An ergonomically designed ultrasound system is important for avoiding work-related musculoskeletal injuries. Occupational injury is increasing among sonographers due, in part, to larger workloads and workforce shortages. According to the Society ofDiagnostic MedicalSonography(SDMS), more than 80% of sonographers are scanning in pain and 20% of these professionals eventually experience a career-ending injury.

On average, within 5 years of entering the profession, sonographers experience pain as a result of their work tasks.1,4

GE Healthcare's commitment to designing ergonomically friendly ultrasound systems has resulted in the new Vivid™ S6, which has been extensively evaluated by Sound Ergonomics, LLC. The Vivid S6 is a new Signature Class ultrasound system that offers many innovative ergonomic features, designed with the sonographer in mind. The advanced features of the Vivid S6 address the industry standards for the prevention of work-related injuries. From the monitor to the lightweight design, the Vivid S6 incorporates simplicity and comfort. After the ergonomic evaluation by Sound Ergonomics' consultants, the Vivid S6 was found to meet or exceed most of the industry standards for equipment design.5,6

1. The Prevalence of Musculoskeletal Disorders and Related Work and Personal Factors
2. Top 4 musculoskeletal injuries found in the workplace, addressing the workforce shortage in the profession by sonographers and sonologists and, hopefully, assist in these industry standards will improve the well-being of stakeholders in making informed decisions. Adoption of the workforce. These standards are intended to assist all industries in reducing the incidence of employees, employers, educators, medical facilities, and equipment manufacturers in reducing the incidence of work-related tasks.

b. Take meal breaks separate from work-related tasks.
c. Take mini breaks during the procedure.
d. Re-focus eyes onto distant objects.
e. Vary procedures, tasks, and skills

1. Minimize sustained bending, twisting, reaching, lifting, pressure, and awkward postures;
2. Adjust all equipment to suit user's size and space;
3. Use measures to reduce arm abduction and how to reduce injury risk by using the Vivid S6.
4. Relax muscles periodically throughout the day:

Figure 1

Most common pains described by sonographers.

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulders</td>
<td>76%</td>
</tr>
<tr>
<td>Neck</td>
<td>74%</td>
</tr>
<tr>
<td>Wrist</td>
<td>59%</td>
</tr>
<tr>
<td>Upper Back</td>
<td>58%</td>
</tr>
<tr>
<td>Hands/Fingers</td>
<td>55%</td>
</tr>
</tbody>
</table>

Percentage of people reporting pain

GE’s Vivid S6 Complete Ergonomic Solution.

Complete innovative design with an ergonomic solution in mind!

Most of the equipment control measures recommended by the industry guidelines are addressed with the Vivid S6.

Mobility

- The lightweight design of the system provides a small footprint and simplicity. It is a small ergonomic system with the comfort of a console.
- The "Flex-Fit" allows for easy up and down movement of the keyboard and monitor for flexibility when standing or sitting while scanning.
- The 37" flat screen monitor has wide screen visibility and incorporates an Auto Sensor feature, which adjusts appropriate brightness and contrast levels in any lighting conditions, eliminating eyestrain. The system has the ability to support a second display setting, optimized for an external monitor.
- The swivel footrest is designed to encourage neutral position of the ankle, as recommended by the industry standards.
- Cable management of the Vivid S6 is innovative - there are 4 cable hooks for easy access and there is less interference in the foot area.
- The lightweight design of the system provides a small footprint and simplicity.
- The "Flex-Fit" allows for easy up and down movement of the keyboard and monitor for flexibility when standing or sitting while scanning.

Performance

- The high performance of a console with one touch optimization features, such as Smart Depth, SmartStress, ATOS, and ASO, are now available in a miniaturized ergonomic mobile system. The result is better image quality, quicker exam times, and ultimately less strain on the sonographer. The optimized control layout accommodates both right- and left-handed users with its 3 easy-to-reach areas:
  1) Scan Area — centrally located near the track ball resulting in less reach.
  2) Patient Area — located on the left of the system, with all necessary patient information and archiving control.
  3) Data Management Area — on the right of the system, for storage of loops and still frame images.
- The user interface is similar to other Vivid systems, thus making the Vivid S6 easy to use. We have streamlined the workflow so that the Vivid S6 is intuitive to new users after scanning only a few patients. This is due to the optimized layout of the control panel that can be easily adapted to any user. Each user can easily migrate from another system in no time.
- The keys are illuminated and glow in the dark of the exam room, thus allowing for clear identification of control functions that can be activated during the exam. The keys that are activated are illuminated in green.
- SmartStress allows the user to save settings at each stage of the stress echo examination, to lessen optimization needs when time is of the essence.
- The Auto Key functionality allows Tissue Optimization and Spectrum Optimization with only one touch of the Auto Key which results in less optimization time for the user.

Reach

- The system offers several features that are within the user’s reach and that require minimal keystrokes. The Vivid S6 provides a key that can be configured to perform any function that the sonographer or physician would like to have at a finger’s reach.
- Smart Depth automatically optimizes acquisition parameters according to the selected imaging depth in both 2D and Color. This leverages keystrokes.

Conclusion

The Vivid S6 is a new system representing the Signature iQs Ultrasound where miniaturization meets console. Its performance brings workflow and productivity to the next level.

It was designed with ergonomics in mind! You can see how a small lightweight design combined with proper ergonomics makes the Vivid S6 easy to maneuver for mobile studies.

Miniaturization is the future of ultrasound. At GE, we are committed to reducing system size — and increasing ergonomics — in our future products.
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**Mobility**
The lightweight design of the system provides a small footprint and simplicity. It is a small ergonomically Sound system with the comfort of a console.
- The “Think” allows for easy up and down movement of the keyboard and monitor for flexibility when standing or sitting while scanning.
- The 37” flat screen monitor is wide angle visibility and incorporates an Auto Sensor feature, which adjusts appropriate brightness and contrast levels in any lighting conditions, minimizing eyestrain.
- The system has the ability to support a second display setting, optimized for an external monitor.
- The “Flex Fit” allows for easy up and down movement of the keyboard and monitor for flexibility when standing or sitting while scanning.
- The 17” Flat Screen Monitor has wide angle visibility and incorporates an Auto Sensor feature, which adjusts appropriate brightness and contrast levels in any lighting conditions, minimizing eyestrain.
- The system has the ability to support a second display setting, optimized for an external monitor.
- The swivel footrest is designed to encourage neutral position of the ankle, as recommended by the industry standards.
- Cable management of the Vivid S6 is innovative – there are 4 cable hooks for easy access and there is less interference in the foot area.
- The 6 Port Connectors result in ease of use, single-handed use, and minimal strain on the worker.
- The system’s versatile casters are designed for mobility on a variety of floor surfaces, such as tile and carpet.
- The system can easily be pushed or pulled with little force, even with one finger!
- The lightweight probes, such as the 3S, 4C, and 8L, offer a more ergonomic balance to minimize torque on the wrist and facilitate a more comfortable grip.

**Performance**
The high performance of a console with one touch optimization features, such as Smart Depth, SmartStress, ATD, and ASO, are now available on a miniaturized ergonomic mobile system. The result is better image quality, quicker exam times, and ultimately less strain on the sonographer. The optimized control layout accommodates both right- and left-handed users with its 3 easy-to-reach areas:
1) **Scan Area** – centrally located near the track ball resulting in less reach.
2) **Patient Area** – located on the left of the system, with all necessary patient information and archiving control.
3) **Data Management Area** – on the right of the system, for storage of loops and still frame images.
- The user interface is similar to other Vivid systems, thus making the Vivid S6 easy to use. We have streamlined the workflow so that the Vivid S6 is intuitive to new users after scanning only a few patients. This is due to the optimized layout of the control panel that can be easily adapted to any user. Each user can easily migrate from another system in no time.
- The keys are illuminated and glow in the dark of the exam room, thus allowing for clear identification of control functions that can be activated during the exam. The keys that are activated are illuminated in green.
- SmartStress allows the user to save settings at each stage of the stress echo examination, to lessen optimization needs when time is of the essence.
- The Auto Key functionally allows Tissue Optimization and Spectrum Optimization with only one touch of the Auto Key which results in less optimization time for the user.

**Reach**
The system offers several features that are within the user’s reach and that require minimal keystrokes. The Vivid S6 provides the key that can be configured to perform any function that the sonographer or physician would like to have at a finger’s reach.
- Smart Depth automatically optimizes acquisition parameters according to the selected imaging depth in both 2D and Color.
- This leverages keystrokes.
- As a complete shared-service system, the S6 has several ergonomic features to maximize keystrokes in vascular applications such as:
- **Wide Aperture** — System automatically changes to this feature when below certain depths, for deeper penetration and better lateral resolution.

**Conclusion**
The Vivid S6 is a new system representing the Signature Class Ultrasound where miniaturization meets console. Its performance brings workflow and productivity to the next level.
- It was designed with ergonomics in mind.
- You can see how a small lightweight design combined with proper ergonomics makes the Vivid S6 easy to maneuver for mobile studies.
- Miniaturization is the future of ultrasound. At GE, we are committed to reducing system size — and increasing ergonomics — in our future products.
GE’s Vivid S6 Complete Ergonomic Solution.

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**Mobility**

- The lightweight design of the system provides a small footprint and simplicity. It is a small ergonomic system with the comfort of a console.
- The ‘‘Flex Fit’’ allows for easy up and down movement of the keyboard and monitor for flexibility when standing or sitting while scanning.
- The 37 Flat Screen Monitor has a wide single-viability and incorporates an Auto Sensor feature, which adjusts appropriate brightness and contrast levels in any lighting conditions, mimicking the system. The system has the ability to support a second display setting, optimized for an external monitor.
- The keyboard and monitor are easily moved for flexibility when standing or sitting while scanning.
- The 17” Flat Screen Monitor has wide angle visibility and incorporates an Auto Sensor feature, which adjusts appropriate brightness and contrast levels in any lighting conditions, minimizing eyestrain. The system has the ability to support a second display setting, optimized for an external monitor.
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**Performance**

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**Reach**

- The system offers several features that are within the user’s reach and that require minimal keystrokes. The Vivid S6 provides a Key that can be configured to perform any function that the sonographer or physician would like to have at a finger’s reach.
- Smart Depth automatically optimizes acquisition parameters according to the selected imaging depth in both 2D and Color. This lessens keystrokes.
- As a complete shared-service system, the S6 has several ergonomic features to minimize keystrokes in vascular applications such as:
  1) Wide Aperture — System automatically changes to this feature when below certain depths, for deeper penetration and better lateral resolution.

**Conclusion**

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- Miniaturization is the future of ultrasound. At GE, we are committed to reducing system size — and increasing ergonomics — in our future products.
Industry Standards:
The industry standards for sonography address the role of employees, employers, educators, medical facilities, and equipment manufacturers in reducing the incidence and impact of work-related musculoskeletal injuries on the workplace. These standards are intended to assist all stakeholders in making informed decisions. Adoption of these industry standards will improve the well-being of sonographers and ultrasound and, hopefully, assist in addressing the workplace shortage in the profession by keeping the most experienced sonographers on the job.

Top 4 musculoskeletal injuries found in the workplace, and how to reduce injury risk by using the Vivid S6.

The major musculoskeletal disorders found in the workplace involve the shoulder, the neck, the hand and wrist.

The adjustability of the Vivid S6 and its compact size provide the system’s monitor and the most commonly used keys.

1. Minimize sustained bending, twisting, reaching, lifting, pressure, and awkward postures; and alternate sitting and standing and vary scanning techniques and transducer grips.

2. Adjust all equipment to suit user’s size and control elements within the user’s reach, reduce arm abduction and allow the user to be positioned in front of the system’s monitor and the most commonly used keys.

3. Use measures to reduce arm abduction and allow the user to be positioned in front of the system’s monitor and the most commonly used keys.

4. Use correct body mechanics when moving patients, wheelchairs, beds, stretchers, and ultrasound equipment.

References:
1. Society of Diagnostic Medical Sonography.

Figure 1: Percentage of people reporting pain in hands/fingers, neck, shoulders, and wrists.

<table>
<thead>
<tr>
<th>Percentage of People Reporting Pain (Year)</th>
<th>Hands/Fingers</th>
<th>Neck</th>
<th>Shoulders</th>
<th>Wrist</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>58%</td>
<td>59%</td>
<td>74%</td>
<td>76%</td>
</tr>
</tbody>
</table>

Healthcare Re-imagined

GE is dedicated to helping you transform healthcare delivery by driving critical breakthroughs in biology and technology. Our expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, and biopharmaceutical manufacturing technologies is enabling healthcare professionals around the world to discover new ways to predict, diagnose and treat disease earlier. We call this model of care “Early Health.” The goal to help clinicians detect disease earlier, access more information and intervene earlier with more targeted treatments, so they can help their patients live their lives to the fullest.

Re-think, Re-discover, Re-invent, Re-imagine.

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