New research looks at ergonomic stresses on operating room staff

Transferring a large patient to a gurney. Pushing a video cart. Donning a lead apron during a case. Scrubbing in for a long procedure. Wearing a helmet in orthopedic surgery. They’re a normal part of an OR staff’s day. They also take a toll on necks, shoulders, and backs.

This heavy physical work is getting more attention as a staff retention issue. More than half—52%—of nurses complain of low-back pain, according to researcher Audrey Nelson RN, PhD, FAAN, of the Patient Safety Center of Inquiry at the Veterans Affairs Medical Center in Tampa, Fla. A study by Trinkoff and colleagues found 47% of nurses in a sample had a back injury and 46% had a neck injury within the past year. Hospital nurses had the third highest injury rates of all workers, following only nursing home workers and truck drivers, in a 2000 report from the Bureau of Labor Statistics.

At that rate, you have to wonder how many nurses leave the profession because their body simply can’t take it any more. It’s a toll the profession can ill afford.

What can OR leaders do to keep employees from suffering musculoskeletal injuries?

OR Manager talked with ergonomics researchers in the US and Europe about the most recent findings and strategies to prevent injuries.

Static posture a problem

New research from The Netherlands is providing some specific data on the physical stresses on OR staff.

Standing in one position for long periods is the biggest problem, the research shows. Static load—due to prolonged standing, trunk flexion, and neck flexion—is the most significant cause of injury in the OR no matter what the age of the nurse, Hanneke Knibbe, MSc, RPth, a researcher and consultant with LOCO-motion in The Netherlands, told OR Manager in an interview.

“We did find a lot of musculoskeletal disorders in scrub nurses caused by prolonged standing and awkward positions,” says Knibbe’s colleague, Paul Meijsen, MAH, practical coach and education coordinator of the operating department at Catharina Hospital Eindhoven, The Netherlands.

“It is difficult to change positions when you are scrubbed in. When you look straight ahead with a straight neck, you can’t see the field, and you can’t do your job. So it is a very big problem, and there are no easy answers,” says Meijsen.

Knibbe and Meijsen are completing 3 studies in ORs in 16 hospitals on implementing ergonomic solutions to reduce static load. Among their findings:

• 2 out of 3 nurses stand longer each day than The Netherlands’ guidelines recommend.
• 75% of nurses who are scrubbed were in awkward positions and had flexed necks.
• 62% of nurses had non-neutral positions of the shoulders, and 53% had non-neutral positions of the back in excess of guidelines.

The researchers did not find a relation between injuries and staffing levels or between lifting and injuries. They also found no relation between footwear or standing pads and injuries.

Knibbe reported on the findings at the 5th Annual Safe Patient Handling and Movement Conference in March in St Pete Beach, Fla. The results also will be presented at the AORN World Conference in Barcelona in September and have been submitted for publication.

Are older nurses at greater risk?
Knibbe and Meijsen have not found a statistically significant relationship between increased age and injury. In general nursing populations, older nurses with back or neck problems tend to exit the profession, leaving a healthier, younger group.

It stands to reason that age would take a toll. Over time, continuous flexing, bending, and tension on the muscles cause changes. The accumulation of wear and tear over 5 to 7 years causes muscles to tire faster and hurt more often, Knibbe says.

“The younger you are when you enter the profession, the earlier you will have problems,” Meijsen adds.

The question about age and injury is complex, Jamie Tessier, MPH, ergonomics researcher and consultant at the University of Massachusetts, Lowell, told OR Manager. She spoke at the Association of periOperative Registered Nurses (AORN) Congress in April in New Orleans.

“There are studies that show more of a burden on older nurses, but other studies show new workers get hurt the most often. That may be because of isolation, inadequate training, or because senior employees might leave tougher tasks to the new employees,” Tessier says. Few studies have been published on job-related musculoskeletal injuries in the OR.

One thing that does seem clear—injuries reported by OR staff are the tip of the iceberg. A show of hands at the AORN meeting indicated the majority thought 50% to 75% of injuries in their department were unreported.

What can be done?

What can be done to prevent injuries based on evidence so far?

The solution is in behavioral changes and sound ergonomic thinking by OR managers and staff, Knibbe and Meijsen say.

Hospitals in The Netherlands have adopted guidelines that scrub nurses are not to stand longer than 4 hours a day.

“That is a maximum for nurses who want to stay healthy,” says Meijsen. Nurses both scrub and circulate and trade off on cases. He also recommends that scrub nurses take “micro-breaks” during the 4 hours.

“The scrub nurse should sit on a draped stool and look straight ahead for a short while in long cases,” he says. “There are moments in nearly every elective operation during which a nurse can sit, even if it’s only for a minute.”

Sitting even for a short time gives the neck, shoulders, back, legs, and knees a new perfusion of blood that makes muscles feel less tired. Sit-stand chairs can be used for this purpose.

In addition, guidelines say scrub nurses should not work with the neck flexed more than 30 degrees or rotated for more than 1 minute uninterrupted.

Lead aprons can cause stress. Wearing the heavy aprons causes compressive force on the spine, Tessier says. She knows of no research on the effects of wearing heavy gear in health care. But in general, “If you’re leaning forward, and the weight is in front of you, it involves increased forces on basically every joint in the body. The further any weight is held from the center of gravity, the greater the impact,” she adds.

Some companies make lead aprons that are lighter in weight or come in 2 pieces, a vest and a skirt. Two vendors are Maxant Technologies, Niles, Ill (800/307-4190,
Though padded floor mats have been recommended for those who stand for long periods, Meijsen calls them “placebos.” The mats cause nurses to feel they can stand for longer than 4 hours, but that is damaging to their muscles, which become overtired, he notes.

A 1998 study from the University of Copenhagen, Denmark, found standing mats had a negligible effect on lower back muscles, foot volume changes, discomfort, and ground force reactions.

**Overcoming myths**

Managers and staff both need to get past myths about patient handling.

A common misconception is that nurses can lift a lot of weight as long as they lift it the right way. Tessler, in a review of 10 studies that examined the compressive force on the spine of patient handling, found all included tasks that exceeded safe limits set by the National Institute for Occupational Safety and Health—and 6 of the 10 reported tasks that exceeded the maximum acceptable weight limit for 75% of women.

“Plain and simple, patient lifting and repositioning are hazardous work, and many tasks exceed human physiological limits,” she says.

An international review of 63 studies by Hignett found strong evidence that training staff on proper lifting technique had no impact on work practices or injury rates. A multifactorial approach based on a risk assessment program was most likely to be successful.

**Injuries on the night shift**

Shift work also has an effect on musculoskeletal injuries. When nurses work nights, it takes more effort to do a task, which may result in a higher risk of being injured. Moreover, they may need more time to recover from an injury, says Acacia Aguirre, MD, PhD, medical director of Circadian, Lexington, Mass, a consulting and research firm that helps employees and employers reduce the risks of shift work.

In one study led by Lipscomb, working long hours (>12 hours a day and >40 hours a week) and working other than the day shift were associated with a 50% to 170% age-adjusted rate of musculoskeletal disorders of the neck, shoulders, and back.

Dr Aguirre offered these suggestions, which may help reduce the risk of injuries during off shifts:

- Limit the number of days nurses work in a row to 7 days for 8-hour shifts and 3 to 4 days for 12-hour shifts.
- Nurses should not work more than 12 hours in a row, especially at night.
- If nurses rotate shifts, their schedule should rotate forward from mornings to evenings to nights rather than the reverse because the body adapts better to forward rotation.
- Avoid starting the morning shift before 6 am so the musculoskeletal system gets enough rest before beginning work.

It is a misconception that people eventually adapt to shift work. “The reality is that our bodies never really adapt 100%,” notes Ann Curley, RN, PhD, interim assistant dean at the University of Medicine and Dentistry of New Jersey School of Nursing, who participated in Circadian’s research.

She has completed a study on nurse injury rates that she has used to educate New Jersey legislators. She believes hospitals should institute no-lift policies.

“The 2 best ways to decrease injuries are through legislation and hospital policy,” says Dr Curley. “I feel strongly about legislation regarding mandatory overtime and staffing ratios. I also feel that if hospitals want to cut back on workplace injuries, it is not enough to tell nurses they should lift in a certain way. I believe hospitals need to have policies that dictate who lifts and when and how. These policies should reflect the latest research in workplace injuries.”

—Judith M. Mathias, RN, MA
—Pat Patterson

References


**Web resources**

**American Nurses Association**
Handle with Care Campaign
www.nursingworld.org/handlewithcare

National campaign for proactive plans to promote safe patient handling and prevention of injuries to nurses. Web site has statistics and safe-handling strategies.

**Veterans Affairs**
Patient Safety Center
www.patientsafetycenter.com

Web site has a section devoted to safe patient handling with resource guides, an algorithm for safe patient handling, sample policies, and other resources

**Ergonomics in Health Care**
www.ergonomicsinhealthcare.org

A comprehensive web site supported by a grant from the Occupational Safety and Health Administration has statistics and tools, including many prevention guides developed by universities and other organizations.

**New York State Public Employees Federation (PEF)**

Publishes an equipment directory, *Patient Handling Solutions*, which describes lifting and transfer equipment and other helpful tools.

**Fast facts on ergonomics**

- 52% of nurses complain of chronic back pain.
- 38% of nurses have had occupational low back pain severe enough to require a leave from work.
- 12% of nurses have left nursing for good because of back pain as the main factor.
- 6%, 8%, and 11% of RNs reported changing jobs because of neck, shoulder, and back problems, respectively.

*Source: American Nurses Association. Handle with Care Campaign.*
www.nursingworld.org/handlewithcare/factsheet.htm
Ergonomic stressors in the OR

Some stressors named by OR nurses at the Association of periOperative Registered Nurses Congress in April:

• Static standing postures
• Static neck flexion
• Moving heavy equipment
• Holding patients’ extremities
• Transferring and positioning patients
• Holding of instruments and equipment
• Wearing of lead aprons
• Standing on cords
• Wearing helmets in orthopedic surgery
• Carrying heavy instrument trays
• Moving heavy patients
• Working in ORs crowded with more equipment
• Working in low-light conditions
• Reaching and moving items stored too high or too low
• Working faster because of turnover times

Ergonomics: Myths and facts

Myths and facts presented by Jamie Tessler, MPH, of the University of Massachusetts, Lowell, at the Association of periOperative Registered Nurses Congress in April.

Myth: Nurses get hurt because they lift improperly.

Fact: “Patient lifting and repositioning are hazardous, and many tasks exceed human physiologic limits,” says Tessler.

She reviewed 10 studies published from 1986 to 2001 that looked at the compressive force on L5-S1 of everyday patient-handling tasks:

• All 10 studies found common tasks that exceeded safe limits set by the National Institute for Occupational Safety and Health (NIOSH).
• 6 of the studies reported everyday tasks that exceeded NIOSH’s maximum acceptable weight limit.

Myth: Manual lifting is more dignified for the patient.

Fact: “What’s dignified about having your shoulder dislocated by the hook method of lifting, as some patients do?” asks Tessler. Studies on patient satisfaction with lifting devices show good results.

Myth: Equipment isn’t needed when a second pair of hands is available.

Fact: “Biomechanical studies of patient handling show that with 2-person lifts, you not only injure one employee but 2—both employees have exposures exceeding safe limits,” she says.

Myth: Workers get hurt because of hobbies at home and/or their own bad habits.

Fact: In studies that have controlled for these variables in a multivariate analysis, these factors do not emerge as contributors to musculoskeletal disorders, Tessler notes.

Myth: The benefits of using lifting devices are unproven and too expensive to consider.

Fact: On the contrary, “there is great equipment on the market,” Tessler says.
Studies have shown that facilities that purchased lifting devices, did the proper training, and performed a before-and-after analysis have saved injuries and money.

A study by the Department of Veterans Affairs involving 6 hospitals evaluated results after the purchase of $750,000 in equipment. They recouped their investment in 1 year from savings in workers compensation costs. The researchers projected savings of $5 million over 9 years.

**Myth: There isn’t enough scientific evidence to do things differently.**

**Fact:** “We do have evidence that lifting devices significantly reduce the stress on the back to well below safe limits,” says Tessler.