

Teaching Residents to Teach: The Impact of a Multi-Disciplinary Longitudinal Curriculum to Improve Teaching Skills

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Abstract

Background: Residents have primary responsibility for teaching medical students, yet many receive no formal teaching instruction. This study evaluated the impact of a longitudinal multi-disciplinary teaching curriculum on resident participants' self-perceived teaching skills.

Methods: Residents received instruction on teaching and leadership skills during a four-month longitudinal teaching course. Participants completed a validated pre-post self-assessment inventory for teaching and a teaching self-efficacy survey.

Results: Participants' self-rated teaching skills significantly increased in all categories of the self-assessment inventory for teaching. Self-efficacy survey results revealed statistically significant increased participant confidence in all teaching skills. Residents were very satisfied with course content.

Conclusion: Residents are eager to improve their teaching skills and benefit from a multidisciplinary learning group. A successful teaching curriculum increases resident interest in teaching and impacts self-efficacy and self-assessed teaching skills.

Keywords: Internship and residency, teaching, curriculum

Residents often have primary responsibility for teaching medical students on the inpatient wards. Despite their significant teaching responsibilities, many residents receive no formal instruction on effective teaching. Moreover, with implementation of duty hour restrictions, residents report attending fewer educational conferences.¹ One study of obstetrics/gynecology residents revealed that with duty hour restrictions, residents report less interest in teaching.² Given the potential adverse effect of duty hour restrictions on teaching, it is increasingly important to provide residents with necessary teaching skills.

Providing residents with teaching skills enhances their professional competency. The Liaison Committee on Medical Education requires that "residents who supervise or teach medical students...be prepared for their roles in teaching and evaluation."³ The Accreditation Council for Graduate Medical Education (ACGME) requires that residency programs demonstrate trainee proficiency in six core competencies.⁴ Increasingly, residency programs are struggling with how to deliver curricula that satisfy the core competencies. Resident curricula in teaching skills help to satisfy the competency of practice-based learning and improvement; this competency re-

quires residents to effectively participate in the education of patients, families, students, residents and other health professionals. Additionally, resident teaching curricula also help to meet the competency of interpersonal and communication skills by instructing residents to more effectively communicate with other healthcare professionals.

In a national survey of residency program directors, 55% reported their programs offered residents formal teaching skills instruction.⁵ Two of the authors (KJ, MW) conducted an unpublished survey of all 21 University of California San Francisco (UCSF) residency program directors. Thirteen program directors (62%) responded; only 6 programs offered some instruction in teaching skills. Seventy-seven percent of respondents felt their residents would benefit from more teaching skills instruction. To address this need, we created a coordinated effort to instruct select residents in teaching skills through initiation of the UCSF Resident Teaching Fellowship.

We selected a longitudinal curricular design to allow resident participants to practice and implement course content and to facilitate greater reflection on teaching experiences. This structure is supported by a recent study

which demonstrated that 'spaced education' (educational encounters which are spaced and repeated over time) improved learner retention of curricular material.⁵ We purposely selected a multi-disciplinary group of resident participants in order to standardize teaching techniques across residency disciplines and create a cadre of residents with expertise in teaching. Moreover, the multi-disciplinary nature of the fellowship creates a peer group among resident teachers and provides encouragement and mentorship for residents from departments where teaching may be less highly valued.

A recent review of resident-as-teacher curricula revealed that resident teaching courses improve resident self-assessed teaching behaviors, teaching confidence, and are linked to improved student evaluations of resident teachers.⁶ A subsequent study of a 13-hour teaching curriculum for primary care residents demonstrated improved teaching skills as measured by an objective structured teaching evaluation (OSTE) of resident participants.^{7,8} To date, there has been no study examining the effects of a longitudinal teaching skills curriculum in a group of multidisciplinary residents including both medical and surgical specialties. The purpose of this study is to assess the impact of a longitudinal multidisciplinary teaching curriculum on the self-perceived teaching skills of a multidisciplinary group of surgical and medical resident participants.

Methods

This study was a prospective cohort study of a multidisciplinary group of residents. The curricular goals were to improve resident teaching skills, provide practical leadership skills, expose residents to academic medicine careers, assist residents in working effectively with a mentor, and to disseminate fellowship content within core clinical residency programs.

The UCSF Resident Teaching Fellowship was begun in the fall of 2003 as a yearly six-month fellowship for selected mid-level residents from clinical departments with significant medical student teaching responsibilities. Due to the large number of residents requesting to participate, we subsequently changed the fellowship to two 4-month fellowships per year in the fall of 2005. We solicited resident participation through an e-mail to all UCSF residents and residency program directors. To participate, residents were required either to be nominated by their program director or have their application supported by their program director. The authors (KJ, MV, MW) reviewed applications and selected residents with a strong interest in and commitment to teaching as demonstrated by their personal statement, previous teaching

experience, and program director recommendation. In addition, we sought to have the broadest possible departmental representation.

Due to space constraints, 54 residents were selected to participate in the fellowship out of 64 applicants. Resident participants were from the following departments: Internal Medicine (N=22), Pediatrics (N=10), Obstetrics/Gynecology (N=5), Family and Community Medicine (N=9), Neurology (N=1) General Surgery (N=2), Orthopedic Surgery (N=2), Urology (N=1), Radiology (N=1) and Radiation Oncology (N=1). In all three academic years, residents in surgical fields participated.

Participants met one afternoon and one evening each month during the fellowship (initially 36 hours of instruction, later 24 hours of instruction). Course content included instruction on creating a positive learning climate, bedside teaching, small-group teaching, teaching microskills, large-group presentations, feedback/evaluation, leadership skills, and assisting the learner in difficulty. The curriculum utilized didactic lectures, small-group discussion, role-play, and reflection on videotaped scenarios. Internal medicine and family medicine faculty taught most sessions. Select sessions were co-led with faculty with specific expertise in teaching skills development. Resident participants were asked to complete a legacy project focused on dissemination of curricular content within their respective residency program.

The fellowship was evaluated employing four methods: 1) a pre-post self-assessment inventory for teaching, 2) a pre-post self-efficacy evaluation, 3) an overall course evaluation, and 4) legacy project completion rate. The pre-post self-assessment inventory for teaching is a validated instrument for assessing teaching skills⁹ containing 77 items rated on a Likert scale of 1-7 where 7 is a favorable rating. These 77 items are grouped in the following categories: organization/clarity, enthusiasm/stimulation, instructor knowledge, rapport, instructor skills, clinical supervision, clinical competence, and personal characteristics. Subscale scores were calculated in each of these categories by summing individual item scores. In addition, a pre-post resident teaching self-efficacy evaluation was developed. This self-efficacy evaluation was created based on the curricular objectives of the course and consensus between the course directors (authors KJ, MV, MW). In this evaluation, residents were presented with a short education case scenario and were subsequently asked how confident they felt in performing the teaching tasks in the scenario. Participants completed an overall course evaluation at the end of the fellowship with items rated on a five-point scale from strongly disagree (1) to strongly agree (5). Lastly, participants completed a leg-

Academic Year	Instruction Hours	Topics Covered
2003-2005	36	Positive Learning Climate Teaching Procedures Bedside Teaching Teaching Microskills Small Group Teaching Large Group Teaching Feedback/Evaluation Learner in Difficulty Physician Impairment Resident Leadership Team Management Mentorship (only 2004-2005) Career Development (only 2004-2005)
2005-2006	24 (run twice)	Positive Learning Climate Teaching Procedures Bedside Teaching Teaching Microskills Small Group Teaching Large Group Teaching Feedback/Evaluation Learner in Difficulty Career Development (optional session)

Figure 1: Topics covered in the Six-Month and Four-Month Curriculum

acy project whereby they disseminated part of the curricular material. We used resident self-report to measure project completion.

For the pre-post surveys (the self-assessment inventory for teaching and the self-efficacy evaluation), resident participants were confidentially surveyed at the initial session of the fellowship and were given the same surveys after the final session. Surveys were coded in order to match pre- and post-surveys for each participant.

Data were compiled and analyzed using SPSS Version 14.0. Descriptive statistics were calculated for the demographics (teaching setting, level of learner taught, future career goals), scale scores and percentage of residents completing their projects. When creating the scale scores, we used a mean substitution when there were missing data in order to not lose cases due to the small sample size. We assessed pre/post differences with dependent sample t-tests. We calculated effect sizes to describe the magnitude of the effect of the fellowship.¹⁰ For the self-efficacy scales we determined statistical significance using a Wilcoxon Signed Rank Test. We chose a Signed-Rank test since this was a researcher-developed survey and a number of the scales had only one item. We

felt that a more conservative approach would be to treat the data as ordinal for this inferential analysis. We report means and standard deviations to aid in interpretability. This study was approved by the UCSF Committee for Human Research.

Results

As of May 2006, 54 residents had participated in the UCSF Resident Teaching Fellowship. Participants reported teaching primarily in the in-patient setting (90.9%). Thirty-five percent reported teaching in the clinic. Residents primarily taught third- and fourth-year medical students and interns. Ninety-five percent of participants reported their future career goal was academic medicine.

We have survey data from 49 (90.7%) participants. We have matched pre-post data for 31 participants (57%) for the self-assessment teaching inventory and 32 participants (59%) for the self-efficacy evaluation. Using a chi-squared test, there was no significant difference ($p > .05$) between respondents and non-respondents in gender or residency specialty (surgical vs. non-surgical). There was no statistically significant difference in self-assessments between residents participating in the four-month curriculum and those participating in the six-month curriculum.

Table 1 indicates a significant increase in participants' self-rated teaching skills in all eight categories of the self-assessment inventory for teaching. The effect size indicates the fellowship had a large effect on ratings in seven of the categories and a moderate effect on one category, professional characteristics.

Analysis of the pre-post self-efficacy data demonstrates statistically significant increased participant confidence in teaching skills in all fourteen areas. There were large effect sizes, exceeding a value of one for 11 skills and a moderate effect size for the remaining scales. (See Table 2).

Table 1 – Self-Assessment Inventory for Clinical and Classroom Teaching in Medicine (n=31 matched responses)

Category	Mean Pre	SD Pre	Mean Post	SD Post	p	Effect size
Organization/Clarity	25.58	3.69	29.23	2.43	<0.001	0.99
Enthusiasm/Stimulation	27.84	3.42	30.00	3.08	0.001	0.63
Instructor Knowledge	21.19	4.58	26.13	4.42	<0.001	1.08
Rapport	47.55	5.78	50.87	4.10	<0.001	0.58
Instructional Skill	45.36	6.76	51.68	5.64	<0.001	0.94
Clinical Supervision	53.43	8.38	62.60	6.56	<0.001	1.09
Clinical Competence	27.32	3.85	30.52	2.89	<0.001	0.83
Professional Characteristics	34.81	4.08	36.71	3.00	0.019	0.47

Residents' satisfaction with the course was very high. Residents (N = 36) felt that the fellowship stimulated their interest in teaching (mean 4.81; SD=0.47; 1 = strongly disagree, 5 = strongly agree), and improved their teaching techniques (mean 4.56, SD=0.61). Residents reported that interacting with residents of different disciplines increased the value of the course (mean 4.78, SD=0.49). The least favorably rated item related to the residents' sentiment that their department was supportive of their participation in the fellowship (mean 4.14,

SD=1.10).

Analysis of project completion data revealed that 56% (n=30) of residents completed a legacy project. These projects ranged from dissemination of course material to their residency colleagues (e.g., pre-clinic conferences on teaching microskills or in-patient conferences on feedback) to the development of new teaching curriculum (e.g., creation of a library of teaching cases in the pediatric department). The most common reason for

Table 2 – Resident Teaching Self-Efficacy Scale (n=32 matched responses)

Category	Mean Pre	SD Pre	Mean Post	SD Post	p	Effect size
Orient learner/Learning climate (4 items)	7.25	1.88	8.62	1.12	<0.001	0.73
Effective bedside teaching (1 item)	5.90	1.82	8.08	1.32	<0.001	1.20
Identify teachable moment (1 item)	6.30	1.75	8.39	1.05	<0.001	1.20
One-on-One Teaching (3 items)	4.52	2.65	8.20	1.21	<0.001	1.39
Large group presentations (4 items)	6.68	1.95	8.23	1.49	<0.001	0.79
Small group teaching (4 items)	4.31	1.97	7.67	1.45	<0.001	1.71
Effectively provide feedback to learners (2 items)	4.48	1.99	8.01	1.27	<0.001	1.78
Effectively solicit feedback from learners (1 item)	4.70	1.91	7.83	1.08	<0.001	1.64
Work with a learner in difficulty (1 item)	3.76	1.82	7.25	1.30	<0.001	1.92
Effectively provide feedback to peers/supervisors (1 item)	4.56	2.35	7.81	1.64	<0.001	1.38
Effectively solicit feedback from peers/supervisors (1 item)	5.09	2.21	7.78	1.15	<0.001	1.22
Identify and prevent/minimize burnout (3 items)	4.01	2.26	7.48	1.61	<0.001	1.54
Team leadership/Management skills (3 items)	4.73	2.09	7.69	1.25	<0.001	1.42
Career planning/Identify potential mentor (7 items)	5.72	2.17	7.53	1.58	<0.001	0.84

Note: Ratings were on a scale from 1 (cannot do at all) to 10 (certain can do): statistical significance was calculated from Wilcoxon Signed Rank Test

a resident's not completing a project was insufficient time due to clinical duties.

Discussion

Fellowship participants perceived improvement in their self-assessed teaching skills and in their teaching self-efficacy. Personal teaching efficacy is linked to effective teaching behaviors in teacher trainees.¹¹ Residents were very satisfied with course content and felt strongly that interacting with residents from other disciplines increased the value of the course. Additionally, they reported the fellowship increased their interest in teaching. It is notable that residents' self-assessment of their professional characteristics did not improve to the same degree as other self-assessed categories. The fellowship did not specifically focus on the professional skills detailed in the self-assessment tool.

Overall, residents felt their departments were supportive of their participation; however, the standard deviation for this item was large and likely represents differences in departments' arrangement of release time for fellowship participation. Participants attended evening sessions on their own time; departments were requested to release residents for afternoon sessions, but not all complied with this request. This issue highlights one of the challenges in creating a core curriculum across residency programs to satisfy ACGME competencies.

Strengths of our study include the diverse group of resident participants, the longitudinal curriculum, and the multiple modalities of evaluation. Other resident-teacher programs have included residents from multiple specialties but had significantly less curricular time^{7,8} or did not have evaluation data.¹² We feel that the longitudinal course design increased the impact of the curriculum due to spacing of the sessions and repetition of the course material.

Our study had several limitations. There was no control group. Perhaps residents' perceived improvement in skills was due to increased teaching experience over the course of the fellowship and/or familiarization with educational terminology. While there are no studies of how resident teaching changes over time, the magnitude of the effect sizes obtained in this study were unlikely to have occurred without the intervention. It also is unclear whether self-assessed teaching skills translate into actual teaching skills improvement. Literature suggests learners' ratings of faculty teaching proficiency and teaching behaviors are significantly higher than faculty self-ratings.¹³ The results of our study may not generalize to all resident

trainees, as our fellowship participants were self-selected residents with a strong interest in teaching. However, we hope that by creating a cadre of dedicated resident teachers in each discipline, we will improve resident teaching at our institution. Additionally, the multidisciplinary focus of the fellowship allowed participants to have a peer group with a similar interest; this is particularly important for those residents in departments with less emphasis on teaching.

Residents' legacy project completion rates improved yearly since the fellowship's inception. Course directors work closely with participants to mentor them in developing accomplishable projects. It is challenging for residents to complete projects given their busy ward schedules. Anecdotally, residents who completed successful projects have reported significant benefit within their department; we believe that legacy projects have increased the profile of resident teaching at our institution.

Residents in all specialties are eager to improve their teaching skills and benefit from a multidisciplinary learning group. A successful teaching curriculum increases resident interest in teaching and impacts self-efficacy and self-assessed teaching skills. Institutional support for a teaching curriculum is mandatory for successful course implementation. Future research directions should include evaluation of the fellowship's impact on actual resident teaching skills as measured by learner evaluations and participation in a pre-post OSTE.

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