

# Equipment & Patient Management in Critical Care Environments

Donna Eichelberger, MSN, RN, CNOR



**The concept of an intensive care unit was first implemented by Florence Nightingale in the 1854 Crimean War, by confining severely injured soldiers to a designated area, so that nurses could regularly monitor them more closely<sup>i</sup>.** After World War II, mechanical ventilation and hemodialysis techniques were introduced and the ICU emerged. What began as the need to monitor patients and provide basic mechanical ventilation support, cardiac monitoring, and oxygen saturation in the 1950s evolved into a technological advanced unit with the ability to expeditiously provide support and resuscitative care.

Today's ICUs can be filled with sophisticated ventilators, cutting edge hemodynamic, pulmonary, and cerebral monitoring support devices, renal replacement therapeutics, and cardiovascular monitoring items, as well as, equipment needed for emergent tracheostomy.<sup>i</sup> Nationally, the number of patient ICU beds has increased 29% in the last decade while the ICU space for each bed has decreased 27.1 square feet per bed<sup>ii</sup>. The combination of increasing technology requirements with multiple advanced monitoring systems and a reduction of average ICU space heightens the need for an improved equipment management system. The HarmonyCARE Boom manufactured by STERIS Corporation (STERIS) addresses this need with pendants and shelving suspended from the ceiling which enable safe handling of the greater amount of equipment needed in the Critical Care space for the patient and staff.

Critical care patients have a 20-28% increased risk for developing an infection when compared to patients in non-critical care areas<sup>iii</sup>. Infections have a huge impact on both the patient and the hospital. Patients with infections have

increased morbidity and mortality rates, while hospitals may experience increased cost, treatments and infection control strategies. It's critical for patients to stay in an environment that reduces the number and spread of microorganisms.

Current guidelines, developed by collective experts from the Council of the Society of Critical Care Medicine (SCCM), recommend the implementation of a strategy to minimize potential pathogens and the risk for infections in the ICU environment<sup>iii</sup>. The SCCM guidelines suggest critical supplies should be immediately located within, or adjacent to each bed with adequate space for both clinical equipment and consumables.<sup>iii</sup> The SCCM guidelines also state that clutter should be avoided as this leads to the potential accumulation of dust that often carries Staphylococci.<sup>iii</sup> The Joint Commission on Accreditation of Healthcare Organizations (TJC) requires that floor space in an ICU adequately accommodate all the equipment and personnel needs with, at a minimum, 225 square feet of clear floor area for each space.

STERIS's top priority is safety: the HarmonyCARE Boom answers many of the design guidelines placed by SCCM and TJC by having supplies immediately located next to bed on the boom, shelving to hold equipment freeing up floor space, and decreasing clutter by having compact adjustable equipment columns instead of equipment in multiple areas.



## Delivering Our Surgical Expertise to This Equipment Intensive Space

STERIS is bringing their surgical suite expertise into the critical care space, with the understanding that this area has different needs and the focus is on patient care and management. STERIS listened to our customers' needs in this highly technical advanced care area, as the inspiration for the design of the HarmonyCARE Boom. Limited space, challenges accessing the patient, and thoughtful room designs were factored into creating the HarmonyCARE Boom.

STERIS understands patients in CCU are critically ill and need 24-7 monitoring, and the condition of the patient can rapidly change throughout the day. Rapid changes in a patient's condition make it extremely important to have equipment within easy reach and readily accessible. The STERIS HarmonyCARE Boom is a high capacity space saving boom that offers an all-in-one solution for electrical, medical gas, vacuum, critical supplies, and data connectivity while providing clear access to the patient's head. The HarmonyCARE Boom moves with the patient, allowing for staff access to the patient at 360 degrees. Improved maneuverability allows staff the ability to easily reposition the boom throughout the patient's room, increasing access to the head while decreasing the risk of tripping and disconnection hazards.

## Staff Safety

Studies have shown that nurses rank among the top 5 highest occupations at risk of job-related musculoskeletal injuries.<sup>iv</sup> It is estimated that nearly 40,000 nurses will report job-related back pain yearly.<sup>v</sup> Back injuries are multidimensional, with symptoms that reach farther than pain, affecting physical, emotional, psychological, social and financial areas for affected people.<sup>v</sup> Costs associated with on the job injuries continue to climb, with back injuries in nurses estimated to cost \$20 billion each year.<sup>v</sup> Having improper body mechanics, postures, reaching, extending, stretching and lifting incorrectly have been found to be a main reason behind muscle-skeletal injuries.<sup>v</sup>

STERIS's priority of safety reaches past the bed and encompasses the multi-disciplinary team caring for the patient. HarmonyCARE Booms can help reduce the risk of job-related back injuries. STERIS booms have working heights that accommodate nursing staff with accessories that assist with patient transfers. Easy access to equipment on the HarmonyCARE Boom decreases unnatural body positions that may occur when trying to stretch and reach headwall units. STERIS HarmonyCARE Booms are customizable for all design challenges, including low ceiling heights and low ceiling-mounted lift systems.

# Staff Efficiency

STERIS thoughtfully designed accessories and offerings that allow key tasks to be performed at the bedside. The HarmonyCARE Boom is designed to house, store and organize multiple critical supplies and equipment at the patient's bedside for easy access and increased efficiency. SCCM guidelines suggest work areas for medication preparation<sup>vi</sup>; to meet this need, STERIS offers retractable shelving integrated into the boom as a work space. Additionally, the boom can support multiple pumps including syringe, large volume, and PCA pumps and accessory poles designed to manage and organize IVs. The added mobility of the boom may reduce the risk of cables and IVs pulling out or becoming disconnected, as often experienced with head wall systems.

Custom designs, configurable from the top to the bottom, offer the ability for multiple booms with up to 10 gas outlets, 12 electrical outlets, and data ports for connectivity - each meeting the needs of high acuity patients requiring mechanical ventilation, bedside dialysis, ECMO (extracorporeal membrane oxygenation) and other critical patient needs.

# Patient/Family Experience

SCCM guidelines state comfort of the patient and the patient's family with an environment that reduces the patient's stress should be a part of the critical care space. The ability to accommodate family visits and visual effects such as color schemes or natural light should be included in the ICU<sup>vi</sup>.

STERIS HarmonyCARE Booms offer ambient lighting, providing low light for patient comfort, as well as a way for providers to perform routine tasks without disrupting patients. The HarmonyCARE Boom, with the ability to move with the patient, allows the room to become more family centric, repositioning the patient for multiple patient orientations that can

accommodate chairs for visitors, ease access to bathrooms, and improve the visualization of the nursing station.

Studies have shown proper design techniques often have a positive impact on both the patient and loved ones, with reports of patients feeling calmer and more relaxed with strong correlations to improved recovery process and effects on physiological parameters including heart rate and blood pressure.<sup>vi</sup> As the patient improves, the ICU boom is ready to get "on the go" with them. Patients can gain independence and stay connected with our boom that moves with them as they take on tasks of daily living.

# Liberating the Patient from the Wall

Intensive care consists of a multidisciplinary team of specialists dedicated broadly to the care and management of critically ill patients. Bed space needs to accommodate access from all sides of the patient for many inter-professional caretakers.<sup>viii</sup> The STERIS HarmonyCARE Boom was thoughtfully designed with surgical suite expertise along with clinical experts to meet their needs. The HarmonyCARE Boom is an all-in-one solution that offers high capacity booms to meet the needs of patients at any acuity level. Seconds matter in the ICU: STERIS booms provide quick, 360-degree access to the patient when the need arises.

The HarmonyCARE Boom makes patient mobility easy, liberating patients from "the wall", allowing multiple patient orientations and room for loved ones. The HarmonyCARE Booms are custom configured to meet your specific needs. Our consultative approach to equipment management continues from design to installation and beyond with ongoing service. Supplemental products can be added to further meet your unique needs, including exam lights, monitor supports, and IV transfer devices. The focus for STERIS is on the customer, beyond the bed, from reducing caretaker risk of injury to enhancing the environment and experience of the patient.

# References

Publication Title	Key Findings	Relevance to HarmonyCARE Boom
<sup>i</sup> Marshall, J. C., Bosco, L., Adhikari, N. K., Connolly, B., Diaz, J. V., Dorman, T., & ... Zimmerman, J. (2017). Clinical Potpourri: What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. <i>Journal Of Critical Care</i> , 37270-276. doi:10.1016/j.jcrc.2016.07.015	Physical space in an ICU, support and monitoring technology needed in the ICU	Design to house multiple pieces of equipment and supplies. Gain additional floor space in the ICU.
<sup>ii</sup> Rashid, M. (2014). Space Allocation in the award-winning adult ICUs of the last two decades (1993-2012): An exploratory study. <i>Health Environments Research &amp; Design Journal</i> , 7(2), 29-56.	Increase in number of ICU beds nationwide while decreasing ICU space per bed.	Increase needs to utilize space in ICU freeing up floor space.
<sup>iii</sup> O'Connell, N. H., Humphreys, H. (2000) Intensive care unit design and environmental factors in the acquisition of infection. <i>Journal of Hospital Infection</i> , 45: 255-262. doi:10.1053/jhin.2000.0768	ICU patients increased risk for infection. Design the ICU to minimize micro-organism in the ICU environment. Design guidelines from SCCM.	Streamlines equipment to the HarmonyCARE Boom, freeing up space Potential decreasing the number of pathogens.
<sup>iv</sup> Krupp, A., Anderson, B. (2014). Standardized use of safe patient handling equipment in the ICU: A unit-based quality improvement project. <i>Am J SPHM</i> , 4(4), 122-128	Critical Care nurses have a high rate of job related injuries.	Improve body mechanics potentially reducing risk of back injury.
Karahan, A., Bayraktar, N. (2002). Determination of the usage of body mechanics in clinical settings and the occurrence of low back pain in nurses. <i>International Journal of Nursing Studies</i> . 67-75. Doi10.1016/s0020-7489(03)00083-x	Critical Care nurses have a high rate of job related injuries.	Improve body mechanics potentially reducing risk of back injury.
<sup>v</sup> Kochitty, A., Devi, S. (2015). A study to assess the effectiveness of a self-instructional module on the knowledge and practice regarding proper body mechanics among the critical care nurses in selected hospitals of Pune. <i>Journal of Advanced Scientific Research</i> 6(4) 13-21	Critical Care nurses have a high rate of job related injuries.	Improve body mechanics potentially reducing risk of back injury.
<sup>vi</sup> Society of Critical Care Medicine. (1995). Guidelines for Intensive Care Unit Design. <i>Crit Care Medicine</i> 23(3): 582-588	Guidelines developed for ICU design.	Essential concepts and standards identified and implemented into the Boom design.
<sup>vii</sup> Olausson, S., Ekebergh, M., Lindahl, B. (2012). The ICU patient room: Views and meanings as experienced by the next of kin: A phenomenological hermeneutical study. <i>Intensive and Critical Care Nursing</i> 28: 176-184. Doi:10.1016/j.iccn.2011.12.003	End users' perceptions and experiences and the affect ICU design interplays on the patient.	End user elements identified to improve experience of patients while in an ICU.
<sup>viii</sup> Marshall, J., Bosco, L., Adhikari, N., Connolly, B., Diaz, J., Dorman, T., Fowler, R., Meyfroidt, G., Nakagawa, S., Pelosi, P., Vincent, J., Vollman, K., Zimmerman, J. (2017). What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. <i>Journal of Critical Care</i> . 37: 270-276. Doi. 10.1016/j.jcrc.2016.07.015	Definitions and classifications of ICU's	Advanced monitoring and technology needed to care for patients in the critical care setting.
Ferri, M., Zygun, D., Harrison, A., Stelfox, T. (2015). Evidence-based design in an intensive care unit: End-user perceptions. <i>BMC Anesthesiology</i> 15(57). Doi. 10.1186/12871-015-0038-4	End user perceptions and experiences in an ICU after using evidence-based design.	End user elements identified to improve experience of patients while in an ICU.

