

# IMAGES OF PAIN

Ergonomic injuries continue to harm the ultrasound field—physically and financially. Knowing the stakes will help you fight the battle.

CATCHING A BREAK in the small cul-de-sac that serves as her office, a sonographer sits back, takes a deep breath and stares ahead to relax for a minute. As she scans the walls dotted with framed achievements and certificates—daily reminders of how she’s helped patients—her tense jaw relaxes into a smile.

But as she reaches to straighten a frame, her hands disrupt her thoughts. Viewing the scars from numerous surgeries to correct ergonomic injuries, she wonders if the rewards of the job are worth the sacrifices. She also wonders if she’s alone in her struggles.

## Facts and figures

Ergonomics is “the science of tailoring the work environment to the worker to prevent injuries caused by wear and tear on the body.”<sup>1</sup> Unfortunately, ergonomic injuries have increased in the last 20 years, taking a financial toll as well as a physical one. According to the Occupational Safety and Health Administration (OSHA), the cost to

the nation in direct workers’ compensation claims exceeds \$20 billion a year.<sup>2</sup>

Of injuries, roughly one-third are due to overexertion/repetitive motion, which can cause more than 100 different conditions. Specific risk factors include rapid hand and wrist movement, awkward posture, forceful exertion, vibration, heavy lifting and repetitive motion. The majority of workplace injuries are back pain, followed by muscle and bone disorders, and wrist injuries such as carpal tunnel syndrome.<sup>3</sup>

Given their job descriptions, it’s no wonder sonographers are at risk. They must grip and continuously apply pressure with a transducer, a handheld instrument that sends and receives the sound waves. In addition, when facing the ultrasound machine with the patient positioned at the side, they must laterally extend their arm for long periods while applying pressure with the transducer. Meanwhile, the opposite hand and wrist adjust the controls to produce a quality image for radiologist interpretation.<sup>4</sup>

In 1997, the Society of Diagnostic Medical Sonographers (SDMS) conducted an extensive survey among sonographers to determine the prevalence of work-related musculoskeletal disorders (MSDs).<sup>4</sup> The study concluded that 81 percent had been scanning in pain and discomfort for almost half of their careers. Tasks aggravating pain were applying pressure, abducting the shoulder, repetitively twisting the neck and trunk in a sustained position, performing studies at the patients’ bedside, and holding the transducer for extended periods. Pain, in order of severity, affected the neck, shoulder, wrist, lower back, hands and fingers, upper back, eyes (straining to view the monitor), middle back and upper arm.

Not surprisingly, staffing issues and work schedules contributed to these MSDs. Due ▶



ILLUSTRATION BY TOM WHALEN



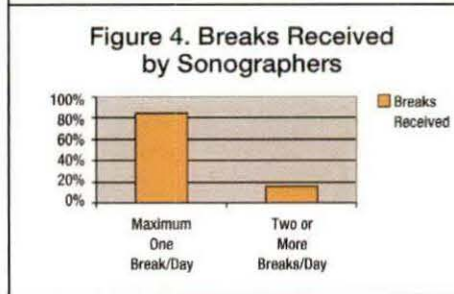
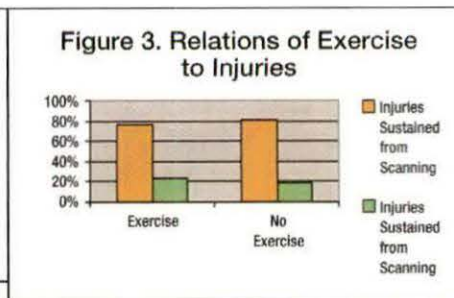
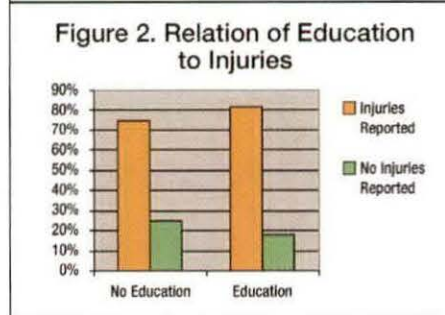
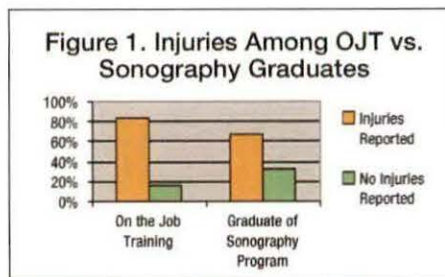
charts/courtesy Wretha G. Goodpaster, MSRS, RT(R)(CT)(M)(QM), RDMS, RVT, et al.

to downsizing and personnel shortages, sonographers were required to evaluate more patients and work longer hours. In fact, results found that 50.2 percent of the sonographers had one or no break (of 10 minutes or longer) in an eight-hour workday.

In another study at the Royal Prince Alfred Hospital,<sup>5</sup> 78 percent of Australian sonographers were found to suffer from work-related MSDs, preventing some from doing their jobs and causing several to find new work. Others had to reduce their hours or alter their work environment. Many also reported pain and discomfort in more than one area, including the shoulder, neck, back, wrist, eyes, hands/fingers, upper arm and forearm.

## Roots of the problem

Several factors seemed to contribute to the injuries, beginning with poor equipment design. Sonographers used stools and exam beds that would not adjust to accommodate their height, forcing them to lean and stretch exten-



sively. Keyboard, height and position were not adjustable, resulting in continuously poor posture. Repetitive movements and sustained pressure and force with the transducer were also required to obtain images. In addition, inadequate work breaks prevented sonographers from resting or stretching periodically.<sup>5</sup>

Another study, conducted by the depart-

ment of internal medicine at the University of Kentucky Medical Center, surveyed cardiac sonographers to determine the prevalence of musculoskeletal pain and identify risk factors.<sup>6</sup> Of the roughly 112 who responded, 80 percent reported new pain since starting their careers, and 46 percent received physical therapy or medication. Factors affecting

## Industry Backs up Sonographer Comfort

By Scott Hatfield

The ergonomic design revolution is sending waves of changes into ultrasound technology as a result of musculoskeletal disorders and other reported injuries.

The revamped equipment sports a lighter look. Sizing is everything it seems, with smaller transducers, which conform better to the shape of the hand. Then there are keyboards adjustable from side to side to reduce or eliminate sonographers' reach. Some units are also easier on the eyes with enhanced viewing monitors that reduce neck strain.

All in all, designers behind the machines are aiming to protect sonographers against bad posture and resultant health problems. And manufacturers are listening. Thanks to feedback, many have revamped units, making them ergonomic-friendly.

"We always try to promote ways to make sonographers feel more comfortable by means of scanning design, such as foot rests that elevate the feet and legs [to] help promote circulation," says Dean Bidwell, principle industrial designer of Design Affairs in Issaquah, Wash. The firm has enhanced medical imaging equipment by incorporating ergonomic features.

Below are manufacturers following this lead:

**General Electric Medical Systems** in Milwaukee has equipped its entire Logiq family of scanners with ergonomic updates. Features include a floating keyboard and ergonomic chairs that aid proper seating position, foam blocks that help reduce strain, and a bed that can position the patient at an ideal height.

**Hitachi Medical Systems America Inc.**, Twinsburg, Ohio, has a fully

digital EUB-6500 ultrasound system, offering features designed to reduce musculoskeletal stress. The unit's lightweight probe design, along with its flexible cables, allows users to reduce grip tension while imaging. Also, the EUB-6500 comes with an ergonomic keyboard design with logically organized keys and toggle switches, and one-touch access to common functions.

**Philips Medical Systems**, Bothell, Wash., offers the EnVior Ultrasound System with the following ergonomic features: a keyboard that moves side-to-side more than 300 degrees for proper sonographer positioning and patient viewing; a monitor and keyboard that move up and down to accommodate clinicians of different heights while standing or sitting; front footrests that reduce lower back pain; and full-length wrist support.

**Siemens Medical Solutions'** ultrasound division in Mountain View, Calif., offers the Sonoline<sup>®</sup> Antares<sup>™</sup>, a system with ergonomic advances based on extensive research and expert user input. The unit's control panel is laid out to keep logical maneuvers in one area, helping sonographers avoid unnecessary neck strain. The scanner is vertically adjustable, and the transducers are gripped.

**Toshiba America Medical Systems Inc.**, Tustin, Calif., provides smaller transducers and lighter, more flexible cables. The unit contains moveable keys on the control panel, allowing sonographers to move the most frequently used keys to the best position. The monitor can also be swiveled and tilted for easy viewing.

Scott Hatfield is the senior industry editor of ADVANCE.



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symptoms included: sonographers who were shorter than 63 inches, performed 100 or more scans per month, had an average scan time of 25 minutes or more per patient, and used manually propelled machines.

### SDMS, OSHA take action

To address these injuries, the Society of Diagnostic Medical Sonographers reported and provided testimony to OSHA that 84 percent of sonographers were affected by MSDs during their career.<sup>1</sup> In turn, OSHA released a final ergonomics ruling on Nov. 14, 2000, emphasizing injury reduc-

effective Jan. 16, 2001, the Senate passed a resolution of disapproval of the Ergonomics Program Standard on March 6, 2001, and the House passed it the next day. President Bush signed the resolution into law on March 20, 2001, prompting OSHA to remove the standard from the Code of Federal Regulations.<sup>9</sup> Since then, no new action has been taken.

### Our survey

Because education is key, we undertook a study at Morehead University in Morehead, Ky., to investigate a correlation between lack of education about injury pre-

## Administrators must provide a healthy work environment to prevent ergonomic injuries among sonographers, offering proper instruction on body mechanics.

vention and prevention. According to the rule, which has since been revoked, employers had to educate employees about potential MSDs, their signs and symptoms, risk factors, preventive measures, and how to file a report when an injury occurred.<sup>7</sup>

Employers with 11 or more employees had to maintain documentation of the reported MSDs, signs, symptoms, hazards, responses to the reports, job hazard analyses and control measures, ergonomics program evaluations, and records of work restrictions. Under the rule, they also had to maintain any written medical opinions on treatment, and give employees and their representatives access to the records.<sup>8</sup>

Unfortunately, the OSHA hearings solicited interest from the business community, which opposed the ergonomics rule. While the final ergonomics rule became

vention and sustained injuries. We also evaluated breaks and exercise habits among the 547 respondents to our survey, conducted in 2002. Highlights of the survey include:

- 79 percent of respondents reported work-related injuries;
- 62 percent learned sonographic procedures on the job, and 38 percent are graduates of an educational program in sonography;
- 83 percent of those trained on-the-job have experienced work-related injuries, while 68 percent of sonography graduates experienced injuries (see Figure 1);
- 54 percent received no education on risk factors and prevention of sonography-related injuries, and 75 percent of those have experienced injuries;
- 46 percent have received some type of education (continuing education, departmental in-service, or formal education) on risk factors and prevention, and ▶



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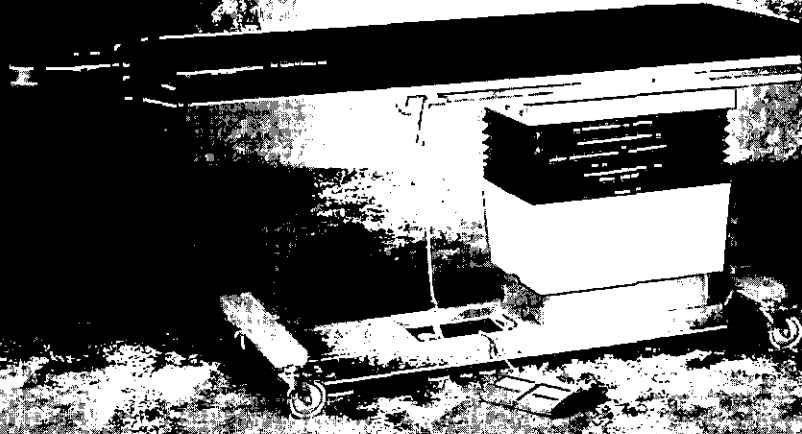
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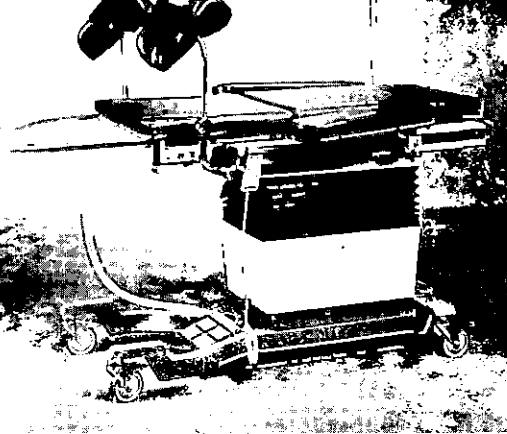
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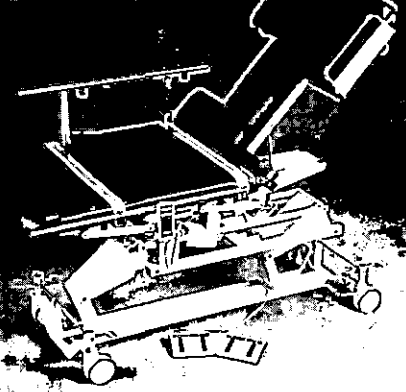
SURGICAL C-ARM TABLE



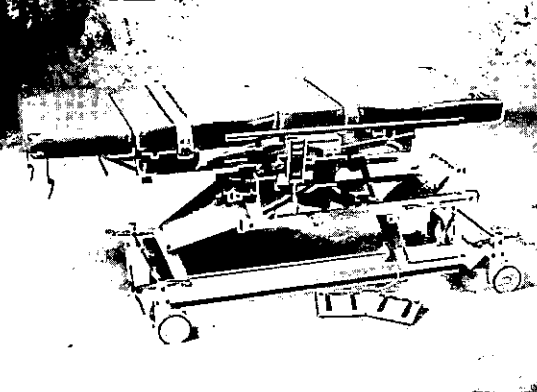
UROLOGY C-ARM TABLE



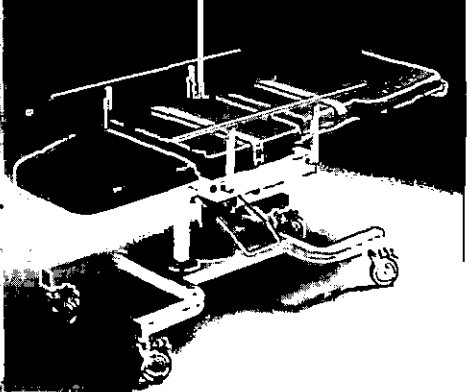
ECHO PRO TABLE



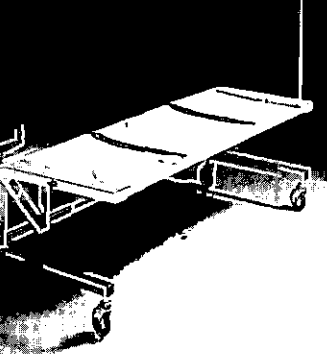
ULTRA PRO TABLE



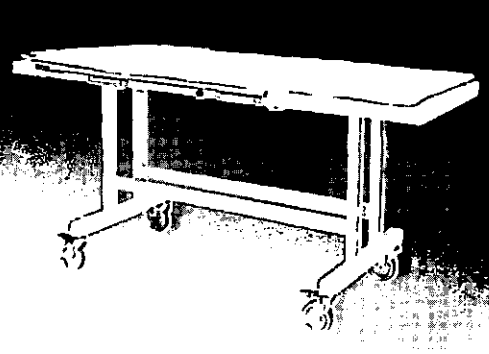
DELUXE ULTRASOUND TABLE



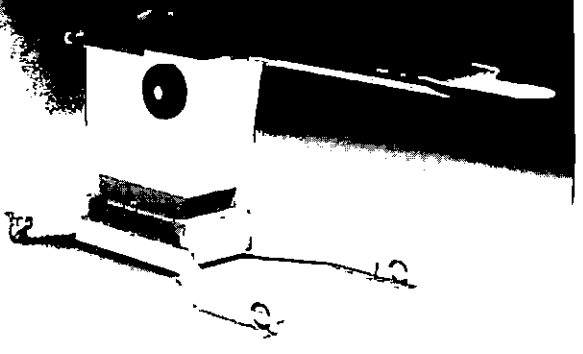
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82 percent of those have experienced work-related injuries (see Figure 2);

- 27 percent do not exercise regularly and of those, 81 percent have experienced work-related injuries. Of those who exercise three or more times per week, 77 percent have experienced work-related injuries (see Figure 3);

- 47 percent of respondents received no break during the day excluding lunch, and 79 percent of those had work-related injuries;

- 4 percent of the total respondents reported receiving more than two breaks per day; 64 percent of those reported injuries; and

- 16 percent of respondents work in a health care facility that provides two or more breaks per day; 84 percent work in a facility that provides a maximum of one break per day excluding lunch (see Figure 4).

### In the end

The take-home message? Administrators must provide a healthy work environment to prevent ergonomic injuries among sonographers. Hand in hand with this, they must offer proper instruction on body mechanics to those trained on the job and who lack education about preventing occupational injuries. While this no doubt places a financial burden on facilities, it will pay off in the long run by having healthy, happy sonographers.

Meanwhile, the sonographer mentioned earlier, still at her desk, reflects on conversations with her colleagues and realizes she's not alone. But thinking of the thousands of patients she's helped through the years, she smiles again, resolving to help future sonographers prevent ergonomic injuries—so they can do the same. ■

### Acknowledgement

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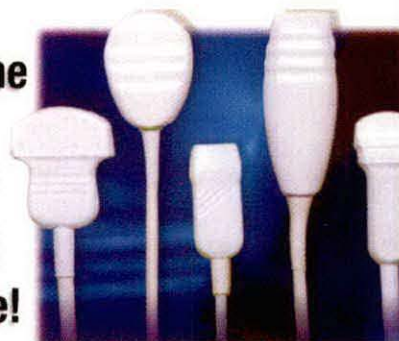
from the Institute of Regional Analysis and Public Policy (IRAPP) at Morehead State University. The authors thank Lloyd Jaisingh, PhD, the statistician, and the sonographers in Ohio and Kentucky who responded to their survey.

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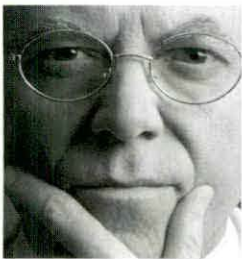
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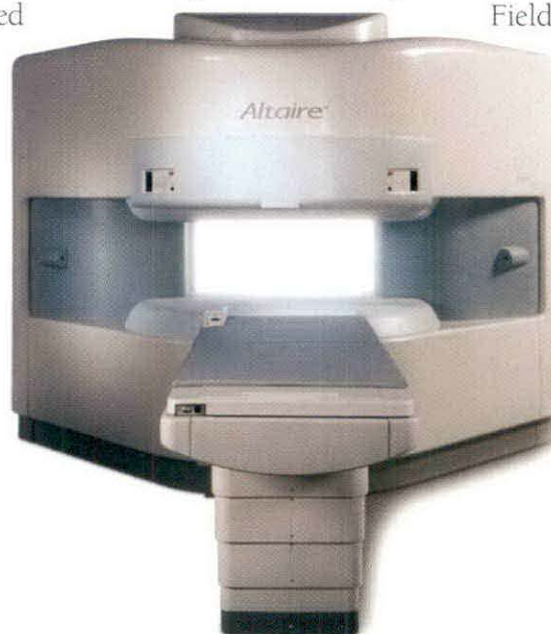
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