

Transforming the Culture of Surgical Education

Promoting Teacher Identity Through Human Factors Training

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Context: Promoting a culture of teaching may encourage students to choose a surgical career. Teaching in a human factors (HF) curriculum, the nontechnical skills of surgery, is associated with surgeons' stronger identity as teachers and with clinical students' improved perception of surgery and satisfaction with the clerkship experience.

Objective: To describe the effects of an HF curriculum on teaching culture in surgery.

Design, Setting, Participants, and Intervention: Surgeons and educators developed an HF curriculum including communication, teamwork, and work-life balance.

Main Outcome Measures: Teacher identity, student interest in a surgical career, student perception of the HF curriculum, and teaching awards.

Results: Ninety-two of 123 faculty and residents in a single program (75% of total) completed a survey on

teacher identity. Fifteen of the participants were teachers of HF. Teachers of HF scored higher than control participants on the total score for teacher identity ($P < .001$) and for subcategories of global teacher identity ($P = .001$), intrinsic satisfaction ($P = .001$), skills and knowledge ($P = .006$), belonging to a group of teachers ($P < .001$), feeling a responsibility to teach ($P = .008$), receiving rewards ($P = .01$), and HF ($P = .02$). Third-year clerks indicated that they were more likely to select surgery as their career after the clerkship and rated the curriculum higher when it was taught by surgeons than when taught by educators. Of the teaching awards presented to surgeons during HF years, 100% of those awarded to attending physicians and 80% of those awarded to residents went to teachers of HF.

Conclusion: Curricular focus on HF can strengthen teacher identity, improve teacher evaluations, and promote surgery as a career choice.

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DURING THE PREVIOUS DECADE, surgery programs have added curricula on human factors (HF) to traditional surgical training.¹⁻⁴ The oft-cited^{5,6} rationale is to improve patient safety and reduce medical error. There are also emerging data suggesting that HF training may improve teaching, encourage the choice of surgery as a career,^{7,8} and increase residents' satisfaction with their training.^{9,10} Departments of surgery struggle to promote excellent teaching in academic centers where clinical care and research have traditionally been more heavily rewarded. Career selection in surgery is increasingly a concern.^{11,12} There is ample evidence^{7-9,13} that effective advising, mentoring, and development of a culture of teaching influence medical students' specialty selection. At the graduate level, residents have identified supportive relationships with faculty and peers as an area of dissatisfaction.¹⁴ This article describes an HF curriculum and reports data that support its influence on teaching and career choice.

Teaching culture is reflected in the importance of teaching to the faculty, the quality of teaching, and the nature of the learning climate. It is supported by faculty who have a strong sense of identity as teachers and who share a purpose of introducing young learners to a profession.

See Invited Critique at end of article

It also allows time for faculty and learners to reflect on their experiences, collaborate on teaching and learning activities, support each other through successes and mistakes, and model reciprocal feedback.¹⁵ The support for teaching and learning by the senior leadership in an academic department makes a successful teaching culture possible.

Human factors, the nontechnical aspects of surgery, address many of the underlying features of a teaching culture by focusing on communication with patients and colleagues, teamwork, reflection, and work-life balance.^{6,16} The introduction of a ro-

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bust HF curriculum and the associated faculty development activities were expected to contribute to a culture of teaching and learning in the department of surgery. This would be evident in (1) a strong teacher identity (TI) for attending physicians and residents who teach HF, (2) increased positive perception of surgery as evident in student evaluations of their learning experiences, and (3) greater interest in surgery and its value as a career. This article describes the University of Massachusetts Department of Surgery's blueprint for building a culture of teaching.

METHODS

PHASE I: PLANNING THE TRANSFORMATION

The department chair announced the formation of an HF initiative and recruited the director of the Center for Clinical Communication and Performance Outcomes (CCCPO) to deliver the first grand rounds on the topic. The CCCPO is a teaching center within the medical school and has been successful in training residents and clinical faculty in teaching and communication skills.¹⁷⁻¹⁹ At the grand rounds, participants were encouraged to contact the chair or CCCPO director if they were interested in participating as faculty in the new program, and faculty were recruited on the basis of their excellent communication skills. Brainstorming sessions were convened, which included the chair, the residency and clerkship directors, faculty, senior surgical residents, and CCCPO faculty. Human factors curricula were developed and taught as a collaboration between faculty and residents from the Department of Surgery and faculty from CCCPO. Three guiding principles were defined for the HF initiative: (1) success will depend on support from the highest levels, (2) educators and clinical teachers from the CCCPO will model the development of content and teaching methods, and (3) surgery faculty will eventually assume complete responsibility for the teaching. During 2 half-day retreats, faculty agreed on a curriculum that would include training in (1) communicating empathy and caring, (2) educating patients, (3) skills in teamwork, and (4) stress and time management. The interdisciplinary faculty group worked together to create and film teaching video demonstrations around teamwork and empathy and caring in common surgical situations.

PHASE II: CURRICULUM IMPLEMENTATION

The student curriculum was a 6-hour Introduction to Human Factors,⁴ presented at the beginning of each clerkship block from 2007 to 2010. Clerkship skills focused on communicating empathy and caring, the student's role in the clerkship, oral presentation skills, and balancing life in the surgery career. Surgery faculty and residents who taught HF in the clerkship were paired with CCCPO faculty for all sessions during year 1 (2007-2008) and year 2 (2008-2009). They attended planning meetings and debriefed their sessions with education faculty before and after teaching. During year 1 and year 2, CCCPO faculty took the lead in developing and presenting the large group sessions, with surgeons taking more responsibility as time went on. During year 3 (2009-2010), surgery faculty took the lead in the education. The residency curriculum was designed as a series of 4 morning sessions focused on communicating empathy and caring, educating patients, and time and stress management. Initially cotaught by surgery faculty and CCCPO faculty, the teaching model was similar to the clerkship, with surgeons assuming progressively greater responsibility. Residents who completed the HF curriculum during their postgraduate years 1 and 2 were recruited to teach in the HF clerk-

ship curriculum, which featured and debriefed the same videos and skills practice cases. In all, 17 attending physicians and residents from the Department of Surgery taught HF.

PHASE III: ASSESSING THE CULTURE OF TEACHING

It was expected that transformation to a strong culture of teaching would be evident in improved learner outcomes, a greater sense of TI among HF faculty, the capacity to attract learners into a surgery career, and a successful transition to surgical faculty-delivered HF curriculum.

Main Outcome Measures

Student and resident learning outcomes are presented elsewhere⁴ and are not discussed herein.

Teacher Identity. In the third year of implementation, all faculty and residents in the Department of Surgery were asked to complete a Teacher Identity Questionnaire that consisted of 40 items measuring self-disclosed values related to teaching as a professional role²⁰ (**Table**). The reliability and validity of this instrument has been reported elsewhere.²¹ This study was approved by the institutional review board. Scores from teachers in the HF (THF) curriculum were compared with scores from faculty and residents of the department as a whole (control participants). Demographic data were also collected: age, sex, years in practice, years in teaching, and surgical subspecialty.

A high score on the TI questionnaire represents an overall stronger identification as a teacher. Eight categories that help differentiate aspects of TI were also measured: (1) a global sense of oneself as a teacher, (2) intrinsic satisfaction from teaching, (3) having knowledge of and skills for teaching, (4) belonging to a group of teachers, (5) feeling a responsibility to teach, (6) sharing clinical expertise with learners, (7) receiving rewards for teaching, and (8) believing that being a physician means being a teacher.²⁰ Also included were 4 questions that related specifically to teaching the HF curriculum and a total score of all items. Responses were selected on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). A 1-way analysis of variance with multiple comparisons was performed to test differences between THFs and controls on the categories, individual items, and overall measure of TI.

Student Perception of Surgery as Career. Improved perception of surgery as a career was measured by a retrospective before-and-after survey that asked students on the final clerkship day, "How likely were you to consider a career in surgery before the rotation?" and "... after the rotation?" Responses were selected on a 5-point Likert scale from 1 (very unlikely) to 5 (very likely). A paired *t* test was used to measure change. Comments were solicited to explain responses and were evaluated for themes.

Transition to Surgery Faculty-Delivered Curriculum

The HF curriculum was assessed by calculating the mean (SD) for questions asking about the overall value of the sessions. The rating scale ranged from 1 (strongly ineffective) to 5 (strongly effective). Means from each of the 3 years were compared, looking for differences between year 1, when presentations and small groups were dominated by CCCPO faculty, and year 3, when surgeons were the primary teachers.

A second measure of student perception of HF faculty is the annual student-voted Outstanding Educator Award for attending physicians and residents. Recipients were chosen during the implementation period.

Table. TI Items Within Categories

Items and Statements	Mean Score ^a		P Value
	THF	C	
Overall TI	4.12	3.81	<.001
Global sense of TI	4.43	3.92	.001
I see myself as a teacher	4.40	4.10	.13
I would miss teaching if I stopped doing it	4.60	4.02	.02
I truly enjoy the role of teacher	4.60	3.94	.004
I look for opportunities to teach	4.13	3.63	.02
Intrinsic satisfaction from teaching	4.43	4.07	.001
Working with students and/or residents costs, but it is worth it	4.13	3.98	.54
I find satisfaction watching my students and/or residents progress	4.53	4.41	.51
Teaching makes my job more rewarding	4.66	4.03	.003
It is important to me to work in a teaching practice	4.40	3.86	.03
Having knowledge and skill about teaching	3.96	3.61	.006
I feel skilled as a teacher of students and/or residents	4.13	3.81	.02
It is important to develop my teaching skills	4.53	4.11	.02
Students and/or residents regard me as an effective teacher	3.86	3.59	.20
I read journals about medical education, eg, <i>Academic Medicine</i> or <i>JACS</i>	2.93	2.48	.16
I would like to be a more skillful teacher	4.33	4.03	.12
Belonging to a group of teachers	3.93	3.51	<.001
I frequently talk to colleagues about teaching	3.53	3.32	.44
I feel part of a community of teachers	3.93	3.15	.003
It is helpful to be able to discuss the progress of students and/or residents with colleagues	4.13	3.81	.14
I enjoy sharing ideas about teaching	4.13	3.55	.009
I would like to be part of a community of teachers	3.93	3.74	.40
Believing that being a physician means being a teacher	4.09	4.00	.40
I do a good job teaching patients about their health	4.06	4.10	.81
I use similar skills to teach both patients and students/residents	3.53	3.28	.40
I enjoy teaching patients	4.40	4.18	.23
Teaching patients is essential to being a good doctor	4.46	4.48	.95
I would like to be a better teacher for my patients	4.00	3.96	.86
Feeling a responsibility to teach	4.43	4.15	.008
All physicians have an obligation to teach the next generation of doctors	4.20	4.33	.59
I consider teaching a personal responsibility	4.60	4.09	.01
It is important to contribute to medical education	4.60	4.16	.02
I find it satisfying to think that I am contributing to the profession by teaching	4.33	4.01	.10
Sharing clinical expertise with learners	4.24	4.04	.06
Surgeons give students and/or residents an important perspective on medicine	4.66	4.59	.68
I am good at teaching students and/or residents to form relationships with patients	3.93	3.72	.40
I teach the importance of developing relationships with patients	4.26	4.10	.40
I am a role model for students and/or residents who want to work in surgery	4.06	3.80	.18
I would like to spend more time teaching students and/or residents about surgery	4.26	4.01	.32
Receive rewards for teaching	3.48	3.06	.01
The medical school rewards my teaching with financial or time incentives	2.00	1.86	.96
Teaching has contributed to my career advancement	4.00	3.16	.008
It is important that the medical school and/or residency program recognize my teaching in some way	3.93	3.61	.25
I would like to be rewarded for my teaching	4.00	3.48	.05
Human factors	4.20	3.90	.02
I model for my students how to communicate with patients and their families	4.20	4.15	.81
I talk to my students about balancing work and outside life	4.20	3.90	.30
It is important for students to ask the perspective of nurses and other team members	4.53	4.06	.055
I talk to my students about managing their time to learn the most on the surgical blocks	3.86	3.50	.16

Abbreviations: C, control; *JACS*, *Journal of the American College of Surgeons*; THF, teacher of human factors; TI, teacher identity.

^aScores were selected from 5-point Likert scales that are described in the "Phase III: Assessing the Culture of Teaching" subsection of the "Methods" section.

RESULTS

TEACHER IDENTITY

One hundred twenty-three faculty and residents were surveyed and 92 individuals (75%) participated in this component of the evaluation. Of the 17 THF who were contacted, 15 (88%) completed the TI survey: 9 of the 11 faculty (82%) and all 6 residents (100%). Of the 106

controls who were contacted, 77 (73%) completed the survey: 39 of the 52 faculty (75%) and 38 of the 54 residents (70%). There were no significant differences between the 2 faculty groups in age, sex, years in teaching, or years in practice. Teachers of HF represented general surgery and 3 subspecialties; the control group represented general surgery and 9 subspecialties. All faculty in the Department of Surgery are clinicians who teach as part of patient care. The department does not use

“teaching attendings,” and there is no specific faculty development outside what was described in this curriculum.

Significant differences in TI were observed between THFs and controls. Teachers of human factors scored significantly higher than controls on overall TI and on 7 of the 9 categories of TI.

VALUE OF SURGERY AS A CAREER

Findings from the retrospective before-and-after assessment about perception of surgery as a career reveal that students were more likely to consider surgery as a profession after the rotation ($T^2=3.1$; $P=.003$; before, $x=2.19$, after, $x=2.79$). All 12 of the students who were less likely to consider surgery as a career discussed lifestyle as a reason. Of the 27 students who were more likely to pursue a career in surgery, 9 expressed surprise that faculty exhibited positive teaching and communication skills. Comments included, “Everyone was really nice and supportive and went out of their way to teach, something I had not expected given stereotypes of surgeons,” and, “Residents here are amazing teachers and supportive. It’s not the militant picture I had thought of prior to the clerkship; I was pleasantly surprised by the camaraderie and the efficiency of the teamwork at the workplace; there is a real patient relationship potential in surgery.”

STUDENT PERCEPTIONS OF THE CURRICULUM AND TEACHERS

Evaluations of the year 3 curriculum taught primarily by surgeons were significantly higher than evaluations of the year 1 curriculum taught primarily by CCCPO faculty ($T^2=3.00$; $P=.003$; year 1, $x=3.93$; year 3, $x=4.34$).

During 2007-2009, 5 of the 30 medical school faculty who received the student-selected Outstanding Clinical Medical Educator Awards also were teachers of HF. No surgical faculty were selected during those years who were not teaching HF. In those same years, 4 of the 5 surgical residents (80%) who received the Outstanding House Officers Award by the medical school were also teachers of HF.

COMMENT

Human factors training highlights the identity of surgeons as teachers and thus offers a key to focusing the culture of surgical training on the educational mission. This will, in turn, make surgery a more attractive career choice for medical students and will help retain residents in surgery programs. There have been studies^{20,21} that examined TI in primary care physicians; however, to our knowledge, this is the first to examine how surgeons think of themselves as teachers. The findings indicate that participation in a robust curriculum that focuses on communication skills, teamwork, and work-life balance is related to strong overall TI, a strong sense of the intrinsic satisfaction for teaching, and a feeling of belonging to a group of teachers. It is possible, or even probable, that the faculty who volunteered to teach HF

already had strong TI. The aim of the HF program was not to increase TI among surgical faculty but rather to draw these faculty members together, enabling them to reinforce teaching and learning, enhance learning outcomes, and influence students’ specialty selection. Because the HF curriculum added a small number of teaching hours (6 to the clerkship and 16 to residency training), we do not believe that exposure to HF faculty would account for the number of teaching awards given by students.

The increased positive perception of surgery as a career choice was encouraging, given national trends that report decreases.^{22,23} Lifestyle related to practice is a deterrent, as is evident in our findings, as well as in other studies.^{23,24} Although this factor is difficult to control, the literature^{7-10,12,25} supports the strong influence that surgical teachers have on career choice. There has been a call for increased training for teaching and mentoring skills, particularly to reduce negative stereotypes of surgeons as aggressive and difficult and to showcase the motivation and passion that characterize surgeons.¹³ Residents who taught in HF had an opportunity to work closely with senior faculty and experienced educators in a formal teaching role, thus being part of a community of teachers. The residents received individualized modeling and feedback, which has been found to improve resident teaching and correlate with higher scores on training examinations.^{26,27} Our results suggest that the training also strengthened residents’ identity as teachers.

An alarming number of residents leave surgical programs during training.^{9,12,14} A comprehensive national analysis¹⁴ of attitudes about residency training identified areas of dissatisfaction as a first step toward stemming attrition from programs. That analysis indicated that significant percentages of residents believed that their programs lacked faculty or support structures to turn to in difficult times, produced strains in relationships with attending physicians, cultivated a lack of respect, and created an uncontrollable lifestyle, which led 14% to consider leaving training. In an interesting article¹² that focused on male and female perceptions of their career in surgery, the authors found that only 5% of all students believe that surgeons have a rewarding family life. The authors proposed that surgeons begin to have open discussions about lifestyle issues during clerkships. Another study²⁸ suggested that a caring atmosphere for patients can exist only if we “extend the caring to students, residents, peers and ourselves.” The HF curriculum provided third-year clerks with the opportunity to discuss lifestyle issues with faculty and junior residents. One session focused on the role of the clerk during the rotation, during which the clerkship director allayed fears about lack of respect or mistreatment.

This study is limited by its small sample size derived from a single institution. The medical center also has a strong faculty development center willing to collaborate. However, student evaluations demonstrated the value of having surgeons, particularly surgical residents, embrace and teach the HF curriculum, rather than importing nonsurgical clinicians and educators to teach this content. Students rated a session higher when it was taught by the surgeons vs these nonclinical personnel. Com-

ments about surgical residents as teachers included, “It was great that Dr X was able to model an interview,” and “Dr X was great and gave us some good tips and allowed us to open up about questions.”

A focus on HF in the curriculum of surgical education on the undergraduate and graduate level represents a fundamental change in how future surgeons are trained. The increasingly sophisticated technological environment based on the rapidly evolving knowledge base mandates that surgeons excel as educators. The old paradigms that served as the foundation of surgical training will not suffice for training surgeons of the future. Leaders²⁹ in surgical education are promoting HF as a fundamental change in how and what we teach. Our program has flourished as a result of the support of department leadership in the integration of HF into the surgical curriculum at all levels. For continued success on a national level, thought leaders and champions of surgical education will be required to convince medical school and hospital administrators to fund such activities at the highest of institutional levels. We have shown that HF offers an opportunity for surgeons with a strong TI to influence important outcomes in medical education, such as learning and specialty choice. Future experiences should test this hypothesis and extend the role of HF training to other areas of interest, including improvement in performance and patient satisfaction, by further highlighting nontechnical aspects of surgery in the education of students, residents, and faculty.

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