Interdisciplinary Development of an Adult Intubation Procedural Checklist

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BACKGROUND AND OBJECTIVES: There are multiple procedural skills common to all residency programs. This study had two main objectives: (1) Use an interdisciplinary team to develop a procedural competency checklist for adult endotracheal intubation that could be shared across specialty programs and levels of training and (2) Evaluate the validity and reliability of the checklist.

METHODS: Clinical faculty from the institutional residency programs for family medicine, emergency medicine, obstetrics, and the simulation laboratory developed the initial checklist. Face validity and content validity of the checklist was established using literature review, expert opinion, and Lawshe’s Content Validity Ratio. A training DVD was produced to standardize teaching and evaluation use of the checklist. Four teams of two physician raters representing a mix of specialty (family medicine, emergency medicine, obstetrics) and skill levels (clinical faculty and residents) were used to test inter-rater reliability of the checklist.

RESULTS: A convenience sample of 35 residents from family medicine, emergency medicine, and obstetrics participated. Bland and Altman’s method for measuring differences between raters was used to test inter-rater reliability. No differences were found between raters based on specialty area or level of training.

CONCLUSIONS: Procedural skills common to multiple specialty residency programs can be taught and evaluated across residency programs when a standardized training program and checklist is used. Resources could be maximized by offering training and evaluation sessions across resident specialty programs that are cooperatively staffed by evaluators of different levels of training and specialty backgrounds.

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In 2006, a seventh competency, Procedural Competence, was proposed for the Accreditation Council for Graduate Medical Education (ACGME) competencies that would focus on technical expertise.1 Mercy St. Vincent Medical Center’s Simulation Training Center provided the opportunity for an interdisciplinary research project to develop standardized educational modules and procedural checklists for adult endotracheal intubation and other procedures.2-5 Of significance, Friedlich et al reported poor inter-rater reliability between physicians of different specialties evaluating residents of different specialties performing minor office surgical procedures.6 No studies testing inter-rater reliability across levels of training (faculty and residents) and across specialty programs during the development of a skills checklist was found.

METHODS
This was a descriptive study to establish validity and reliability of a procedural checklist for uncomplicated adult intubation in a simulated setting. There were two phases: (1) establish validity of the checklist and (2) test inter-rater reliability across specialty areas and levels of training.

Institutional IRB approval was obtained. A literature search was completed to compile a pool of items representing the complete range of steps needed to accomplish adult intubation. Investigators grouped similar concepts and then condensed them into concise steps. Items were ordered according to evidence-based consensus from initial to end tasks. The checklist was sent to 40 board-certified physicians in emergency medicine.

From Mercy St. Vincent Medical Center, Mercy Family Medicine Residency Program, Toledo, OH.
FAMILY MEDICINE

Across individual raters, the average median score of completed steps was 19 out of 26 (73%). Disagreement between raters in total scores ranged from one to three steps. Across teams, the average median number of completed steps raters agreed on was 22 out of 26 (85%). Confidence intervals within teams overlapped, providing support for no difference between raters by specialty or level of training.

Discussion
Establishment of validity beyond face validity is frequently not done. We found comprehensive content validity testing using literature review and Lawshe’s Content Validity Ratio to be a useful process. The qualitative comments received from the expert panel provided a wealth of rationale and key teaching points for each step and was of great value to investigators in revising the final checklist.

A major challenge for simulation training is limited availability of qualified faculty. Unlike Friedlich’s study, we did not find a difference between evaluators of different medical specialties and no differences across levels of training between faculty and resident physicians. By demonstrating high inter-rater reliability scores across all groups, we hope to develop interdisciplinary training and evaluation sessions, increasing utilization and availability of the simulation lab to a larger pool of participants. All of the simulation curriculum tools developed by family medicine and this research group have been posted to the internal simulation Web site for use by anyone within the institution.

Our greatest obstacle was trying to coordinate faculty and resident schedules from three different residency programs. A minimum of 8–12 weeks notice was needed to plan any group activities. Study limitations included small sample size and using co-investigators as raters. The study would have been strengthened if each participant had been videotaped, allowing all eight investigators to observe identical skill performances and viewing angles.

Interestingly, the greatest weakness was one we had not expected. Participants and raters were told no feedback would be given, and raters were not allowed to answer questions. This was a deliberate decision to avoid influencing raters on how they were grading skill performances. During the check-out process, many of the participants expressed disappointment about not being able to ask questions or review their checklists. The raters found it frustrating to not be able to offer key teaching points and provide feedback. Both sides felt this was a lost opportunity for learning. For future projects, a debriefing/teaching session should be offered to participants immediately after testing.

Conclusions
Endotracheal intubation was the first of five shared procedural skills identified by the interdisciplinary focus group. This study suggests procedural skills common to multiple specialty residency programs can be taught and evaluated across programs and levels of training when a standardized training program and checklist are used. Using common assessment tools provides an opportunity for institutions to benchmark competency performance individually and by program and aggregate performance data for multiple residency programs within the institution. We would welcome the opportunity to work with any outside residency program interested in replicating this study.

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