

Assessment of Medical Student Performance in Discussing Central Venous Line Placement under Ultrasound Guidance with a Standardized Patient



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Background – Ultrasound in Medical Education

- Expansion of hands-on learning, simulation in education
- Using ultrasound (US) as an adjunct to physical exam skills has been shown to be an acquirable skill for medical students
 - Afonso, et al. (JGIM 2010) demonstrated second year medical students most successful in imaging internal jugular vein after instruction
- Ultrasound technology as part of some residency training programs

Background - Ultrasound in Patient Care



- Ultrasound use supported in many clinical practice guidelines
- Ultrasound guidance for central venous line (CVL) placement one of the top innovations in patient safety recommended by AHRQ
 - Iatrogenic complication rate 6.3-11.8%
 - Based on small study of 4th year medical students demonstrating benefit for US guidance during CVL placement, NNT to prevent 1 arterial stick is 2

Background – Education on Informed Consent



- Ethics, core element of overall clinical competence and amenable to performance-based evaluation
- Informed consent one of most common ethical themes confronting medical students
 - Essential skill in Internal Medicine
 - No consistent education / evaluation of skills across medical student and resident training
- Small studies of medical student OSCE (objective structured clinical exam) in obtaining informed consent for surgical procedures and HIV testing have encouraging results



Objectives

- To develop an end-of-clerkship OSCE to evaluate skills in ultrasonography as relevant to guiding placement of a central venous catheter
- To concurrently assess skills in fully informing a patient about a necessary clinical procedure

Ultrasound in the M3 IM Clerkship



- Taught to use ultrasound as an adjunct to history and physical exam
- Thyroid ultrasound
 - Lecture (1 hour) – Use of ultrasound in thyroid pathology (Endocrine faculty)
 - Hands-on workshop (1 hour)
- Central venous line placement, internal jugular
 - Simulation workshop (3 hours)
 - Blue Phantom™ models
 - Use with residents and faculty in clinical situations



Skills from M1-M2 Years

- Experience from the preclinical years that students bring to the clerkship
 - Ultrasound physics and use of the machine
 - Imaging of
 - RUQ – Kidney, Liver, Diaphragm, M. pouch
 - Bladder
 - LUQ – Kidney, Spleen
 - Neck – IJ, Carotid, Thyroid
 - Heart – Parasternal long axis view – LA, LV, MV

Ultrasound – Assessment of skills



- OSCE (Objective Structured Clinical Exam) is standard testing format with standardized patients, M1-M4
 - designed to test clinical skill performance
- Must demonstrate
 - Understanding of technology
 - Ability to acquire images
 - Knowledge of clinical scenario
 - Ability to interpret findings in context of patient history and physical exam
 - Ability to use findings appropriately in patient care plan

Central Venous Line Placement OSCE



- 2008 – 2009 - Demonstration of placement technique with model
 - Written tasks – questions to demonstrate knowledge of central line placement
- 2009 – present - Standardized patient encounter
 - Sepsis – with focused history and physical exam
 - Discussion of procedure with patient
 - Obtain informed consent
 - Identify landmarks and vessels with ultrasound guidance
 - Written clinical tasks

Methods



- All M3 students since 2009 completed 1 of 2 ultrasound OSCE stations
 - Administered at end of 8 week clerkship
 - Standardized patient evaluation of clinical competence in history-taking, PE, professionalism
 - Faculty evaluation of competence in ultrasonography
- All receive simulation training in ultrasound-guided right IJ CVL placement
- Descriptive statistics of cumulative student performance measured



Results

- N = 47 (average 8-12 students per rotation)
- 96% appropriately examined patient
- 100% mentioned need for CVL; only 53% mentioned hospital admission
- 100% correctly identified vessels
- 74% standardized patients felt adequately informed
 - 85% failed to mention post-procedure chest Xray, most frequent omission

Technical Competency in Ultrasound Skills



- 94% correctly oriented probe marker for procedure (opposite of convention)
- 100% were able to freeze an image with 94% then able to measure the carotid artery in 2 dimensions
 - 77% asked for Valsalva, but not always needed
- 96% were then able to save that image

Sample Image



Professionalism in the Encounter



- 100% introduced themselves and their student role
- 98% considered attentive to patient needs and modesty
- 100% solicited patient questions during the encounter

Limitations

- Small, single institution study
- Descriptive analysis only
 - Future analysis – correlation between overall performance on OSCE and competence / confidence in ultrasonography
- Since 2011, additional lecture hour in informed consent added to curriculum
 - Data not included in this analysis

Conclusions

- Ultrasound knowledge acquisition and technical skill can be assessed using OSCE
- Procedure OSCE allows for assessment of ability to appropriately discuss procedures with patients
 - Necessary skill, rarely taught, less frequently assessed



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