



Saving Our Sonographers With Proper Ergonomic Techniques

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Breast ultrasound technologists are key components of a successful breast imaging department. Many times, sonographers are focused on providing high-quality patient care but at the same time are jeopardizing their physical well-being. Rushing to acquire the perfect image, straining and stretching to reach the keyboard, moving a patient alone without help, and neglecting to take the time to ask for assistance when necessary can all negatively impact a sonographer's physical well-being. Occupational injuries occur not because of *what* sonographers do but rather *how* they perform the tasks required to do their jobs. Pausing to become aware of how one's body should work and effectively using the imaging equipment will foster effective and safer working environments that can benefit the clinician, patient, and entire organization.

The following are valuable sonographic statistics to consider:

- 81,080 sonographers are employed in the United States.¹
- 85% of sonographers in the United States are women.²
- 15% of sonographers in the United States are men.²
- The average age of sonographers in the United States is 43 years.²
- Approximately 90% of sonographers have some form of musculoskeletal injury.³
- One in five sonographers experiences a career-ending injury.³
- A sonographer works an average of 5 years before experiencing pain.^{3,4}

These astonishing statistics warrant attention. In recent years, equipment manufacturers have begun to recognize the importance of ergonomics. Mammography machines now have switches at different levels on the C-arm and foot pedal to reduce repetitive hand and finger motions. Ultrasound machines have adjustable monitors and consoles along with ergonomically designed transducers that are lightweight and easy to maneuver. Manufacturers have also noted that an ergonomically designed machine is less intimidating for the patient, provides a more comfortable examination, and creates a positive patient experience.

How can sonographers avoid becoming part of these statistics?

Use the Physical Therapy Department

Most physical therapy departments offer or perform workstation and work area evaluations. A skilled specialist from a physical therapy department can observe various work areas, assess how the sonographer uses the equipment, and provide information and tips for improvement. Once feedback and the tools to use proper ergonomics have been provided, it is up to the sonographer to enforce them. Proper ergonomic techniques need to be incorporated into daily routines to become regular habits. Making the techniques systematic and routine can help prevent sonographers from slipping back into ineffective methods of imaging. If a physical therapist is not available within the organization, the internet has a wealth of information pertaining to ergonomics.



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Tips to Improve Ergonomics

The layout of the room and equipment is critical to improving ergonomics. Positioning the bed and ultrasound machine at an angle provides an effective working environment with appropriate access to the machine and the patient while avoiding twisting or unnecessary bending. The bed and ultrasound machine should form two legs of a triangle, and the sonographer can stand in the center (Figure 1). The perimeter in which the sonographer can perform tasks for a long period of time without overextending can be described as the primary work zone, secondary work zone, and tertiary work zone (Figure 2). Understanding the zones

and workspace will help establish proper sonographer ergonomics. Adequate lighting in the workspace is also important. Ultrasound machines should not be placed directly under the ceiling lighting source to avoid reflection on the monitor, causing eye strain. Lighting should also be dimmed appropriately because bright light can affect the image quality.



Photo courtesy of the author

Figure 1. Examination room set up with the bed and ultrasound machine angled to form two legs of a triangle.

Continued on page 10>

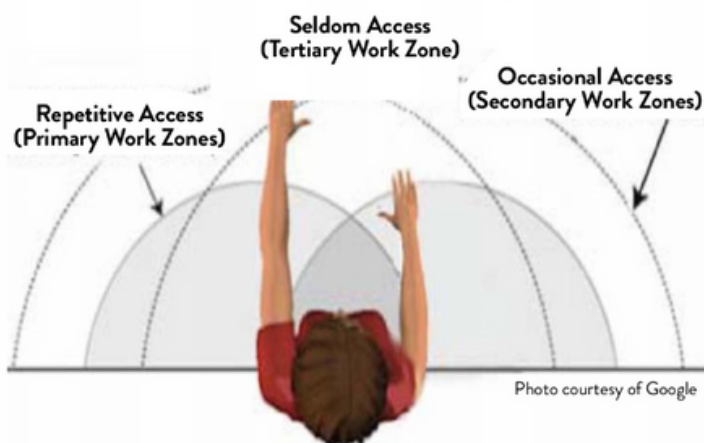


Figure 2. Work zones. Working in the triangular area is optimal for ergonomics.

Once the layout has been addressed, the monitor should be adjusted. The console should be pivoted toward the technologist with presets built into imaging protocols. This adjustment reduces the number of keystrokes and overreaching during the examination. The height of the monitor must be adjusted to the sonographer's eye level, with a minor tilt downward. For staff members who share equipment, it is useful to save monitor adjustments by placing a mark on the side of the console and on the side of the monitor where it raises and lowers. Each staff member may choose an individual color specific to their settings and place marks on the unit (Figure 3). These marks provide a means to quickly and accurately adjust the unit for the technologist performing the examination.

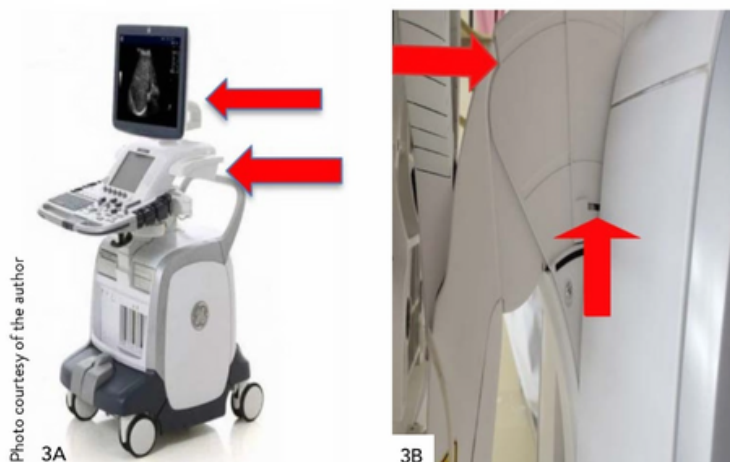


Figure 3. A, Arrows indicate locations where the monitor and console are raised and lowered. B, Arrows indicate locations where marks can be placed on the unit to represent preferred settings for individual users.

Another critical aspect of organizing the examination room is the location of the patient's bed. The bed should be raised or lowered to the appropriate height for the sonographer. This adjustment will reduce any possible extension of the sonographer's body while avoiding leaning or twisting, which may cause injury. Some examination beds include electronic, stationary, and manual setting options that can be modified for the sonographer performing the examination. Motorized beds are the most ideal option for optimal ergonomics. The height of these beds can be adjusted to accommodate patient transfer and the sonographer. Stationary

gurneys pose more of a challenge, but the lack of bed movement can be compensated for. If the examination room does not allow you to place the bed at an angle and the bed is against a wall, try turning the patient to avoid overextension by the sonographer. Having the patient lie supine with the patient's head in the routine examination position may be adequate to obtain imaging of the right breast. Having the patient sit up and reverse their position on the gurney to obtain imaging of the left breast may be more ergonomically friendly. When using a stationary bed, sonographers are usually scanning while seated. It is essential to be mindful not to lean into the bed (Figure 4A) to avoid a shoulder, neck, or twisting injury. Standing (Figure 4B) would not be suggested with a stationary bed.

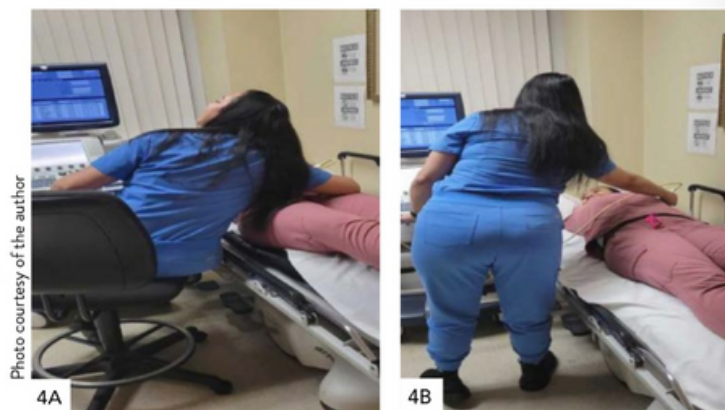


Figure 4. A, Incorrect sitting technique. B, Incorrect standing technique.

Manual beds that require pumping a foot pedal to raise and lower the bed require the use of the sonographer's legs and feet. Using an alternating-leg technique to raise and lower manual gurneys will help reduce repetitive motion injuries.

Sonographers may sit or stand when performing imaging. Those who prefer to stand may choose to use a fatigue mat to absorb stress on the legs and feet over time and help support a standing position (Figure 5A). The mat can be stored under the bed when not in use. When sonographers choose to sit in a chair to perform imaging, the chair should be close to the machine and patient gurney to ensure proper technologist posture and minimal arm extension. For adequate arm extension, a 30° abduction is recommended. Imaging staff should be mindful of placing their feet flat against the floor and using a chair that provides lumbar support (Figures 5B and 5C).



Figure 5. A, Correct use of fatigue mat. B, Proper sitting technique with lumbar support and feet flat on the floor or supported. C, Scanning position with the patient as close as possible to reduce extension of the arm.

The final part of ergonomic technique is the transducer and the sonographer's grip. It is very important to use transducers that foster the palmar grip (Figure 6). The palmar grip is an ergonomic, wrist-neutral grip that reduces torque and tension in the hand, fingers, and wrist.

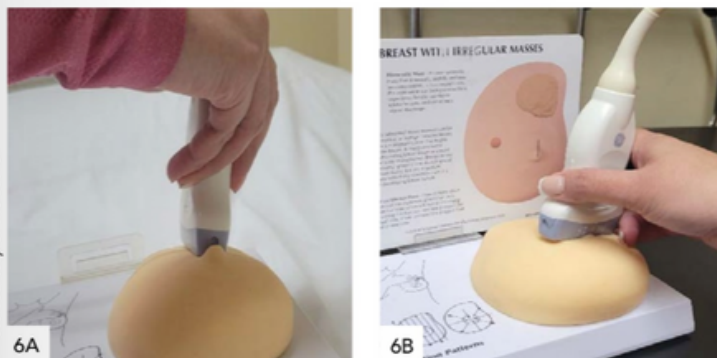


Figure 6. A, Incorrect grip. B, Correct grip.

The following are tips for achieving optimally sound ergonomic technique while performing sonographic examinations:

- Position the machine within proper reach.
- Adjust the console adequately for seated and standing scanning positions.
- The base of the console should not interfere with the ability of the sonographer to reach the patient and the console.
- There should be adequate clearance for the sonographer's legs and feet when scanning in a seated position.
- Adjust the height of the monitor to minimize excessive neck rotation, flexion, and extension.
- The monitor should be at eye level.
- The touch screen and keyboard should not restrict neutral posture or require excessive reaching beyond the primary work zone.
- Use customized preferences to reduce keystrokes.
- Transducers should be lightweight, balanced, and designed with the palmar grip (neutral wrist position) to reduce torque in the wrist.
- Examination beds should be raised to allow arm abduction of less than 30°.
- Sonographer examination chairs should swivel and should have lumbar and thigh support and a footrest.
- Chair height should be adjusted appropriately for the sonographer.
- The sonographer's feet should remain flat on the floor when seated or should be supported with a fatigue mat when standing.
- The patient should be positioned close to the sonographer.
- Adjust bed height, if possible.
- Reverse the patient's position to facilitate scanning of specific body parts.

This information should serve as a reminder that sonographers need to protect their bodies so they can continue to provide lifesaving examinations and procedures for their patients in a healthy manner. Their bodies, patients, and organizations will reap the benefits of the best in patient care.

References

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Contrast Enhanced Mammography Imaging Screening Trial (CMIST) Is Now Open! (continued from page 6)

- DBT and CESM are performed with the GE Pristina SenoBright HD.
- The contrast agent is iohexol, 350 mg iodine per milliliter.

Study costs: The costs of the year 0 and year 1 CESM and the costs for start-up, data entry, and image submission will be covered by the trial.

Site qualifications (approximately 15 sites expected):

- Interpreting physician/reader requirements are MQSA qualification, a minimum of 5 years' experience reviewing digital mammography, and interpretation of a minimum of 20 prior GE Pristina CESM examinations.
- Sites must have completed a minimum of 50 clinical GE Pristina CESM examinations.
- The technologist performing study CESM examinations must have performed a minimum of 10 clinical GE Pristina CESM procedures.

If you are interested in participating in the study or would like more information, please contact:

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Reference

1. First patients enrolled in Contrast Enhanced Mammography Imaging Screening Trial (CMIST). News release. American College of Radiology. May 4, 2023. Accessed June 30, 2023. <https://www.acr.org/Media-Center/ACR-News-Releases/2023/First-Patients-Enrolled-in-Contrast-Enhanced-Mammography-Imaging-Screening-Trial>