

Outcomes of a proficiency-based skills curriculum at the beginning of the fourth year for senior medical students entering surgery

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Introduction. We hypothesized that a proficiency-based curriculum administered early in the fourth year to senior medical students (MS4) would achieve outcomes comparable to a similar program administered during surgical internship.

Methods. MS4 ($n = 18$) entering any surgical specialty enrolled in a proficiency-based skills curriculum at the beginning of the fourth year that included suturing/knot-tying, on-call problems, laparoscopic, and other skills (urinary catheter, sterile prep/drape, IV placement, informed consent, electro-surgical use). Assessment was at 4–12 weeks after training by a modified Objective Structured Assessment of Technical Skills (OSATS). Suturing and knot tying tasks were assessed by time and OSATS technical proficiency (TP) scores (1 [novice], 3 [proficient], 5 [expert]). Outcomes were compared with PGY-1 residents who received similar training at the beginning of internship and assessment 4–12 weeks later. Data are presented as mean values \pm standard deviation; statistical significance was assessed by Student's t test.

Results. Fifteen of 18 MS4 (83%) reached proficiency on all 15 tasks, and 2 others were proficient on all but 1 laparoscopic task. Compared with PGY-1s, MS4 were significantly faster for 3 of 5 suturing and tying tasks and total task time (547 ± 63 vs 637 ± 127 s; $P < .05$). Mean TP scores were similar for both groups (MS4, 3.4 ± 0.5 vs PGY-1, $3.1 \pm .57$; $P = NS$). MS4 OSATS scores were higher for IV placement, informed consent, and urinary catheter placement, but lower for prep and drape and for management of on-call problems.

Conclusion. MS4 who participate in a proficiency-based curriculum taught early in the fourth year are able to meet proficiency targets in a high percentage of cases. This approach should better prepare MS4 for surgical internship. (*Surgery* 2015;158:962-71.)

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VARIABILITY IN CLINICAL EXPOSURE, skills training, and medical school curricula may lead to interns with varying levels of competency in technical skills, clinical knowledge, and confidence. In response to Accreditation Council for Graduate Medical Education competency requirements,¹ many programs have instituted specialized curricula for interns at

the beginning of the year. These programs, often referred to as “boot camps,” have improved patient care by producing interns with better procedural, communication, and cognitive skills.^{2,3}

As simulation and proficiency-based training programs have become mainstays of surgical intern education, similar “boot camp” or internship preparation courses for fourth-year medical students (MS4) have been established by several institutions.⁴⁻¹⁰ Several studies have shown that matriculants of a fourth-year skills program were shown to have improved confidence and technical skills performance compared students who did not participate in such a course.⁶ In 2006, the senior author implemented an accelerated skills preparatory course for surgical internship in the spring of the fourth year that resulted in improved skills performance and a greater sense of preparedness

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for internship.¹¹ This program has subsequently led our institution to implement a Capstone internship preparation course in the spring that is now required of all MS4, regardless of planned specialty.

Our group has recently shown that implementation of a proficiency-based suturing and knot tying curriculum at the beginning of the fourth year resulted in improved skills performance and retention compared with students who underwent no training.⁷ We hypothesized that a broader, proficiency-based curriculum administered at the beginning of fourth year, when students could apply their skills on clinical subinternship rotations, would offer several advantages to skill development and would result in outcomes comparable with a similar program administered at the outset of surgical internship. The purpose of this study was to analyze outcomes of this program in MS4s and to compare their performance to that of postgraduate year 1 (PGY-1) surgical residents at 4–12 weeks of internship who underwent similar training and assessment.

METHODS

In June 2013, Washington University MS4 (Class of 2014) students entering any surgical specialty were invited to participate in a proficiency-based skills curriculum that was administered at the beginning of the fourth year (end of June to mid August). Recruitment was via an e-mail to the entire MS4 class. Informed consent was obtained under an institutional review board–approved protocol. Twenty MS4 were initially enrolled in the course. A group of PGY-1 surgery residents that included categorical general surgery ($n = 8$), plastic surgery ($n = 2$), urologic surgery ($n = 3$), and vascular surgery interns ($n = 1$) who completed a similar curriculum and assessment at the beginning of the prior academic year was used for comparison.

Curriculum. The proficiency-based skills curriculum is outlined in Table I. Because the students were on elective rotations during this time (eg, clinical subinternship rotations), the program was administered during once weekly 3-hour sessions over 6 weeks. The suturing and knot tying component of the curriculum has been previously described in detail.⁷ Each session consisted of a short didactic component followed by hands-on skills training or, in the case of the on-call problem session, small group case-based discussions. Students were given materials to practice for suturing and knot tying and were allowed access to the skills lab for practice of the other skills, such as laparoscopic skills. Students were also given goals and

Table I. Senior medical student curriculum tasks

Suture and knot tying tasks
Simple interrupted suture
Subcuticular suture
One hand tie
Two hand tie
Tie on pass
Laparoscopic skills
Camera navigation
Peg transfer
Bean drop*
Pattern cutting*
Sterile prep and drape
Informed consent
Peripheral IV insertion
Urinary catheter placement
Basic electrosurgical use*
On-call problem management
Hypotension
Tachycardia
Altered mental status
Dyspnea

*Tasks unique to the senior medical students curriculum, that is, not in postgraduate year 1 boot camp program.

Trainees were required to test on 2 of 4 on-call problem scenarios to pass this station.

proficiency targets for each of the tasks assessed. PGY-1 surgery residents underwent a similar curriculum during the Department of Surgery intern “boot camp” program at the outset of the internship year and were also given materials for independent practice of suturing and knot tying and had similar access to the skills lab for practice of laparoscopic and other skills training.

Some differences in the curriculum for the 2 groups were present. The MS4 curriculum included skills training and assessment on basic electrosurgical energy use and 2 laparoscopic tasks (pattern cutting and bean drop) that were not a part of the PGY-1 “boot camp” program. Conversely, the PGY-1 curriculum included assessment on plain film interpretation and central venous catheter placement that were not a part of the MS4 curriculum.

Assessment outcome measures. *Suturing and knot tying.* Time and an Objective Structured Assessment of Technical Skills (OSATS)–based technical proficiency (TP) score were used to assess suturing and knot tying performance for both groups as described previously.^{11–13} The time for each individual suture and knot tying task were recorded and a total task time (sum of 5 individual tasks) was generated. TP was evaluated through videotaped assessment using a dual-camera video capture system (Simbridge, B-Line Medical,

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