Development of a Novel Integrated Portal and Draping System Using Intraoperative Simulation

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Background Introduction: National Guidelines and Databases have recently been developed to monitor hospital outcomes and care. One aspect of this oversight, Surgical Hospital Infections is a benchmark that most hospital QA measures are easily tracking. With this new benchmark, other parallel changes in surgical procedures such as the integration of Surgical Ultrasound and other useful electronic technology (Radioactive Marker Wands etc.) have been incorporated. All of these critical pieces of electronic technology mandate the problematic use of electrical tethers to supply electricity and directional activity from their CPU’s (Central Processing Units). This equipment has in the past required sterile sheathing that originates from the (CPU) and extends to the patient onto the operative field potentially contaminating the sterile surgical field. Our Institution and Inventors have Co- developed a novel design into the standard surgical draping systems such that common procedures may utilize this needed technology and route the non-sterile electronic tethers through the “portals” to maintain absolute surgical and procedural sterility. This concept to was carried out using benefits of medical simulation. This abstract identifies the methods used to improve design efficiencies prior to use on live patients.

Methods: True mocked-up Simulation of Mayo Clinic Cardiac Operating Rooms was configured. OR table, Simulated patient, Anesthesia workspace with Echo Machine (Sonosite Corp) and Anesthesia Machine (Draeger Corp.) and EMR (Cerner Corp). The Patient was draped in a sterile fashion with modified cardiac surgical draping system with novel portal integrated into the draping system. The Portal was folded and in retracted state ready for sterile deployment. The standard surface ultrasound probe with electronic tether was placed into the portal from the non-sterile side of the draping system(Anesthesiologist side) and introduced into the portal orifice. The probe was then dressed for common use by the surgical team (sterile) and extended for measurement relative to the anatomic surgical position. Length from the sternum to ankle was determined. Probe retraction and re-use was determined as were position to surgical field when NOT in use. Speed and efficiency of usage was appreciated as were locations of the portal

Results: The Simulation of the operating room proved invaluable to the design and usage of this new draping system. Location of the portal design, length of the electrical tether and total sterility of the process was appreciated. The novel design of this technology portal appears to enhance sterility of the surgical field when tethered electronic surface ultrasound probes are utilized during cardiac surgery as would be used in Epi-aortic scanning, or imaging of anatomic structures from thorax to lower extremity. The mock drape setup Increased rate of deployment
of the device. Re-usability throughout the procedure was unique with full maintenance of the sterile field.

**Conclusion:** Our data simulation demonstrates that novel innovation design plus realistic simulation can rapidly move the process of product refinement to a heightened level. New questions arise and earlier issues are efficiently answered through this simulation. Realistic simulation is important not just for training and safety drills but rapid development of intellectual property.

Surgical team orientation with proper instrumentation and orientation for Simulation.