An Apprenticeship Rotation Teaches Chief Residents Nontechnical Skills and ACGME Core Competencies

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BACKGROUND: Traditionally, surgical training has used an apprenticeship model but has more recently moved to a service-based model, with groups of residents working with groups of attending surgeons. We developed an apprenticeship rotation to enhance one-on-one interaction between chief residents and selected faculty. We hypothesized that the apprenticeship rotation would be effective for teaching nontechnical skills (NTS) and core competencies.

MATERIALS AND METHODS: An apprenticeship rotation was created at a university-based surgery residency in which each chief resident selected a single attending surgeon with whom to work exclusively with for a 4-week period. Emphasis was placed on teaching intraoperative NTS as well as the 4 difficult-to-teach Accreditation Council for Graduate Medical Education core competencies (DCC): Interpersonal and Communication Skills, Practice-Based Learning and Improvement, Professionalism, and Systems-Based Practice. Participants were surveyed afterwards about their rotation using a 5-point Likert scale. A Wilcoxon signed rank test was used to compare differences depending on data distribution.

RESULTS: All (13/13) the chief residents and 67% (8/12) faculty completed the survey. Overall, 85% of residents and 87.5% of faculty would recommend the rotation to other residents/faculty members. Both residents and faculty reported improvement in trainees' technical skills and NTS. Residents reported improvement in all 4 DCC, particularly, Practice-Based Learning and Improvement, Professionalism, and Interpersonal and Communication Skills.

CONCLUSION: The apprenticeship rotation is an effective means of teaching residents both NTS and DCC essential for independent practice. Consideration should be given to introducing this program into surgical curricula nationally. (J Surg Ed 72:1095-1101. © 2015 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: apprenticeship model, surgical education, nontechnical skills, technical skills, core competencies

COMPETENCIES: Professionalism, Interpersonal and Communication Skills, Systems-Based Practice, Practice-Based Learning and Improvement

INTRODUCTION

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) introduced the 6 core competencies —Patient Care (PC), Medical Knowledge (MK), Interpersonal and Communication Skills (ICS), Professionalism (Prof), Practice-based Learning and Improvement (PBLI), and Systems-based Practice (SBP)—with the expectation that residency programs would direct their curricula to development of these skills.[1,2] In the decade since, the term "nontechnical skills" (NTS) has become common parlance in surgical education to cover the range of cognitive and social skills such as leadership, teamwork, decision making, and situation awareness. These skills have been found to be positively associated with reductions in adverse events.[3] NTS assessment tools have subsequently been developed for surgeons, focusing on trainable behaviors in the operating.[4-6] Despite the introduction of educational frameworks, 4 of the clinical core competencies, including ICS, Prof, PBLI, and SBP, along with NTS, have proven difficult to embed in surgical training.[7-11] Several studies[7,8] indicate that surgical residents receive varied levels of training in the 6 core competencies with more emphasis placed on the easier to teach competencies of PC and MK in the operating room

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and other areas of clinical practice. To better prepare residents to become independent surgeons, the importance of all 6 core competencies as well as NTS should be emphasized in all levels of training, chief residency year (postgraduate year 5).

The Halstedian training model of surgical residency traditionally followed the apprenticeship model, with a single trainee working under the supervision of a single practicing surgeon.[12,13] To overcome challenges regarding the suitability of this model for modern training needs, many surgical residency programs have adopted a service model designed to enhance trainees' exposure to the necessary variety of procedures, reduce cost of training, enhance quality of educational experience, and improve patient safety. In the service model of training, groups of residents train under groups of surgical faculty concurrent with providing surgical care to patients and service delivery. However, mentorship, especially in NTS and "difficult-to-teach" core competencies (DCC) of PBLI, ICS, SBP, and Prof is still often lacking.[8] We hypothesized that some mentoring aspects of the Halstedian model, if reintroduced, may benefit chief residents' transition to independent practice.

In an attempt to address this and improve both NTS and DCC learning, we designed an apprenticeship rotation at the chief resident level. This consisted of a 4-week rotation for chief residents to provide training and mentoring in the "difficult-to-teach" NTS and competencies of PBLI, ICS, SBP, and Prof. This was built on the apprenticeship model of training,[12-15] with residents working one-on-one with a self-selected faculty member in all his/her areas of surgical practice. This model has been shown in other settings to improve continuity of care and overall resident education, especially when combined with other models of training.[16] However, most existing apprenticeships focus mainly on PC and MK, the topics that many surgeons are most confident in teaching.[16-18] The aim of our study was to determine the effectiveness of an apprenticeship model at teaching the more difficult ACGME DCC and NTS. We hypothesized that a one-on-one apprenticeship rotation would be effective in teaching chief residents DCC and NTS.

MATERIALS AND METHODS

This study was approved as exempt by the Institutional Review Board at Brigham and Women's Hospital.

Study Design and Participants

Chief residents from 2 consecutive graduating classes (2013 and 2014) in the Brigham and Women's Hospital General Surgery Residency completed a 4-week apprenticeship rotation with a faculty preceptor of their choice within the Department of Surgery. Preceptors could practice in the same specialty as the resident's intended fellowship or in any other field of interest. Nominations were submitted before the start of chief year and approved by the program director. Participating preceptors and chief residents received documents that outlined the purpose and goals of the apprenticeship rotation at the beginning of the academic year and a week before the rotation (Supplementary material). Residents were encouraged to shadow their faculty preceptor in all aspects of academic surgical practice, including operating room, clinic, laboratory, research, and administrative tasks. The apprenticeship rotation was designed specifically to be separate from the required postgraduate year 5 rotations, and as such, no resident coverage gaps at either the senior or junior levels were created. Resident participants were instructed to either shadow or second assist in the operating room so as not to infringe on the education of other residents.

By the end of the rotation, residents were expected to: (1) demonstrate competence in a subspecialty of the resident's choosing in preparation for fellowship or surgical practice; (2) demonstrate knowledge of the essential skills of academic surgical practice; and (3) receive one-on-one teaching and feedback. In addition, residents were expected to obtain specific skills pertaining to each of the 6 ACGME core competencies with emphasis placed on NTS. In all, 13 chief residents and 12 faculty members participated in the program, with 1 faculty member serving as a mentor twice. Each was invited via email at the end of the rotation to complete an anonymous web-based survey, with 3 weekly reminders to nonresponders.

Survey Instrument

Web-based surveys were developed to assess participants' opinions of the apprenticeship rotation in general, its usefulness at teaching specific skills, the mentoring experience, and the participant's likelihood of recommending the rotation to future participants. In addition, both preceptors and chief residents were asked to rate the resident's competency in 16 different skills that were deemed essential for graduates to master by the end of their training. Each skill could be matched to one of the 6 core competencies advocated for by the ACGME[1]: (1) PC, (2) MK, (3) ICS, (4) Prof, (5) PBLI, and (6) SBP. These were further categorized into "easy-to-teach" core competencies (ECC: PC and MK) and DCC (ICS, Prof, PBLI, and SBP). Chief residents were also asked to rank the factors they took into consideration when choosing faculty mentors and to rate how relevant the skills taught during the rotation were to their intended field of practice or fellowship. To ensure anonymity, no demographic questions such as gender, age, race, year group, or intended specialty were included in the surveys.

Data Analysis

Deidentified responses were collected and managed using REDCap[19] electronic data capture tools hosted at Brigham