

Exam Tables – An Important Component of the Sonography Work Environment
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Ergonomic workstations should be designed for the specific requirements of the work tasks, as well as the behavior patterns of the workers¹. The design of the ultrasound workstation plays a significant role in addressing occupational injury among sonographers & sonologists.

The incidence of work-related musculoskeletal disorders (WRMSD) among ultrasound professionals in North America has increased from 84% in ² to 90% in 2008 ³. The factors contributing to these injuries are multifactorial and, as a result, risk reduction measures come from a variety of sources. One set of factors contributing to this type of injury is biomechanical, which involves workstation design and equipment. The approach to workstation design can be described as *systems-oriented*, focusing on the worker-equipment interface. This approach takes into consideration the worker in his or her physical working environment and the organizational context⁴. Important criteria to consider when designing equipment for the ultrasound workstation is knowledge of the end-user's expectations⁵. In sonography, the expectation is the reduction in worker injury and turnover, both of which impact the quality of patient care. The design of the ancillary equipment in the workstation, therefore, would focus on identifying & reducing work-related risk factors for musculoskeletal injuries.

An important component of the sonography work environment is the ultrasound exam table. It should be designed to accommodate a variety of patient exams, as well as to accommodate the anthropometry and work practices of the sonographers and sonologists. Too often exam rooms are equipped with transport stretchers, which are not designed around the requirements of ultrasound exams.

A major requirement for an ultrasound exam table is electric height adjustability, through the use of a foot pedal and/or a hand control. Survey data indicate that the shoulder is the most frequent site of pain^{3,6}, which is caused primarily by prolonged arm abduction while scanning. Surface electromyography (SEMG) measurements of the trapezius and rotator cuff muscles have indicated that muscle firing can be reduced by 46% when the angle of arm abduction is reduced from 75° to 30° ⁷. This reduction in arm abduction can be achieved by adjusting the exam table to the appropriate height for the user. However, it is important that this adjustment can be made quickly and easily so that it becomes a part of the behavior pattern of the user. The height range should be expansive enough to accommodate both standing and seated users. This range generally is a low of 22-23" and a maximum height of 38". In addition to the height of the user, a wide height range accommodates a larger variety of exams; and a very low minimum height makes patient transfer to the exam table easier and safer.



Fig. 1: A low table height (22") makes it possible for patients to transfer unassisted from the wheelchair to the table. This reduces back injuries in sonographers and reduces patient fall risks.



Fig. 2: An exam table that is too high, accompanied by a chair that is too low, can result in arm abduction greater than 50 degrees and increases the risk for shoulder injury. Lowering the exam table and raising the chair reduces arm abduction to an acceptable level of 30 degrees or less.



Fig. 3: Once the exam table height is positioned correctly, the scanning arm should be supported.

The lift capacity of the exam table should match the load capacity. An exam table that does not lift the same weight that it can hold prevents sonographers from positioning the patient appropriately to reduce arm abduction.

The options of both a hand control and foot pedals make positioning the table height quick and easy from either side.



Fig. 4: Hand control



Fig. 5: Foot control

The design of the exam table should not prevent the sonographer from positioning the patient close to him or her. Side rails should fold completely under the table frame and the mattress should extend to the edge of the frame. An adjustable wedge section allows the sonographer to support the patient in a lateral decubitus position and to step in closer to the patient. Wedge sections on both sides of the exam table can increase the options for patient positioning and reduce the sonographer's arm abduction when scanning the patient's left side.



Fig. 6: Retractable side rail



Fig. 7: Wedge section

The exam table should have additional features specific for each type of exam, such as a dropping footboard and foot supports (stirrups). These features allow the sonographers to position the patient at the end of the exam table and, thus, perform endovaginal exams with less arm abduction. When seated at the head or foot end of the exam table, the sonographer should be able to sit with his or her knees comfortably under the table.



Fig. 8: Dropping footboard



Fig. 9: Foot supports (stirrups)

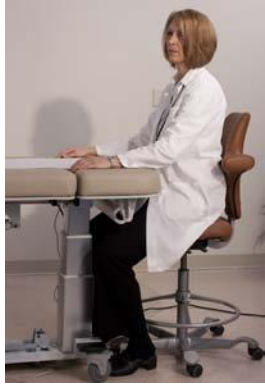


Fig. 10: Ample room for knees under the ends of the exam table



Fig. 11 : The least injurious work position for performing endovaginal exams. Allows sonographer to keep the scanning arm close to his/her body.

There are a number of other exam table features that can add to ease of use and to patient and sonographer comfort. Electrically-controlled Fowler, in combination with a dropping footboard, allows the sonographer to position the exam table much like a chair. This allows the patient to transfer easily to and from the table with little or no sonographer assistance. The exam table can then be appropriately positioned for the exam being performed, either with the patient lying flat or semi-upright.



Fig. 12: Chair configuration of the exam table.

Central locking casters can be added to the table and allow sonographers to lock all the wheels by engaging one locking mechanism. This is especially useful when moving the exam table throughout the work day and makes it quick and easy to reposition the table during an exam.



Fig. 13: Central locking mechanism

A head rest can be added when performing thyroid & carotid artery exams. This feature supports the patient's head while allowing free access to the patient's neck when scanning from the head of the table.



Fig. 14: Head rest angle can be adjusted for optimal patient positioning.

Two other features that add to the flexibility of an exam table are dual towers and a table length extender. Dual towers not only improve the stability of the table but allow for more options for table adjustability including trendelenburg and reverse trendelenburg. The table extender can be added when a patient's height exceeds the standard table length of 74 inches.



Fig. 15 Dual towers



Fig. 16 Table extender

When properly used, exam tables with ergonomic features allow the sonographer to position table and the patient as needed to avoid reaching and excessive arm abduction. The design of the ultrasound workstation equipment is an optimal control method for reducing exposure to injury-producing hazards. The goals of ergonomics are to match the job to the worker and to optimize work efficiency⁴. An ergonomically designed exam table, with options available to accommodate a variety of exam types, reduces awkward work postures and can reduce the time need to complete an ultrasound exam. Since the outcome for treatment for work-related musculoskeletal injuries is poor, it is important to address the prevention of these injuries through equipment design and sonographer education.

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