Trainee Information

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Program: Physical Medicine and Rehabilitation - Spinal Cord Injury
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PGY: 5

Proposal Information

Title: Real-Time Mobile Response Technology for Continuous Knowledge Assessment and Feedback to Promote Resident Engagement and Educator Self-Reflection

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RESEARCH NARRATIVE

Problem to be addressed: Educational curricula in physical medicine and rehabilitation (PM&R) residency programs rely on didactic sessions that are most often grounded in content lectures. Formal assessments of trainee knowledge are largely limited to a yearly self-assessment exam (SAE) and engagement of trainees with the material throughout the year is seldom assessed. Feedback for faculty and residents who lead didactic sessions on teaching skills and efficacy is similarly infrequent and is often separated in time from teaching activities (e.g., in monthly evaluations by trainees on clinical rotations or annual program evaluation feedback).

In this study, we aim to test the feasibility of incorporating a mobile learning assessment and feedback tool into didactics lectures and case-based discussions to promote real-time quantitative and qualitative assessment of learners and educators, and its effect on resident engagement in the didactic curriculum and self-reflection on teaching skills by educators. Learners’ smartphones will function as an audience response system for multiple choice and short answer questions corresponding with concepts covered in lecture and case-based conference format. We anticipate that a clear understanding of the specific benefits and challenges of using a mobile learning assessment and feedback tool within a PM&R residency program will facilitate innovations for residency didactic curricula that may improve continuous knowledge assessment and educator feedback, which will promote professional development for both residents and faculty who serve as teachers. We hope to pilot such an approach with the aim of generating a guide that may be tailored to other institutional settings and for other medical and surgical disciplines that rely on didactic lecture or case-based formats for formal educational conferences.

Literature Review (1-2 paragraph summary and a maximum of 6 references): Adoption of the PM&R Milestones by the Accreditation Council for Graduate Medical Education (ACGME) and recent developments in Maintenance of Certification (MOC) for professional organizations have more recently begun to focus on progressive development and continuous assessment of professional competencies, including knowledge, skills, and attitudes related to professional and personal growth as a physician. (1,2) Resident self-assessments are provided annually in the form of annual in-service exams but no framework for continuous assessment exists and resident engagement with educational conferences are seldom assessed with any metric except attendance. While practices surrounding resident and trainee evaluation and feedback have witnessed a trend towards more frequent and objective assessments, methods for delivering consistent, anchored feedback and evaluation for medical faculty on teaching skills remain comparatively underdeveloped. (3) Audience response systems have been trialed in didactic and case-based resident conferences in several medical specialties, and allow educators...

**Study hypothesis:** We hypothesize that regular assessment of trainee knowledge tied to presentation content and objectives in a PM&R didactic curriculum and the opportunity for real-time feedback on educators using an easily accessible mobile, smartphone-based response tool will result in increased levels of trainee engagement, self-learning outside of lectures and conferences, and self-reflection by educators on teaching skills. Furthermore, we hypothesize that the majority of learners and educators will find a user-friendly, mobile response system both intuitive and acceptable.

**Population:** Our study population will consist of 21 residents currently in the Harvard Medical School / Spaulding Rehabilitation Hospital ACGME-accredited PM&R residency program and approximately thirty-five teaching faculty at five Partners Healthcare sites who are involved in the residency didactics curriculum. This work will be submitted to the Institutional Review Board at Partners Healthcare, Inc. prior to any testing or data collection for exemption as research conducted in an established educational setting involving research on a comparison among instructional techniques, curricula, and classroom management methods. Questionnaire data will be analyzed with biostatistical support provided by the Harvard Medical School Department of Physical Medicine and Rehabilitation through the Associate Chair for Research, Dr. J. Andrew Taylor.

**Description of intervention or study design:** Phase 1: Focus Groups and Pre-Intervention Surveys In Phase 1, we will conduct three focus groups with each year of resident trainees in the Harvard Medical School / Spaulding Rehabilitation Hospital PM&R residency program and five faculty focus groups comprised of teaching faculty who instruct and supervise PM&R residents at Partners Healthcare Institutions including Spaulding Rehabilitation Hospital Boston, Massachusetts General Hospital, Brigham and Women’s Hospital, Newton Wellesley Hospital, and Spaulding Rehabilitation Hospital Cambridge. Focus groups will be conducted in the spirit of affirmative inquiry to identify characteristics of positive, engaged learning experiences and key barriers to engagement for residents, frequency of self-learning outside of formal didactics, as well as the most useful characteristics of educator feedback, and the frequency of feedback that most educators receive. After focus groups, we will ask participants to complete one or two surveys, one for resident trainees in each year of training in the Harvard Medical School / Spaulding Rehabilitation Hospital PM&R residency program and another for residents and teaching faculty who lead and supervise educational conferences PM&R residents at Partners Healthcare Institutions including Spaulding Rehabilitation Hospital Boston, Massachusetts General Hospital, Brigham and Women’s Hospital, Newton Wellesley Hospital, and Spaulding Rehabilitation Hospital
Recruitment: All trainees and teaching faculty will be permitted and encouraged to participate. Participants will be reimbursed for their time with a $20 gift certificate from Amazon.com (or similar compensation) at the end of their participation in a pre-intervention focus group and survey. Analysis: Focus group audio will be transcribed, and the data will be evaluated for consistent themes. Any themes that are not represented in the draft survey will be added. Similarly, content that is not endorsed by the focus groups will be removed or amended.

Protocol: Focus groups will be conducted at an otherwise agreed upon location most convenient and comfortable for the participants. Participants who are not able to participate in-person will be allowed to call in via departmental conference line. The focus group will be digitally recorded for later review and transcription. The focus group interview will open with a discussion and agreement upon ground rules (e.g., respect all participants; all information shared will be confidential, allow speaker to finish before talking). The facilitator will create a comfortable environment for participants, helping them to express their experiences and opinion. The facilitator will follow a pre-designed, piloted script at each institution. Each question will be discussed, and follow-up questions may be asked by the facilitator, as determined by the content of the discussion. The facilitator will encourage quiet participants to voice their opinions and steer conversation away from dominant participants. Body posture, facial expressions, and other actions will be recorded, as these will not be available from the audio recording.

Analysis: Focus group audio will be transcribed, and the data from all institutions will be evaluated for consistent themes. Any themes that are not represented in the draft survey will be added. Similarly, content that is not endorsed by the focus groups will be removed or amended. Survey Development: Survey items will be both quantitative and qualitative. Qualitative items will be formatted using a 5-point Likert scale. They will be developed from items that have been previously found to be important factors in engaged learning and questions related to self-evaluation in the areas of continuous learning, level of engagement, frequency of feedback, and self-reflection about teaching abilities, including personal strengths and areas for improvement. (1) Resident-only or learner surveys will contain items in the following areas and will be limited so that it can be easily completed within approximately 12 minutes: Level of engagement in current didactic curriculum Past experience regarding perceived clarity of didactic session objectives Comfort level of responding to questions posed by educators verbally or using an audience response system Frequency of self-learning and continuous learning outside of formal didactic activities Frequency of opportunities to give educators feedback on their teaching performance Perceived benefits and challenges of using a smartphone-based audience response system Educator surveys will contain items in the following areas and will be limited so that it can be easily completed within approximately 12 minutes: Past experiences with assessment of teaching skills via learner feedback Self-assessment of current teaching skills related to learner engagement and clarity of learning objectives Current frequency and mechanism of evaluation by learners Familiarity with principles of effective question writing for test items Perceived benefits and challenges of using a smartphone-based audience response system

Chloe Slocum Cambridge.

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Phase 2: Mobile Audience Response System and Feedback Implementation In Phase 2, we will implement use of a smartphone-based, mobile audience response system with didactic programming over a three-month trial period. PM&R Chief Residents, one of whom is charged with supervising each didactic session and coordinating with faculty, will receive a one-hour interactive instructional demonstration of how to use the audience response system. All resident participants will be asked to download the necessary and free smartphone application, which runs on low bandwidth. Presenters, including senior residents and faculty, who are scheduled for didactic programming will be contacted two weeks before their scheduled didactic session and asked to submit three key concepts and six original questions for their presentation, which may be in either short answer or multiple-choice format (short answer questions will ask for a list of response items or a single sentence as an answer). They will also receive a brief, four-slide PPT on working with the PM&R Chief Resident during their presentation that will explain the timing and technology involved with the audience response system and when to expect presentation feedback. Three questions will be randomly chosen for pre-test assessment and three will be randomly chosen for post-test assessment so that each concept is represented equally in pre- and post-test assessments. There must be an even number of either short answer or multiple-choice questions and there must be at least two multiple-choice questions. The PI and Assistant Program
Director will vet all questions to assure that they adhere to the principles of effective test item writing. The “Teacher” or educator component of the response system will be run through a single administrative account that will be accessed only by the PI and Assistant Program Director for response information. Audience responses will be anonymous. Resident learners will receive immediate feedback on their smartphone and an explanation of the correct answer but will not have access to aggregate scores of their overall performance during didactic sessions. At the end of the post-test question items, they will be prompted to submit brief anonymous feedback on the educator’s performance for the previous didactic session, commenting on specific strengths or suggestions for improvement. Educators will receive a report of their performance data, including aggregate resident pre-test and post-test response data for concept questions and end-of-session feedback. Feedback will be reviewed by the PI and Assistant Program Director and any resident identifying information will be removed. Educators’ feedback will remain confidential and will only be shared with individual presenters related to their own performance. Phase 3: Post-Intervention Surveys  Participating residents and faculty will be asked to complete post-intervention surveys at the end of the three-month trial period. Resident-only or learner surveys will contain items in the following areas and will be limited so that it can be easily completed within approximately 12 minutes: Level of engagement in current didactic curriculum Experience regarding perceived clarity of didactic session objectives over the past three months Preference for responding to questions posed by educators verbally or using an audience response system Frequency of self-learning and continuous learning outside of formal didactic activities Frequency of opportunities to give educators feedback on their teaching performance Perceived benefits and challenges of using a smartphone-based audience response system Educator surveys will contain items in the following areas and will be limited so that it can be easily completed within approximately 12 minutes: Experience with assessment of teaching skills via learner feedback using smartphone-based response system Self-assessment of current teaching skills related to learner engagement and clarity of learning objectives Current frequency and mechanism of evaluation by learners Familiarity with principles of effective question writing for test items Perceived benefits and challenges of using a smartphone-based audience response system Elements of useful feedback and most effective feedback provided during the trial period Interest in future training in use of a smartphone-based audience response system Participants will be reimbursed for their time with a $20 gift certificate from Amazon.com (or similar compensation) at the end of their participation of the post-intervention survey.  Phase 4: Summative Analysis and Resource Guide Preparation  The PI and Assistant Program Director will prepare a report for the Graduate Medical Education Committee for the Department of PM&R with a comprehensive report detailing aggregate results of resident performance on pre-test and post-test results, survey data on residents’ report of didactic engagement and self-learning outside of formal conferences, and educators’ report of self-reflection regarding teaching skills. A summary will be prepared for publication that details the perceived benefits and challenges of using a mobile response system to promote resident engagement, self-learning outside of didactic programming, and self-reflection by educators by using real-time assessment and a strategy of timely educator feedback into routine didactic presentations and conferences. A set of recommendations for development of similar curriculum innovations for graduate medical education training programs more broadly using existing mobile technology and a user-friendly resource guide of interactive mobile learning technology resources for medical educators will be prepared for circulation to Program Directors and educators.

**Description of comparison group (if relevant):** Due to small sample size and study design, there is no designated comparison group that is relevant to our research proposal.

**Outcome variable to be used to determine the efficacy of the intervention (if relevant):** Comparisons will be made between pre-intervention and post-intervention survey items related to self-report of resident engagement, frequency of self-learning outside of formal didactic sessions, frequency of timely educator feedback, and self-reflection by educators on teaching skills and techniques.

**Power analysis to determine feasibility (when relevant):**

IRB status of project: The protocol will be submitted for IRB. The protocol will be submitted for IRB exemption.

BUDGET


Disclosure of other funding sources. (Will receipt of this grant augment or replace other funding sources for your research?): This grant would be sole source of funding.

OTHER

Previous COE involvement to date: I have attended the Teaching Skills Development Seminar and Value-Based Health Care Delivery Courses through the Partners Centers of Expertise. I have attended dinner talks by Dr. Baker and with the Massachusetts Secretary of Health and Human Services, a dinner lecture on Risk Management at BWH, and research grant recipient de-briefing and progress report meetings. I have widely encouraged PM&R Residents to attend COE events and have been responsible for improved publicity to our residents that appears to have resulted in increased attendance by Spaulding residents, which I am very happy about (and proud of).

Previous COE funding: I have never received a grant or funding from the COE.