

An Intensive Medical Education Elective for Senior Medical Students

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ABSTRACT

Peer teaching by medical students is increasingly considered an effective and efficient instructional modality with value for both teachers and learners. In 2012, twelve senior medical students participated in an inaugural, four-week Medical Education Elective at The Alpert Medical School of Brown University. The first week emphasized education theory and skills. During the remaining three weeks, participants served as a core group of instructors in a Clinical Skills Clerkship (CSC), a three-week required course transitioning rising third-year students to clinical clerkships. Senior near-peer instructors (NPIs) gained substantive experience in developing curriculum, facilitating small group sessions, teaching clinical skills, mentoring, providing feedback, and grading an Objective Structured Clinical Examination (OSCE). Based on direct observation by faculty and written anonymous evaluations by learners (n=98), NPIs demonstrated a high degree of teaching competence. This innovative, by-invitation-only, annual elective is the most substantive medical education experience for medical students described in the literature.

KEYWORDS: Education, medical, undergraduate, curriculum, peer mentoring

INTRODUCTION

Peer teaching by medical students is a feasible and acceptable modality in medical education and spans content areas from the basic sciences to clinical skills.¹ The literature cites peer teaching as effective and efficient, especially where teachers are scarce, with added value for both student-teachers who gain early exposure to the teaching mission of physicians as well as student-learners who benefit from role modeling by peers.² Peer (students at the same level of learning) and near-peer (more senior students and resident physicians) teachers also impart the so-called “hidden curriculum” of the medical profession, playing a decisive role in medical students’ professionalism and identity formation.³

Formal teaching courses to prepare near-peer instructors (NPIs) for their roles continue to be in the minority and to vary widely in terms of format, duration, and scope.¹ The most common formats are didactic and small-group learning

sessions addressing various aspects of teaching, including facilitating small groups and feedback. While some offer teaching opportunities to students – leading cases, participating in simulated teaching exercises, teaching physical exam skills, and supervising junior students – it is unclear how substantive these teaching experiences are and to what degree students actively participate in curriculum development and implementation.

Although all physicians routinely teach in their role as clinicians, not all Accreditation Council for Graduate Medical Education (ACGME)-accredited residencies offer formal training in teaching. In the United States, residents receive an average of 11.5 hours of teaching training during residency.⁴ Given this relatively limited amount of formal training combined with the inherent time pressures faced by resident-teachers that have only increased with work-hour restrictions, strategically incorporating formal medical education experiences into medical school curricula seems logical to ensure that future resident physicians are better prepared to teach both their patients and their student-learners.

The Medical Education Elective at the Alpert Medical School is a new four-week course developed to give interested senior medical students a comprehensive experience in medical education with the goal of preparing future physicians for significant teaching roles. This course, the most extensive of its kind in the literature, allows fourth-year medical students to serve as core NPIs in a classroom-based Clinical Skills Clerkship (CSC), a required three-week transition course for rising third-year medical students. Here, we describe the development and implementation of this immersive medical education experience.

METHODS

The development of the Medical Education Elective was a collaborative effort among faculty members in the Office of Medical Education (PG, RD, and JT) and a medical student who served as the first lead senior student (NP). Students at our institution have the opportunity to pursue a particular area of interest over the course of medical school in a Scholarly Concentration Program; this senior student studied medical education and co-designed the first Medical Education Elective as his final project. The faculty selected a cohort of 12 senior students from a graduating class of 78 to participate

Table 1. A week of preparation for senior medical student near-peer instructors (MS4s, NPIs, n=12) to teach in a required, three-week Clinical Skills Clerkship (CSC) for rising third-year students (MS3s).

Day 1		Day 2		Day 3		Day 4		Day 5	
Time (hrs)	Event (Facilitator)	Time (hrs)	Event (Facilitator)	Time (hrs)	Event (Facilitator)	Time (hrs)	Event (Facilitator)	Time (hrs)	Event (Facilitator)
0.5	Introduction to elective (Course Leaders / LSS*)	1.5	Didactic Session: Teaching and Learning Styles (LSS)	1.5	Didactic Session: Small Group Facilitation (Faculty)	1.5	Preparation for professional development workshops (Lead Workshop Facilitators)	4.5	Preparation for Virtual Family Curriculum small group facilitation (LSS / Group)
2.5	Discussion of each lesson plan in the syllabus (Course Leaders)	1.5	Didactic Session: Presentation Techniques and Objectives (LSS)	1.5	Didactic Session: Teaching Ethics (Faculty)	1.5	Introduction to evaluation/assessment/ remediation of OSCE (Course Leaders)		
1.5	Preparation for oral presentations by specialty (LSS / Group)	1.5	Preparation for professional development workshops (Lead Workshop Facilitators)	1.5	Work with clerkship coordinators to organize clinical clerkship site visit (Group)	1.5	Refinement of OSCE evaluation checklist (Course Leaders / Group)		

*LSS: Lead Senior Student

OSCE: Objective Structured Clinical Examination

in this for-credit elective based on previous interest in teaching and leadership experiences during medical school.

During the first week of the inaugural Medical Education Elective, the 12 NPIs learned about medical education theory and practical teaching methods from various faculty members and the lead senior student / NPI (Table 1). Specific topics included learning styles, oral presentation strategies, and techniques for facilitating small groups. NPIs also participated in curriculum design activities such as creating video-recorded specialty-specific oral presentations for junior students to access electronically. They reviewed and refined paper-based small group cases from the Virtual Family Curriculum⁵ to formulate discussion questions, standardize learning goals, and identify supplemental teaching materials.

During the subsequent three weeks of the Medical Education Elective, NPIs served as the core instructors in the required three-week CSC taken by 98 rising third-year students in the spring of 2012. The NPIs had active teaching roles in the three major curricular components of the CSC: a Virtual Family Curriculum, clinical skills training, and professional development (Table 2).

Each NPI led his or her own group of eight or nine junior students through the Virtual Family Curriculum, a series of six, specialty-specific cases designed to introduce junior students to important clinical skills.⁵ Their primary teaching responsibilities included leading discussions and instructing junior students in a variety of clinical skills such as writing specialty-specific progress notes, writing admission orders, and interpreting chest x-rays (CXRs) and electrocardiograms (EKGs). NPIs were responsible for providing feedback on written assignments, giving verbal feedback at the

course midpoint, and assessing the students' small-group performance at the end of the course.

NPIs also served as instructors in the clinical skills component of the CSC designed to give junior students practice with common procedures and protocols. Each NPI was assigned and taught two stations: one core skill (suturing, CXR interpretation, EKG interpretation, or evidenced-based medicine) and one non-core skill (injections, venipuncture, IV insertions, arterial blood gas, intubation, lumbar puncture, or running a mock trauma). NPIs provided real-time instruction and feedback to junior students in groups of six. They also conducted a clinical skills review session to help junior students prepare for the final exam.

Finally, NPIs participated in the professionalism components of the CSC which were intended to maximize junior students' experiences as learners and health-care team members in a series of new clinical learning environments. This curriculum gave senior students multiple experiences in advising and mentoring, including facilitating discussions about the practical aspects of junior students' first scheduled specialty-specific clerkships, conducting individual mentoring sessions with a series of junior students, facilitating discussion sessions about success during clinical clerkships, and leading a key component of an inter-professional workshop attended by local nursing and pharmacy students.

At the end of the CSC, NPIs were responsible for both implementing and grading a six-station, summative objective structured clinical examination (OSCE) under the close supervision of faculty course leaders. As preparation, they reviewed and modified a faculty-member constructed version of the examination (PG). On the day of the exam, they

Table 2. Senior medical student MS4 NPI teaching responsibilities during the required, three-week Clinical Skills Clerkship (CSC).

Activity	Description	Instructional Approach	Time (hrs)	Level of Responsibility
Virtual Family Curriculum				
Small group facilitation	Prepare for and lead virtual family curriculum cases	Small group discussion	18	Lead facilitators
Small group member evaluation	Provide written feedback on assignments, provide mid-point feedback, complete formal student evaluations	Varied	20	Primary evaluators
Clinical Skills Training				
Procedural training	Teach procedures (i.e. lumbar punctures, phlebotomy, injections, suturing, IV insertion, mock codes, interpreting x-rays and EKGs, using evidence-based medicine)	Hands-on procedural training	16	Co-instructors with MD, PharmD, and nursing faculty
Interprofessional team training workshop	Lead groups of medical, nursing, and pharmacy students in an interprofessional team training exercise	Small group discussion and activity	4	Lead facilitators
Specialty-specific oral presentations	Draft, demonstrate, and discuss specialty-specific oral presentations	Small group discussion	2	Lead presenters
OSCE skills practice	Provide additional instruction in clinical skills	Small group practice	3	Lead instructors
Professional Development				
Clerkship-specific orientation	Lead Q&A about the nuts and bolts of students' first clerkships	Small group luncheon discussion session	1	Discussion leaders
Careers in Medicine specialty introduction	Discuss career decision-making processes for chosen specialties on the day that specialty is highlighted	Large group didactic session	6	Co-presenters with faculty members
Professional development workshops	Facilitate three workshops addressing professionalism, success on the wards, and using evidence based medicine	Small group discussion	3	Panelists, co-facilitators with faculty
Extracurricular research panel discussion	Participate in panel about research opportunities during clinical years; lead small group discussions	Large group panel, small group discussion	3	Panelists, small group co-facilitators
Mentoring	Meet with eight students for short mentoring sessions	Individual sessions	3	Near peer mentor
Final OSCE				
OSCE preparation	Prepare OSCE evaluation criteria	Curriculum preparation		Leaders
OSCE assessments	Perform real-time assessment of student performance and grade written work (i.e. admission orders)	Direct evaluation, group grading session	8	Lead evaluators
OSCE remediation	Teach remediation sessions as needed	Direct evaluation	2	Lead evaluators

evaluated junior students' performances in the core clinical skills stations that they had each taught during the course and graded the written components of the assessment including a history and physical, admission orders, and CXR and EKG interpretations. Finally, they conducted student remediations as needed.

During the CSC, each NPI was directly observed leading a small-group session by an experienced medical educator who then provided written feedback. Third-year students provided informal verbal feedback to their own NPI small group leader mid-course and formally evaluated their respective NPI at the end of the course with an anonymous, electronic, written evaluation. Junior students used a 5-point Likert scale (1=poor, 5=excellent) to rate various aspects of NPIs' teaching competence, including promoting a collaborative learning environment and effectiveness in the following

teaching skills: facilitating small group discussions; giving feedback on write-ups; teaching oral presentations; and providing feedback. Junior students also used a four-point scale (1=remained the same, 4=improved exceptionally) to rate their own self-assessed degree of improvement in four clinical skills that were primarily taught by the senior students including writing a clerkship-specific history and physical, writing admission orders, managing insulin orders, and managing intravenous fluids.

Finally, the NPI teaching evaluations contained open-ended questions for junior students regarding their own senior small group leader as well as the cohort. Qualitative data were reviewed and coded by two authors to identify comments that pertained to the specific quantitative questions and identify any additional themes.

To evaluate the impact of the elective, the 12 NPIs

Table 3. Rising third-year medical students' (MS3s) teaching evaluations of their senior fourth-year medical student (MS4s) near-peer instructors (n=98/98, 100%).

Teaching Competence	MS3 evaluations of MS4s (%)*			Sample Comments
	Poor/ Fair	Average/ Good	Very Good/ Excellent	
Effectiveness in facilitating small group discussions	0	8	92	<ul style="list-style-type: none"> “He achieved a good balance of prodding us to think through things on our own, while also providing his own input/answers to continue fostering a meaningful discussion.” “[He] was a fantastic small group leader in terms of facilitation of discussion and keeping our group on task.”
Promotes a collaborative learning environment	0	3	97	<ul style="list-style-type: none"> “I’m particularly proud of her for tactfully suggesting to me that I should talk a little less in small group to allow the reticent members to speak up...[she] did a phenomenal job of balancing students with different levels of confidence...” “I really enjoyed the small group structure. It was a comfortable environment that really helped me feel supported and excited to learn throughout this clerkship.”
Effectiveness in giving feedback on write-ups	0	7	93	<ul style="list-style-type: none"> “He was extremely quick to provide feedback on the SOAP notes, and his comments were to the point and helpful.” “It was clear that [she] put a lot of time and energy into...providing feedback for our notes. Her feedback was excellent - specific and not overwhelming.”
Effectiveness in teaching oral presentation	0	16	68	<ul style="list-style-type: none"> “[The senior students] were especially good at teaching...oral presentations because they remember what it was like to not know how to do those things.”
Effectiveness in providing midpoint feedback	0	3	93	<ul style="list-style-type: none"> “He provided very thorough feedback...I also appreciated that he used the ‘compliment sandwich’ technique in his feedback.”
Overall teaching competence	0	7	93	<ul style="list-style-type: none"> “It was cool to see the fourth years in action...now I have a great idea of the type of student I will be striving to be over the next two years.” “It was clear that he was truly passionate about teaching and helping out us younger students.” “Very approachable, supportive, professional, patient, affirming, friendly, down-to-earth...”

* (1= poor, 2= fair, 3= average, 4= good, 5= very good, 6 = excellent)

participated in a three-hour debriefing session at the end of the course and provided anonymous, written feedback to the lead senior student. We also compared Internal Medicine Clerkship OSCE performances across two classes of junior students.

A university Institutional Review Board representative determined that this required curriculum development and implementation process did not require a formal review.

RESULTS

Twelve NPIs participated in the inaugural Medical Education Elective. Their specialty choices included family medicine (n=4), internal medicine (n=3), obstetrics and gynecology (n=2), pediatrics (n=1), and triple board including pediatrics, psychiatry, and child and adolescent psychiatry (n=1).

During the CSC, an experienced faculty member from the Office of Medical Education (RD) individually observed seniors teaching their own small groups and provided written feedback. The comments were generally positive and frequently pertained to teaching techniques and effectiveness in conveying information to the junior students. Specific, constructive comments were provided to each NPI.

At the end of the CSC, the NPIs' teaching performance was assessed by all 98 junior students who participated in the CSC (Table 3). Over 90% of junior medical students evaluated their senior medical students as being “very good” or “excellent” in 5 of 6 areas of teaching competence. No junior student rated any senior student as “poor” or “fair” in any area. Junior students also provided qualitative feedback about their respective small group teachers, and many of their comments pertained specifically to the areas of teaching competence also assessed by quantitative measures.

To further assess the degree of teaching competence achieved by senior students, junior students self-assessed the degree to which they improved in four clinical areas taught by NPIs. The strongest area of improvement was in writing admitting orders. All junior students reported improvement, more than half indicated that they “improved significantly,” and almost a quarter felt they “improved exceptionally.”

Junior students' qualitative comments also identified qualities in the senior students that junior students valued in their learning experiences. A large number of students commented on positive characteristics they observed in their senior students including approachability, degree of preparedness, enthusiasm, clarity of presentation, helpfulness of

feedback, presentation style, managing the group dynamic, and knowledge.

As determined by the debriefing session and feedback to the lead senior student, NPIs all agreed that their participation in the Medical Education Elective positively affected their preparedness to teach, especially in the areas of medical knowledge, interviewing, oral presentations, interacting with patients, professionalism, and providing constructive feedback.

The clinical performance of junior students improved as measured by comparing performance on comparable third-year Internal Medicine Clerkship OSCE stations (specifically, CXR and EKG) for students in the graduating class of 2013, who did not take the CSC, and those in the graduating class of 2014, who took the first CSC.⁶

CONCLUSIONS

In this intensive Medical Education Elective, junior students perceived the NPIs to be competent teachers and their clinical skills improved, both subjectively and objectively. While there are reports in the literature of medical student NPIs effectively leading problem-based learning sessions,¹ this elective experience required a considerably broader skill set. Students were responsible for managing small-group dynamics, leading discussions, teaching multiple practical clinical skills, incorporating basic science knowledge into case-based problems across multiple sub-specialties, and providing both written and oral feedback, skills not typically required of medical students. As in other studies of courses intended to teach medical students how to teach, these senior students / NPIs reported that this elective aided in their preparation for teaching as residents.

Future short-term directions will include a refinement of the selection process for participation in the Medical Education Elective, further development of the course based on evaluations of both the Clinical Skills Clerkship and the elective itself, and the design of a formal e-syllabus.

Longer-term, we are developing methods to more formally evaluate the impact of the elective on NPIs' efficacy as teachers and ultimate career decisions. Given that these original senior students were invited to participate in the elective based on their demonstrated interest in medical education, we hypothesize that they may be more likely to pursue a career that includes formal opportunities for teaching. Evaluating the effectiveness of this course on students' actual teaching skills as residents will be challenging as they are currently practicing at different institutions in a variety of clinical specialties. Even so, we do plan to follow the 12 original students as well as participants in the course from subsequent years over time to determine whether they are more likely to receive teaching awards and to pursue careers in academic medicine than their medical school classmates.

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Presentation

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