

**A Multidisciplinary Simulator-Based Approach for Teaching and Learning Central Venous Catheter (CVC) Insertion
Academic Technology Final Report
June 30, 2008**

1. Original objectives and strategies including revisions:

The goal of the Simulation Based Teaching and Learning Central Venous Catheter (CVC) Insertion pilot project is to have medical students, residents, and nurse practitioner students learn about and practice central venous catheter insertion. This project uses a blended learning model with learners completing an online learning module followed by a hands-on, face-to-face small group session lead by faculty in the University of Massachusetts Medical School (UMMS) Simulation Center with the CVC task trainers. Learners will be able to practice the technical skill of CVC insertion in the safe simulated environment of the UMMS Simulation Center. At the completion of this hands-on session, their final attempt of CVC insertion will be assessed by faculty utilizing the CVC Objectives Structured Assessment of Technical Skills (OSATS), which was developed for this project. This project experienced some delay due to the development and implementation of new standards regarding CVC insertion within UMassMemorial Medical Center. As a result of this delay the decision was made by the project team to modify this project and not to have separate control and experimental groups of learners but rather to have learners serve as their own historical controls. Additionally, because of this delay it was no longer feasible to have a Post Simulation Assessment utilizing the CVC OSATS with live patients.

Since the New England Journal of Medicine (NEJM) recently made videos of the subclavian and internal jugular approaches for CVC insertion available online and we received permission to use the link to these videos within the newly developed Vista 4 based online learning module it was decided not to produce our own instructional video regarding CVC insertion. We elected to develop short video segments and photos to be used in conjunction with the NEJM as part of the online learning module.

With the elimination of the Post Simulation Assessment noted above, additional groups of learners (3rd year medical students, and Post Graduate Year (PGY)-1 surgical residents) were able to be included in this project.

2. Activities

- Development of a BLS Vista 4 online learning module for CVC insertion. The online module included CVC knowledge pre/post tests, information regarding indications for central line insertion, potential complications and documentation of the procedure. The online module also included video demonstration of anatomical landmarks, contents of the CVC kit and links to New England Journal of Medicine videos for subclavian and internal jugular CVC insertion.
- Three groups of learners were recruited to participate in this pilot project; Graduate School of Nursing acute care nurse practitioner students, PGY-2 surgical residents and third year medical students.
- Learners and faculty reviewed the BLS Vista 4 online learning module for CVC insertion within 5 days prior to the hands-on session for CVC insertion in the UMMS Simulation

Center. As part of the online learning module learners completed a knowledge pretest as well.

- During the two hour face-to-face, hands-on Simulation Center sessions learners reviewed the pertinent anatomical relationships with Varian technology (3D imaging of structures and vasculature of the neck and chest) and worked in pairs with surgical and anesthesia faculty to practice the technique of CVC insertion using both the subclavian and internal jugular approaches.
- At the conclusion of the Simulation Center session the technical skill of CVC insertion for each learner was evaluated by the above-noted faculty using the CVC OSATS.
- All learners and faculty completed an evaluation regarding the online learning module for CVC Insertion and the Simulation Center session
- A debriefing luncheon was held with the CVC project team and participating faculty to obtain further input and recommendations for improvements in the online module and Simulation Center sessions.

3. Deliverables

- BLS Vista 4 online learning module for CVC insertion including video demonstration and linked to NEJM videos
- CVC knowledge pre/post test
- CVC OSATS

4: Assessment:

A total of 19 learners and 6 faculty participated in the CVC Insertion Project. The learners included 6 acute care nurse practitioner students, 8 third year medical students and 5 surgical residents (3 PGY1 and 2 PGY2).

Results of Learner Evaluations:

All learner respondents agreed/strongly agreed that the online module was presented in a way that provided learners with a foundation of knowledge and skills of CVC insertion and that the online module effectively provided information about CVC insertion needed for the simulation experience, increased knowledge regarding indications, contraindications, preparation and basic steps of CVC insertion.

All learners felt that the online module increased their confidence and comfort level for CVC insertion and that the simulation experience occurred in a way that helped them integrate and apply knowledge learned during the online module. All learners felt that the simulation experience increased their confidence to some extent/great extent in performing CVC insertion.

Results of Faculty Evaluations:

All faculty agreed/strongly agreed that the online module was presented in a way that provided learners with a foundation of knowledge and skills of CVC insertion and that the online module effectively provided information to learners about CVC insertion needed for the simulation experience. All faculty agreed/strongly agreed that the simulation experience occurred in a way that helped learners integrate and apply knowledge learned during the online module.

Analysis of the results of learners pre/post knowledge tests and the simulation OSATS has not been completed.

5. Issues and further questions raised by your work:

As it was not feasible to include a Post Simulation Assessment as part of this project due to the development and implementation of new standards regarding CVC insertion within UMass Memorial Medical Center, it is not clear whether the technical skills obtained by subjects through this blended approach, which included a simulated experience, correlates with the application of these skills in a live experience with patients.

6. Disposition of funds:

CVC Insertion Grant Expenditures

Item	Cost	Notes
Central Line Kits	\$773.80	53 kits
Lubricant	\$5.65	For Ultrasound Use
Ultrasound Blocks and replacements and repair product	\$1500.46	
Central Venous Catheter Insertion Simulators	\$2,800.00	
Freight	\$216.00	
Sub Total	\$5,307.91	
<i>Costs of filming, photography, IT work</i>	<i>\$2,760.00</i>	
Total	\$8,067.91	

Expenses above the amount of the award were provided by the UMMS Simulation Center.

7. Additional comments:

None

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