The Development of a Comprehensive School-Wide Simulation-Based Procedural Skills Curriculum for Medical Students

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OBJECTIVE: The purpose of this project was to assess the effectiveness of using the Delphi process to create a structured simulation-based procedural skills curriculum for all students at the Keck School of Medicine of the University of Southern California (KSOM).

METHODS: The Delphi process was used to develop a list of procedural skills that students are expected to perform competently prior to graduation. Once consensus of faculty was reached, a needs assessment was performed to poll graduating seniors' experience performing each skill. A comprehensive simulation-based curriculum was developed and implemented for all Year II students at KSOM. Student satisfaction with the curriculum was collected using a standardized end-of-session evaluation form and student self confidence was assessed using a retrospective pre- and post-self-efficacy rating for each skill.

RESULTS: The needs assessment clearly established the need for a more organized approach to teaching procedural skills at KSOM. Quantitative and qualitative data revealed that students responded favorably to the curriculum and appreciated the efforts put forth by KSOM. Student self-efficacy increased significantly for each skill.

CONCLUSIONS: The Delphi process was effective in reaching consensus among educational leaders at KSOM regarding which skills to include in the curriculum. Although there were a few minor challenges, we determined that it is feasible to develop and implement an explicit school-wide simulated-based procedural skills curriculum. (J Surg 67:309-315. © 2010 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: curriculum development, Delphi process, procedural skills, medical education

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INTRODUCTION

Essential to the practice of medicine is the ability to perform clinical procedural skills in a safe manner. Although many schools make the assumption that core procedural skills are being taught and assessed adequately, several studies have raised doubts about residents' preparedness in this area[1-6] and there is concern about the variation, standards, and appropriateness of the skills of new graduates as they enter their internship year.[7-10]

Although concerns for patient safety have challenged the traditional "see-1-do-1-teach-1" apprenticeship model for teaching, many schools continue to rely on this opportune approach to learn and practice essential procedural skills during the clerkships. Usually students receive a global assessment of performance, rather than a formal assessment on each skill with individualized feedback. This method of assessment is widely variable and critically dependent on the supervising physician. In addition, physicians today are faced with increased demands on their time and pressure to perform more procedures in a cost effective manner. This is compounded by the fact that there are fewer hospitalized patients available for teaching and mandated work hour restrictions for trainees. Thus, faculty members are finding less time to teach and assess technical skills. These reasons, along with the ethics involved with practicing on real patients, have all contributed to the need to rethink the traditional ways of teaching requisite skills to students.

Simulation centers have emerged over the past decade and offer a solution to many of the problems outlined above. They provide students with a dedicated place to learn and practice skills in a structured, stress-free environment without putting patients at risk. Using simulation allows the student to go at his or her own pace, stop at a critical moment to ask questions, repeat the procedure as necessary, gain feedback from the instructor, function independently, and reach the plateau phase

of the learning curve more quickly.[11] The most important element of any simulation center is a comprehensive curriculum. However, a survey of 60 medical schools[12] showed that very few schools had organized curricula for teaching and assessing procedural skills.

In 2003 the Association of American Medical Colleges (AAMC) established the Task Force on the Clinical Skills Education of Medical Students and released *Recommendations for Clinical Skills Curricula for Undergraduate Medical Education* in 2005.[13] The task force made several recommendations for skill development including that medical schools develop and make explicit a clinical skills curriculum and identify a specific set of skills, including procedural skills, to be learned prior to graduation. Several schools have responded to these recommendations and have made attempts to rectify the problem through the identification of core skills; however the majority of medical schools continue to rely on the apprenticeship model. Other schools have addressed this issue through the development of skills courses,[14-18] however these have been primarily elective courses in specific disciplines; none have been school-wide or mandated.

Recently there has been movement within the Association for Surgical Education, specifically the Committee on Simulation, to develop a national medical student skills curriculum. This proposed curriculum is intended to focus on skills relevant to the education of all medical students; not only those pursuing a career in surgery. This initiative is timely and correlates with the recommendations set forth by the AAMC.

The development of a comprehensive procedural skills curriculum may help to ensure that students are equipped with basic skills through a clearly defined and cohesive program and may reduce gaps and duplication in medical school curricula. Challenges to overcome in this endeavor are the ability to reach consensus among experts regarding which skills are essential for inclusion, agreement regarding the curricular modules, feasibility of implementation, and evaluation for all medical students at an institution.

Purpose

The purpose of this report is to describe our experience using a modified Delphi technique to create a structured simulation-based procedural skills curriculum for all students at the KSOM. Specific aims of this project included: (1) to reach consensus among the education leaders at KSOM as to which procedural skills are necessary for all students to master prior to graduation; (2) to develop and implement a structured procedural skills curriculum for all medical students at KSOM; (3) to assess the impact of the curriculum on medical students' self-efficacy for each skill; (4) to determine the feasibility of a competency-based evaluation system for all required skills; and (5) to evaluate the acceptability of a simulation-based procedural skills curriculum by medical students and faculty.

METHODS

Delphi Process

The Delphi process was initiated and managed by a core group of faculty and educational leaders at KSOM. The Delphi method was selected due to its iterative process of anonymous surveys and ability to obtain a consensus opinion among experts and/or individuals. The initial list of procedures was generated by utilizing brainstorming sessions and a review of all current literature and resources on skill development. The aim at this stage was to be comprehensive and inclusive. An initial list of 43 procedures was assembled and distributed to all of the educational leaders at KSOM, including Clerkship Directors, Department Chairs, Medical Student Educators, members of the Educational Policy Committee (EPC), and members of the Year I/II and Year III/IV curriculum committees (n = 25). All faculty members rated the importance of each skill on a 5-point Likert scale (from 1, not necessary to 5, definitely necessary). In addition, faculty were also asked to list any additional procedures that were felt to be important but omitted from the initial list. The forms were collected and tabulated and a revised list of skills was created. Feedback regarding each skill was also obtained from Year III and IV medical students. This list was used for the first iteration and distributed to the same groups with the same instructions. This process was repeated until consensus was reached. The final list of procedural skills was presented and approved by the EPC. This list is presented in Table 1.

Needs Assessment

Once consensus was reached regarding which skills were essential for inclusion, a needs assessment of graduating seniors (class

TABLE 1. List of Procedural Skills That Students Are Expected To Competently Perform Prior To Graduation

1. Arterial blood gas
2. Cervical collar placement
3. Dressing change
4. Electrocardiogram (performing)
5. Foley catheter insertion
6. Foley catheter removal
7. I&D of superficial abscess
8. Intravenous catheter placement
9. Intravenous catheter removal
10. Knot tying
11. Nasogastric tube placement
12. Nasogastric tube removal
13. Packing a wound
14. Papanicolaou smear
15. Staple insertion
16. Staple removal
17. Suture insertion (simple interrupted, simple continuous, subcuticular)
18. Suture removal
19. Vaginal wet mount
20. Venipuncture
21. Wound irrigation

I&D, incision and drainage.