The Development and Implementation of a Curriculum using Simulation to Teach Interns Basic Invasive Clinical Skills

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ABSTRACT

INTRODUCTION

The ACGME requires that all residents are competent in performing basic invasive clinical procedures. Although simulation models have been used in other programs to teach these skills to interns with the intent to provide training and skills attainment before learning and performing on real patients, a large scale, mandatory simulation training, in which every incoming intern must satisfactorily complete training in a simulation center, prior to starting their intern year, has yet to be described. We describe such a curricular intervention produced in our Simulation Center.

METHODS

A half-day, intensive curricular intervention for teaching the commonly performed invasive procedures was developed and implemented at the University Clinical Skills and Simulation Center (UCSSC). This was a program which every incoming intern had to satisfactorily complete during their orientation period. Interns from every residency program were involved. Faculty were likewise recruited from every residency program. Ten invasive and two non-invasive skills were taught using standardized checklists developed by the faculty. The faculty taught the skills and then directly observed each intern perform each skill on low fidelity models, using the standardized checklist. If the intern did not satisfactorily complete the individual procedure, remediation was provided. The procedures included internal jugular line placement with ultrasound guidance, subclavian line placement, femoral line placement, urinary bladder catheterization, nasogastric tube placement, simple suture placement, lumbar puncture, thoracentesis, intravenous catheter placement, arterial line placement, sterile gowning and gloving and handwashing. Completed checklists were signed by faculty and sent to the program directors.

RESULTS

In June 2009, 127 interns at Thomas Jefferson University Hospital received this training program in the UCSSC. Interns were from the Departments of psychiatry, pediatrics, emergency medicine, orthopedics, otolaryngology, neurosurgery, general surgery, family medicine, OB/GYN and internal medicine. All interns received hands-on skills instruction to perform the individual procedures on a low fidelity model. Every intern successfully completed the training for each procedure. All interns completed a evaluation of the progarm answering questions graded by a Likert-type scale (1: Strongly disagree, 5: Strongly agree). The interns indicated that they had increased confidence in their skills (4.68) and that the overall assessment of the program was excellent (4.60).

DISCUSSION/CONCLUSIONS

We describe a standardized, reproducible, required skills attainment program for interns to learn common invasive procedures before beginning their intern year. Although logistically challenging, this intervention was smoothly produced and well received by the interns. Although their self-reported confidence improved, we will need to assess if indeed this program improves patient safety and quality in clinical care. We are currently developing a mechanism to study such outcomes.

METHODS

Every incoming intern (n = 127) to TJUH was required to attend and complete this curriculum during their orientation week in June, 2009. All interns were emailed instructions prior to their arrival on campus on preparing for the session. They were instructed on watching the appropriate New England Journal of Medicine procedural videos with emphasis on the procedures felt most critical for them per a survey of their program directors.

The intern class was divided into 5 groups of no more than 40 learners each. The number varied daily depending on scheduling availability and was mixed as far as home department. The teaching faculty was obtained from the core faculty of the UCSSC (n = 5) and faculty champions from each of the residency programs (n = 15). Prior to the sessions, there were one hour long faculty development training sessions for the faculty involved.

The design of the half day intern sessions is outlined in **Table 1**. The learners rotated in a round-robin manner until all stations were completed. Suturing and knot tying were done concurrently during any down time and after the main sessions.

The checklists developed for each of the procedures entail a specific set of step-wise items and cover the most important steps in performing the technical procedural on a model or a patient. After the intervention, the learner is observed doing the procedure using equipment that is specific to the hospital on a plastic model, by a faculty member and must satisfactorily perform each step on the checklist. The faculty then signs that the learner has, "successfully completed simulation training" for that procedure. If the learner did not satisfactorily complete the checklist, she/he received further focused teaching and then repeated the procedure. After the conclusion of these sessions, thee completed checklists were then forwarded to the learner's program director. At the end of half-day session, a survey was completed by the learners regarding aspects of the sessions. The learner used a Likert scale in which 1 is strongly disagree, 3 is neutral, 5 is "strongly agree".

Statistical analysis: means of the survey questions were calculated and are presented in **Table 2**.

Table 1: Curricular Outline of the Program

Component	Number of faculty and learners	Duration*
1. Introduction	**Entire group(up to 40 interns)**	**30 minutes**
▪ Hand washing video ▪ Didactic information		
2. Small groups	**1 faculty, 2-3learners**	**2 hours (15minutes per skill)**
▪ Thoracentesis ▪ Suturing/wound closure ▪ Urinary bladder catheterization ▪ Nasogastric intubation ▪ Radial arterial line placement ▪ Intravenous line placement ▪ Lumbar puncture ▪ Sterile gowning and gloving		
Large groups	**2 faculty per station, 6-7 learners**	**1.5 hours (30 minutes per skill)**
▪ IJ insertion with US ▪ Subclavian vein cannulation ▪ Femoral vein cannulation		
Discussion		
▪ Post intervention evaluation		

*Includes time for movement between rooms

Outline of activities, duration, numbers of faculty and learners

Table 2: Evaluation of Invasive Skills Attainment Simulation Sessions

N = 125 interns

1: strongly disagree, 3 neutral, 5: strongly agree

	Mean	Range
Overall program	**4.60**	
Program aspects		
Content appropriate:	4.6	(3 to 5)
Applicability:	4.7	(4 to 5)
Clarity of teaching:	4.4	(3 to 5)
Goals achieved:	4.4	(3 to 5)
Program well coordinated:	4.5	(3 to 5)
Teaching tools		
Video from NEJM:	4.1	(2 to 5)
Simulation models	4.6	(3 to 5)
Self reported aspects		
Improvement in my skills:	4.4	(3 to 5)
Confidence in my skills:	4.4	(3 to 5)

Results of surveys filled out immediately after the activity

RESULTS

Over a 3 day period in June, 2009 127 interns completed the invasive skills attainment sessions. The intern profile of programs included: 12 Interns from Emergency Medicine, 9 interns from Family Medicine, 48 from Internal Medicine, 3 from Neurosurgery, 8 from Obstetrics and Gynecology, 6 from orthopedic surgery, 4 from otolaryngology, 24 from Pediatrics and Med/Peds, 6 from Psychiatry and 10 from General Surgery, including Urology. All interns successfully completed the simulation training for each procedure and were observed by a faculty using the standardized checklist.

Completed post-session surveys were obtained from 125 of 127 participants. **Table 2** presents the results in detail.

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