types of gloves worn will affect the amount of hand and finger force associated with a specific task
- Improperly-sized gloves can either slip too easily or compress the sensitive muscles within the palm and thumb region, eventually leading to chronic discomfort as well as impairment in mobility.
- As glove thickness increases, the tactile sensitivity tends to decrease, which affects the ease of instrument/device manipulation.

Today, ergonomically-designed gloves offer a solution for addressing hand fatigue. Technological advancements in glove design technology have resulted in hand protection that supports musculoskeletal health when performing repetitive tasks and also improves worker performance.[49] This type of glove is produced by measuring the stresses of occupational activities and then applying advanced technologies to engineer solutions that alleviate muscle effort, strain, and tension, while maximizing the dexterity, comfort, and fit of single-use gloves.

For example, exertion measurements and comparisons are based on specific tasks, such as flexion of the hand; pinch grasp, ie, holding a common instrument; or grip friction, ie, completion of a precise, standard task. These measurements are then evaluated in two ways: the first is by conducting controlled user surveys evaluating user experience as well as comfort, both before and after tasks are conducted. The survey criteria may include various aspects such as fit, comfort, performance, tactile sensitivity, the ability to appropriately don the glove, and gripping ability. The second evaluation is conducted by taking electromyography measurements which quantify the amount of muscle effort exerted by individual muscles in the hand during the assigned tasks.

Once the measurement data are collected, they are analyzed to determine how glove performance compares to data collected in bare-hand operations and also those taken while wearing comparable products. Based on these results, gloves that deliver measurable improvements in user comfort, fit, and productivity while reducing the risk factors associated with ergonomic injury can be designed. Over time, the use of ergonomically designed gloves may result in less downtime and fewer injuries, and subsequently, more consistent levels of both quality and productivity.

BEST PRACTICES FOR PREVENTING ERGONOMIC RELATED INJURIES

Currently, there are regulations as well as best practices outlined by professional nursing associations to prevent ergonomic-related injuries in the O.R., as described below.

STATE NO LIFT LAWS

In the United States, the following 11 states have enacted "safe patient handling" laws or published rules and regulations: California, Illinois, Maryland, Minnesota, Missouri, New Jersey, New York, Ohio, Rhode Island, Texas, and Washington; there is a resolution from Hawaii. Of these states, ten (California, Illinois, Maryland, Minnesota, Missouri, New Jersey, New York, Rhode Island, Texas and Washington) require a comprehensive program in healthcare facilities, consisting of an established policy and guidelines for obtaining appropriate equipment and training, data collection, and evaluation.[50]

PROFESSIONAL GUIDELINES AND RECOMMENDATIONS

American Nurses Association (ANA).

The ANA supports policies and actions result in the elimination of manual patient handling, in order to provide a safe environment of care for both nurses as well as patients.[51] The ANA recognizes that MSDs are common in nurses, frequently caused by manually moving of patients; and can be life altering and sometimes, career ending events. The ANA's Handle with Care® Campaign is designed to develop and implement a proactive, multi-faceted plan to support the issue of safe patient handling and the prevention of MSDs among nurses in the United States.[52] One component of this campaign is the effectiveness of safe patient handling equipment and devices, which has eliminated manual patient handling in nursing care. Moreover, many of the healthcare facilities that have incorporated patient handling technology have reported reductions in both nursing staff injuries, number of lost work days secondary to injury and staff turnover, and workers' compensation costs for MSDs.

Association of periOperative Registered Nurses (AORN).

AORN publishes and regularly updates three documents related to preventing work-related injuries.

- Safe Patient Handling Tool Kit. This tool kit provides several resources to educate personnel on the correct techniques for moving patients as well as equipment in the perioperative practice setting in order to prevent musculoskeletal injuries due to improper moving and lifting techniques. It includes presentations, posters, a pocket reference guide, and tools to perform a safe patient handling gap analysis.[53]
- Guideline for a Safe Environment of Care, Part I. Recommendation I states:

  "Precautions should be taken to mitigate the risk of occupational injuries that may result in death, days lost from work, work restrictions, medical treatment beyond first aid, and loss of consciousness."[54]

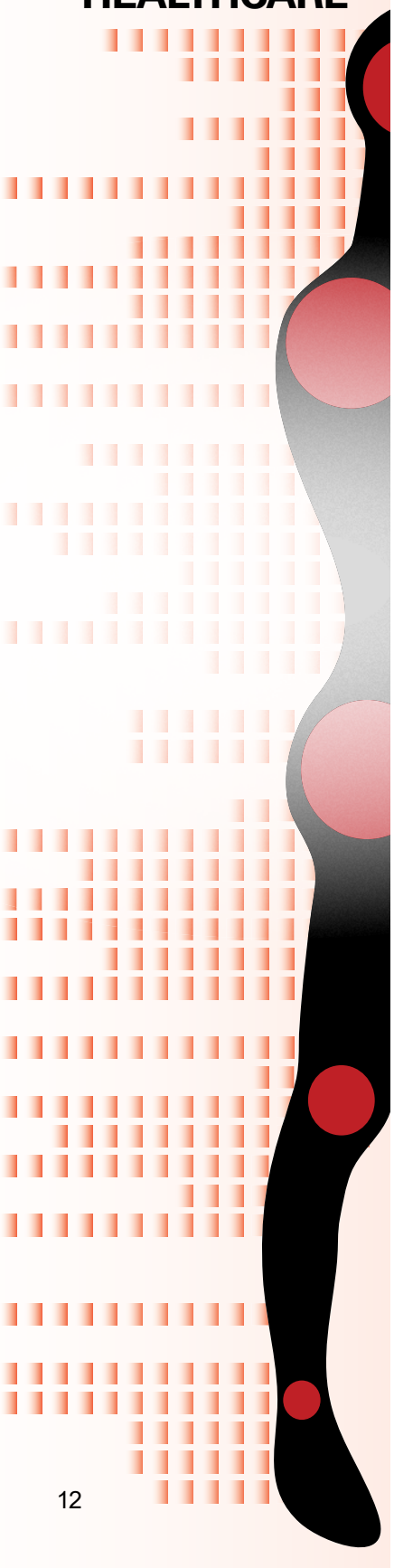
The recommendations for an ergonomically health perioperative environment include, but are not limited to:

- Educating staff members on the use of patient handling devices and strategies to prevent musculoskeletal injuries;
- Having appropriate assistive patient handling equipment available;
- Covering equipment cables across the floor;
- Using anti-fatigue mats; and
- Using lift teams as well as assistive devices to lift or transfer patients.

- Guideline for Minimally Invasive Surgery.[55] This guideline includes a discussion on the ergonomic hazards specific to minimally invasive surgical procedures, including recommended provisions for preventing slips, trips, and falls; adequate lighting; and location of equipment that prevents fatigue from glare or static positions.

Australian College of Perioperative Nurses (ACORN)

The ACORN Standards for Perioperative Nursing in Australia constitutes the specialty knowledge of the perioperative nursing community in Australia and represents the accepted standard for professional practice. Individual standards are regularly reviewed and updated by teams of reviewers according to a rigorous, structured process managed by the Standards Editor and the Standards Committee Chair. The ACORN Standards is held in high esteem by government, industry and the general public. The 14th edition of the standards added a new guideline on fatigue in the perioperative environment.[56]



- **Guideline Statement 1** – Healthcare facilities shall promote a culture of safety by having written policies, procedures and guidelines relating to fatigue management for the delivery of safe and effective nursing care.
- **Guidance Statement 2** – To enable clinicians to function safely and efficiently within their work roles, the manager at the unit level should recognize the potential of fatigue when considering staffing allocations, rostering and workload utilization.
- **Guidance Statement 3** – The perioperative nurse shall be aware of the patient and individual safety risks in relation to fatigue.

O.R. ERGONOMIC RISK REDUCTION STRATEGIES

Recommendations to address the specific ergonomic risk factors in the OR discussed above are as follows:[57]

- **Standing for Long Periods of Time and Fatigue:**
  - Rest breaks should be incorporated frequently into the workday.
  - Surgeons and other team members should try to vary posture while operating, when possible.[58]
  - Anti-fatigue mats should be used during prolonged periods of standing to reduce discomfort.
- **Instrument Design and Placement:**
  - Instrument handles should be positioned at the elbow height of the surgeon.[59]
  - Instruments and other devices should be selected based upon ergonomic guidelines, such as permits one-handed use; interchangeable shafts; buttons are easily accessible; allows both force and precision grip; can be held comfortably throughout various rotations; and requires low amounts of force to operate.[60]
- **Forward Leaning Postures:**
  - Personnel should stretch frequently and take rest breaks.
  - Forward tilting sitting stools can be used, depending on the user; however, these can cause compression on the chest and/or abdomen and lead to discomfort.
- **Neck Posture and Screen Positioning:**
  - Monitors used in minimally invasive surgical procedures should be set at a visible distance, without causing HCWs to lean forward or squint.
  - The monitor height should be set so that the top of the screen is at eye level.
  - Monitors should be situated on a flexible arm.[61]

- **O.R. Bed Height:**
  - The OR bed height should be set so that the instruments and equipment being used by the surgeon are positioned at elbow height. This requires height adjustability, but unfortunately does not fit the work surface to the entire surgical team.
  - Alternatively, the surgeon could stand on a height-adjustable platform.

- **Foot Pedal Placement:**
  - The foot pedal should be placed so that it is aligned in the same direction the surgeon is facing, in order to minimize twisting of the body and/or leg.[62]
  - Foot pedals with a built-in footrest that alleviates the need to repetitively lift and lower the foot from the floor can be considered for use.

OTHER EVIDENCE-BASED TECHNIQUES

Additional proven effective techniques to reduce ergonomic-related injuries include the following:[63, 64, 65]

- Selection of appropriate mechanical patient-handling equipment and devices.
- Sufficient training on proper operation of lifting equipment.
- Accurate completion of patient mobility assessment matched to equipment and protocols.
- Safe-lifting policies and procedures.
- Specialized patient lift teams when available.

Today, various solutions that reduce injuries and increase HCW and patient safety are available. Equipment and devices specifically designed to prevent ergonomic-related injuries in the OR include:

- **Patient transfer sheets.** These are friction-reducing, patient transfer and repositioning sheets designed to prevent disabling back injuries to HCWs by reducing physical strain to the back, shoulders, neck and arms.
- **Anti-fatigue mats.** Anti-fatigue mats are designed to decrease stress and strain placed on muscles and joints due to static positions, eg, standing during lengthy procedures.
- **Ergonomic step stools.** Step stools designed with a cushioned top can provide comfort and support during prolonged standing.
- **Trip management system.** This system consists of a cord cover designed to reduce trips and falls caused by cords and tubings on the OR floor. Many of these covers are available in a bright color, so that they are easily seen; they also serve as a signal so that healthcare personnel know where cords and tubings are located on the floor. They also typically have adhesive strips to keep it in place during use.
- **Fluid management systems an absorbent floor pads.** To prevent slips and falls in the OR, one of the best measures is to control fluids at their source, ie, so that they never reach the floor.[66] Proactive measures that can be taken to prevent OR floors from becoming wet include the use of:
  - Absorbent pads placed on the floor around the OR table. These pads are used for absorbing fluids to keep the floor dry, thereby reducing the risk of slips and falls; the absorbent materials in these pads generally absorbs fluid without expanding, similar to a diaper, so it maintains a low profile and does not become a tripping hazard. A fluid-proof, non-slip backing keeps the floor underneath the pad dry.
  - Fluid waste management systems, including:[67]
    - ◊ Intraoperative floor suction devices, generally used in high-fluid-volume cases (eg, arthroscopies).
    - ◊ Fluid collection systems, ie, drapes that incorporate fluid collection bags.

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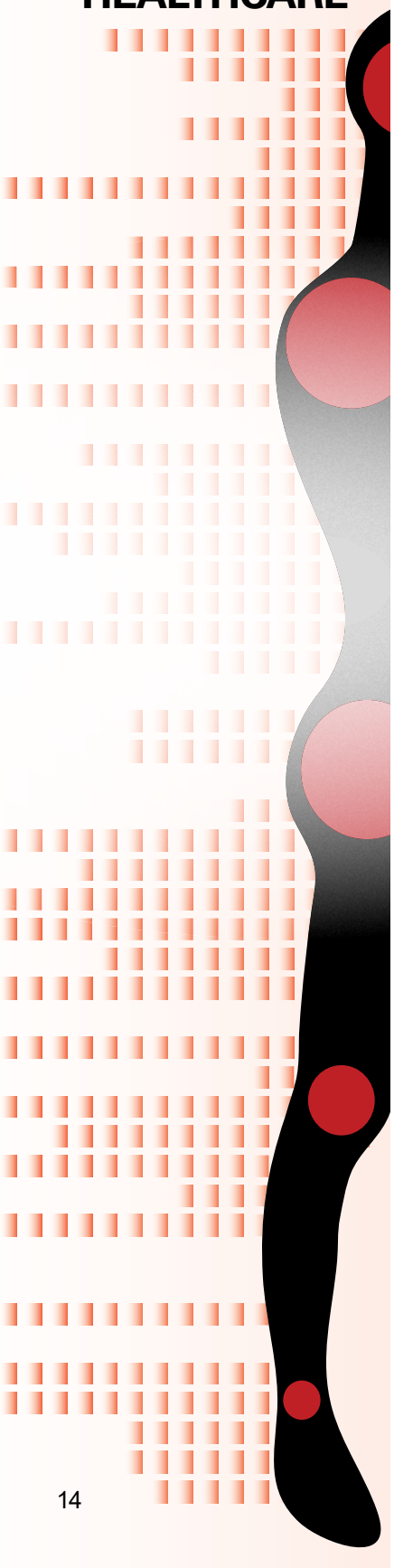

SUMMARY

Today, ergonomic risks in the healthcare industry are numerous and associated with direct and indirect costs for employers as well as HCWs; they impact healthcare worker safety, as they are a source of work-related injuries and illnesses and lost days from work, which also affect both the quality and safety of patient care. These risks are of particular concern in the OR due to various factors inherent to this practice setting; these risks include, but are not limited to, moving and positioning patients; lifting equipment; standing for long periods of time; instrument placement and design; forward leaning postures, neck posture and screen positioning; and hand fatigue.

Perioperative personnel must be aware of these ergonomic risks and implement evidence-based best practices to proactively reduce them; strategies include implementing techniques to eliminate manual patient handling and using ergonomically designed instruments and devices and anti-fatigue mats. The selection of high-performing, ergonomically designed single-use gloves is another strategy for reducing muscle effort and also supporting occupational hand health and worker productivity. Through this knowledge and implementation of appropriate risk reduction strategies, all members of the perioperative team can promote a safe environment of care for their patients and co-workers.

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