



Setting a New Standard for Ergonomics in Smaller Ultrasound Systems

An Assessment of Voluson SWIFT

For GE Healthcare
By Sound Ergonomics, LLC

As ultrasound becomes a valuable tool for many medical specialties, ultrasound systems have undergone many changes in order to accommodate the varied needs of each different user. Industry standards¹ developed to address work-related injuries in sonographers primarily focus on larger, multi-specialty systems. However, the smaller systems incorporate ergonomic features in different, more flexible ways and illustrate the need for standards specific to their use. The GE Voluson™ SWIFT is paving the way for ergonomic standards unique to this category of ultrasound systems.



Consider the definition of ergonomics – “the study of people’s efficiency in their working environment.” It’s a science that designs things people use so that the two interact in an efficient and safe way. Workplace ergonomics focuses on designing the work environment and how it can be arranged for each user. Based on these definitions, there is wide latitude in the design of ultrasound systems so the features accommodate the needs of the different medical specialists. “Efficiency” in a work environment can be obtained in various and unique ways.

One important ergonomic feature of Voluson SWIFT is its movability and maneuverability. This is significant in reducing risk for injury because it’s lightweight and can be positioned easily with one hand throughout the ultrasound exam. With larger systems, users are unlikely to stop scanning in order to get up and reposition the system which can then increase the risk for occupational injury since a user may be scanning with extended reaches or arm abduction. The ability to easily move and reposition the system while scanning aids in

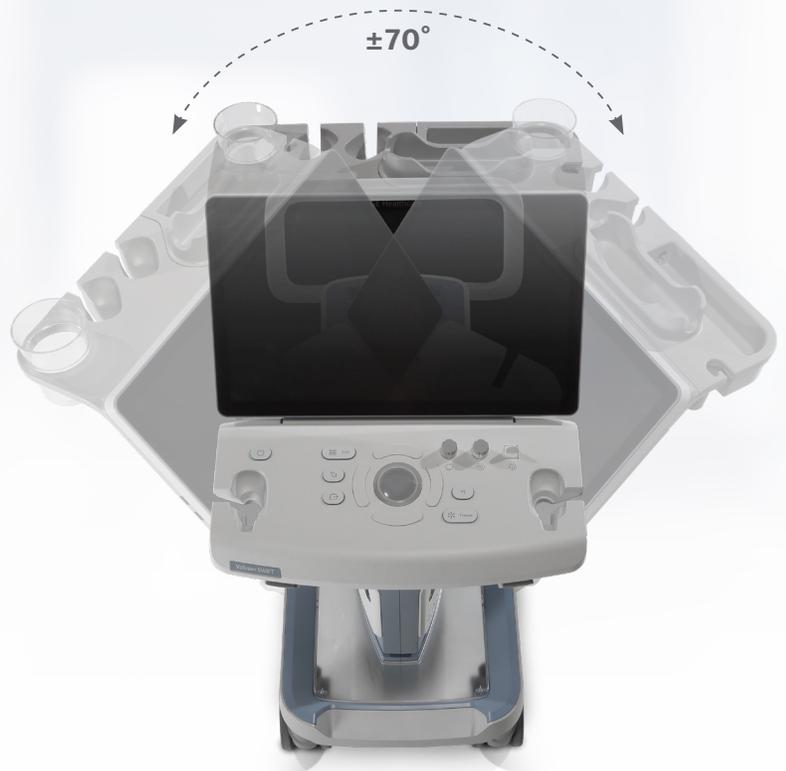
finding the best position for optimal user comfort. One injury risk is a non-neutral neck position while viewing the system’s monitor. To address this, the industry standards suggest that the monitor and the control panel should both be separately adjustable. However, a neutral neck position can be obtained in different ways, especially with the smaller cart-based systems. A lightweight, maneuverable system can quickly be rotated into the best viewing position without the need for the control panel and the monitor to be independently adjustable. With the majority of the controls located on the monitor, the sonographer will use the control panel infrequently.

Voluson SWIFT’s compact size takes up very little space in exam rooms, many of which are used for exams and procedures other than ultrasound imaging.

Height-adjustability is another important feature since it accommodates users of different heights and sitting or standing while scanning. Voluson SWIFT’s overall height has 200 mm of travel, and this allows users to position the monitor at the ideal level for viewing without neck extension or flexion.



The Voluson SWIFT utilizes an 18.5" high resolution monitor that tilts from 45 to 90 degrees providing a wide range of viewing angles. In addition, 70 degrees side to side rotation allows users to swivel the monitor for more comfortable viewing with minimal neck twist.



The control panel on this system is very compact and easy to swivel for optimal positioning. Adjustments to the position of the control panel are done very smoothly without levers or locks that need to be disengaged before any movement can be initiated. The simplified control panel incorporates only the most frequently used keys minimizing its depth and decreasing the user's reach to the monitor; and the front is a "waterfall" design, slightly rounded so the users can rest their left palm on the control panel rather than the wrist. Carpal tunnel injury can result not only from repeated flexion and extension of the wrist but also from mechanical pressure on the wrist.

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Another impressive feature of Voluson SWIFT is the functionality of the controls, which are located on the monitor. The TGC controls are on the left side of the monitor which eliminates the user's need to reach across his or her body to access them. Many controls are programmable for each user's preferences. As a result, the user "drives" the features rather than the features "driving" the user. Customizing the touch screen controls to each individual's work style causes less frustration and stress^{2,3} for the user and reduces "transducer time." Both of these factors can contribute to a lower risk for musculoskeletal injury.

Voluson SWIFT has a very robust and "intelligent" exam protocol feature; Scan Assistant recognizes which view has been captured and can activate certain items for that view, such as calipers if a measurement is appropriate. Within Scan Assistant is SonoLyst, an artificial intelligence feature which can automatically identify fetal anatomy seen on standard views. SonoLyst has the ability to identify anatomy on a frozen image, label and then measure if required for the protocol or provide feedback to identify if an image has all the features for a specific anatomical structures for consistency and quality. Referring to the definition of ergonomics as the study of people's efficiency in their work environment, Scan Assistant and SonoLyst fit this definition perfectly. Reducing "transducer time" allows for muscle recovery between exams without compromising productivity or image quality.

There are far more parts to an ergonomic work environment than the features commonly described in various standards. Positioning the ultrasound system's monitor and control panel can be done in different ways as long as the user is working in a neutral position as often as possible. Ease of mobility, flexibility of system controls and reducing user frustration with responsive exam protocols are just as important as multiple adjustable system components.

It is difficult to compare small cart-based systems to larger, multi-specialty systems as both incorporate ergonomic features which will be employed differently but both ultimately contribute to an efficient, safe work environment and a lower risk for occupational injury. Ergonomic features are not "one size fits all" and Voluson SWIFT evokes the need for new standards for these types of ultrasound systems.



References

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