UNIVERSITY OF SOUTH DAKOTA

Mobile Simulation Unit

Design Process

Overview:

Through funding from the American Recovery and Reinvestment Act of 2009, the University of South Dakota (USD) Distance Nursing Program designed a mobile simulation unit (MSU) featuring cutting-edge technology. The USD Nursing Simulation Unit is a 38-foot long, 25,000 pound vehicle featuring training technology such as mannequins that can imitate human heart beats, breathing, coughs, blinking eyes and human voices. In addition to the mannequins and top-notch medical equipment all of the technology used in a simulation center or smart classroom was installed; video recording devices in the patient care section and a flat screen viewing monitor in a multi-purpose debriefing room. The recording and viewing equipment allows training participants an opportunity to view a live feed of the simulation or review recordings to examine their performance and enhance learning. The USD Nursing Simulation Unit gives the benefits of simulation for participants completing clinical training in rural communities.



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Design Features

The following company was awarded the competitive bid to build the mobile simulation unit:

LaBoit Specialty Vehicles Inc. 700 Cross Point Road Gahanna, OH 43230

www.Laboit.com 1-800-776-9984

Vehicle:

- 2012 Ford F5DU Motorhome 252; gasoline powered engine, automatic transmission
- Two 7.0K Oman gas generators
- Rear view back-up camera –Zone Defense
- Leveling-stabilizing system – Quadra Bigfoot
- LP gas heater 30,000 BTU w-tank
- Three (3) roof mount air conditioners
- 2 inch thick acoustical foam ceiling (to absorb noise)

Multi-purpose Section: Eight (8) feet wide by sixteen (16) feet long

- Direct access from driving compartment to this section
- Seats 8-10 people (tables and chairs fold up and are secured when driving)
- Video camera mounted --Vaddio WallVIEW 70 PTZ
- Pressure sensitive microphone mounted from ceiling – SHURE CARDIOD MX202W/C
- Wiring of video and microphone feeds into control room
- Intercom system between this room and the control room
- Installed hand washing sink with storage cabinet

Control Room: Five (5) feet wide by eight (8) feet long

- Counter at seat height with space for two swivel chairs
- Control rack with 6 miniature video monitors –Vaddio PreVIEW Rack Console
- Storage drawers and cabinets
- Accordion folding door to access patient section and multi-purpose section.

Patient Care Section: Eight (8) feet wide by ten (10) feet long

- 36-40 inch wide door (in order to move stretcher and equipment storage carts in and out)
- Floor mounts to secure one stretcher-like bed
- Head wall above stretcher bed (mock oxygen supply valve, mock vacuum-suction valve, nurse call button, plug ins for mounted cardiac and vital signs monitor, manual blood pressure cuff)
- Head of Bed and Foot of Bed mounted video cameras -- Vaddio WallVIEW 70 PTZ
- Pressure sensitive microphone mounted from ceiling – SHURE CARDIOD MX202W/C
- Wiring of video and microphone feeds into control room
- Intercom system between this room and the control room
- Installed hand washing sink with storage cabinet

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Timeline

August-November 2010

- Hired a renowned simulation expert as a consultant to help conduct focus group sessions for input into design features.
- Arranged meetings with key healthcare partners (sites where clinical training is conducted) , USD Sanford School of Medicine directors, USD School of Health Science Department Chairs and USD Department of Nursing faculty to obtain input into design features and use (functions) for a mobile simulation unit.
- Toured established simulation centers in Sioux Falls, SD and a mobile simulation unit that operates from the University of Iowa, Emergency Medicine Department.

January-February 2011

- Contacted builders or manufacturers of specialty vehicles, mobile medical clinics to obtain examples of models or designs.
- Consultant returns to help USD train a "Team of Simulation Champions" (nursing faculty) regarding best practices for conducting simulation training and use of video debriefing.
- Reviewed input from focus group and healthcare partner meetings and made decision for design specifications.

March 2011

- Basic Computer Assisted Design (CAD) completed and design team establishes specification details for the USD Nursing Simulation Unit.
- Approval process for Department of Labor purchase authorization completed.

April 2011

- Prepared for competitive bidding process according to federal and state of South Dakota procedures.
- "Team of Simulation Champions" nursing faculty completes emersion training sessions at the University of Utah Health Professions Simulation Learning Center.
- Standards and guidelines for simulation training scenarios are developed.

June 2011

- Submitted bids for building MSU are reviewed and decision on award completed.

July-September 2011

- Worked with engineers at LaBoit Inc. to enhance and finalize CAD or floor plan.
- Stripped down Ford Motor Home chassis ordered (12 week manufacturing & delivery lag).
- Worked with USD Creative Services to design graphics to be applied to exterior sides of MSU.
- Worked with USD Information Technology Department to design plan for installation of video cameras, microphones, recording equipment and wiring.

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Mobile Simulation Unit

TimeLine

October-December 2011

- Ford Motorhome Chassis arrives at LaBoit—manufacturing of exterior and interior of the USD Nursing Simulation Unit begins.
- At least weekly communication with LaBoit general manager regarding specifications, and processing of change requests.
- Ordered medical training devices and supplies for MSU.
- Finalized plans for installing video cameras and recording devices.
- Traveled to Gahanna Ohio, LaBoit Inc. facility to do walk-through inspection before final work completed.
- December 27, 2011 The MSU is delivered to USD!

January 2012

- Video cameras and recording equipment installed and tested.
- Installed outdoor access to electrical power, for when unit is parked.
- USD Nursing faculty and staff completed training on how to run equipment.
- Arranged for insurance coverage, title registration and license plates.
- Arranged for a state approved fuel credit card.
- Contracted with a charter service to provide qualified drivers.
- Contracted with a local service for routine maintenance (oil changes, propane etc.)
- Prepared press releases.
- Planned and coordinated simulation training sessions at rural locations for the entire semester.
- January 24th, 2012—the USD Nursing Simulation Unit left on the first trip to conduct simulation training at a clinical site in Waconia, MN

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Lessons We Learned

#1 The video recording equipment is simple to use and we are very pleased with the high definition quality and sound during live feed and during recordings. The training participants take their conduct and performance more seriously when they know they are recorded. (Consents to video tape are obtained at the start of each training session and the video recordings are erased within 72 hours after training is completed).

#2 More space was created by reducing pre-installed cabinets and other storage. Instead we use 3 foot tall, 3 drawer steel storage carts on wheels that can be loaded on and off the MSU and restocked from our home base. We would advise anyone considering our design to include a pull out loading ramp or install a hydraulic lift device to make it easier to move equipment on and off the MSU. We eliminated those devices to reduce costs and now regret it!

#3 Consider where such a large vehicle could be parked or stored when not in use. We have no garage facilities large enough. So the MSU is always parked outdoors. Medical equipment and training mannequins are very sensitive to extremes in temperatures and any fluids will freeze during the winter months! Outdoor electrical outlets (50amp) had to be installed on the exterior of the building nearest our parking space in order to supply power to keep electrical water tank heaters running.

#4 We assumed many of our rural clinical facilities that we travel to would have exterior electrical outlets, this was not the case. This created problems with travel in the summer months of July and August when temperatures in the great plains states were consistently at 100 degrees F or higher. So when the gas generators could not supply enough electrical power to run the roof top air conditioners at high settings, we had difficulties connecting to an electrical power supply!

#5 Research travel routes in advance, especially in rural areas to make sure there are no weight or height restrictions for any bridges or overpasses. Keep a list of road side assistance phone numbers for each region of travel handy!

#6 We requested a gasoline powered engine to save fuel costs, but the drivers all commented that a diesel rear driven engine would make it easier to drive.

#7 Keep a detailed travel and maintenance log-it helps track and predict future operational costs. The average mileage per gallon gasoline is 6.5mpg!