

Comprehensive Educational Performance Improvement (CEPI): An Innovative, Competency-Based Assessment Tool

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Abstract

Background: The focus of competency-based training is on outcomes, specifically well-trained residents. Our goal is to help move resident assessment away from content- and process-based factors and towards measures of mastery of practice. Doing so requires reorganizing and reprioritizing elements of the training program. We describe our attempt to shift the priorities of our program (the primary care internal medicine residency of the Mount Sinai School of Medicine [Elmhurst] Program) towards the desired outcomes of the medical resident, faculty, institution, and program as a whole. These outcomes are based on the six core competencies of graduate medical education (medical knowledge, patient care, interpersonal and communication skills, professionalism, systems-based practice, and practice-based learning and improvement). We call this process “comprehensive educational performance improvement” (CEPI).

Methods: We began by identifying each individual learning element of the program and classifying it into a clinical, didactic or evaluative “domain.” We thus identified 40 clinical learning elements (specific outpatient and inpatient clinical settings), 25 didactic learning elements (specific lecture formats, workshops, conferences, etc.), and 11 evaluative elements (evaluation formats and contexts). Then we developed a set of questions intended to define and evaluate each element. Finally, we established criteria for prioritizing these questions, by asking relevant faculty, staff, and residents to assign priority scores for each.

Results: By this process, we generated 2–6 questions for each learning element, resulting in a total of 301 questions. This constituted a comprehensive plan for the assessment of both the program and the competency of the medical residents who have completed the program. Examples of the application of this process are described.

Conclusions: The CEPI process has a number of strengths. It allows for the concurrent assessment of each learning element with its intended outcomes, enabling us to simultaneously assess its outcome and its programmatic value. It effectively integrates the cognitive aspects of a program element with its clinical aspects, along with the input of evaluators at various levels. Finally, it helps train faculty members in an evidence-based approach to the curriculum.

Key Words: Medical education, medical residencies, assessment, evaluation, curriculum, accreditation, core competencies.

Background

FOR CENTURIES, MEDICAL TRAINING was based on an apprentice system. Through extensive observation and imitation of an appropriate medical role

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model, the trainee would supposedly gain the knowledge and skills needed to become an independent practitioner. Although this system served medical education for centuries, it is no longer appropriate in the modern era. The reasons include the ever-expanding volume and complexity of medical knowledge, the development of modern technology, the growing complexity of medical and social systems, and society’s changing perceptions of the roles, responsibilities and accountabilities of physicians (1).

Two paradoxes typify the difficulties inherent in training doctors in the modern era. The first paradox is that it is possible for a medical trainee to be in possession of an enormous amount of medical knowledge and still not be an effective physician. The second is that it is possible for a trainee to have all the skills necessary to be an ef-

fective physician and still not be able to direct these skills towards effective patient care. It is partly in response to these two paradoxes that the Accreditation Council for Graduate Medical Education (ACGME) has promulgated a search for novel approaches to medical training. Towards this goal, it has addressed the first paradox by the organization of the “domains” of medical education (clinical, didactic and evaluative) into six core competencies (*medical knowledge, patient care, interpersonal and communication skills, professionalism, systems-based practice, and practice-based learning and improvement*), and addressed the second paradox by the promotion of its “outcome project,” which emphasizes that the most appropriate assessment of the outcomes or results of medical training is the demonstration of actual clinical performance, not presumed potential clinical performance (2–4).

How do the ACGME’s core competencies address the first paradox? Clearly, a trainee may have an abundance of *medical knowledge regarding patient care*, but lack an understanding of how to ensure that a given patient can actually receive that care by overcoming barriers to access (*systems-based practice*), or else be unable to effectively communicate with the patient in a way that the patient understands (*interpersonal and communication skills*). And the trainee would not be able to assume an effective physician’s role in society without mastering the competency of *professionalism*. Nor would he or she be able to carry out ongoing self-correction or the lifelong updating of clinical skills without mastering the competency of *practice-based learning and improvement*. But demonstrating or assessing that the trainee has mastered these competencies, while necessary, is not a sufficient goal of medical training. The focus must then shift to the outcome of a well-trained resident who has demonstrated the ability to function as an independent practitioner. Thus, we must assess and ensure the *actual* effectiveness of training as opposed to its *potential* effectiveness. Looking at the actual effectiveness of training requires a set of questions that differs in intent from those previously asked (3). Previously, it was sufficient to ask, “Do clear learning objectives of appropriate content exist, and is the resident appropriately exposed to settings in which they can be achieved?” The new focus now must ask, “Do the residents actually achieve the learning objectives in a meaningful way, and how can this achievement be demonstrated to contribute to the resident’s performance as a practitioner?” A new set of priorities (clearly identifying learning objectives, assessing the attainment of these objectives, and using these

data to facilitate the continuous improvement of both the residents’ and the program’s performance) is also required (3).

With our training goals in mind, we describe in this report the process by which we refocused the priorities of our program (the primary care internal medicine residency of the Mount Sinai School of Medicine [Elmhurst] Program) in light of the professional needs and desired outcomes of the medical residents, the faculty, the institution (Elmhurst Hospital Center), and the program as a whole.

Methods

While revising the written curriculum for the residency program, we examined the role that each component of the program played in the process of resident education and training. Previously, our curriculum (like other traditional curricula) had been organized around *content* (what we taught) and *process* (how we taught it).

Our goal, in accordance with ACGME guidelines, was to reorganize it around *outcomes* (3). Thus, the relevant questions are not “Is this what we want the resident to know?” (i.e., a content-based curriculum), or “Is this the best way to teach this material?” (i.e., a process-based curriculum), but rather, “Does the presence of this content and process in the curriculum help us to train a resident who can master the competencies of practice?” (i.e., an outcomes-based curriculum).

In the process of envisioning this reorganization, we developed an approach that we call “comprehensive educational performance improvement” (CEPI). As a first step, we endeavored to identify each individual, distinct learning element (LE) of the program and classify each LE into its clinical, didactic, or evaluative domain. LEs (defined as the “specific settings, contexts and methods in or by which resident education and training occur”) were identified by a review of the formal written curriculum as well as from discussions with residents. Clinical LEs would include specific inpatient (e.g., general medical wards, critical care units) and outpatient (e.g., medical clinic, nephrology clinic, emergency room) settings in which the residents rotated. Didactic LEs would include lectures, conferences and workshops in which the residents participated. Evaluative elements included evaluation formats and contexts other than those specific to the clinical and didactic learning elements (see Table). Then, we applied to each LE a set of general questions intended to define and to describe, qualitatively and quantitatively, the programmatic value of each LE. These questions were the following:

- Can this LE be categorized into one or more of the core competencies?
- Can its actual effectiveness (its outcome) be described or measured in terms of the resident's performance?
- How does this LE specifically further the educational goals of the program?
- Is this the most effective modality for teaching and learning this specific content?
- Does this LE provide the proper balance between education and service?
- Does this LE have a measurable impact on the resident's professional development?
- Is its inclusion in the program consistent with the needs of the institution?

Applying these general questions, when appropriate, to each of the distinct programmatic LEs produced a compendium of more specific questions. And each of these specific questions, as will be described below, represents a potential educational performance improvement (PI) project. Recognizing the impossibility of undertaking all of these potential PI projects, the final step is to prioritize them, by asking relevant faculty, staff, and residents to go through the compendium of questions and to assign priority scores for each of them, as well as to suggest how to address each of them. This process can be used to assess the program and the competency of the residents, as well as suggest ways to improve both.

Results

By the process described above, we identified 40 distinct clinical LEs (specific outpatient and inpatient settings through which the residents rotated or performed service in the course of the program) and 25 didactic LEs (specific lecture formats, workshops, conferences, etc., in which the residents participated over the course of the program). Additionally, we included 11 evaluative elements (additional evaluation formats and contexts other than those specific to the clinical and didactic learning elements). We approached these evaluative elements (Table) with a similar set of criteria, asking if they were the best, most appropriate, or most useful methodologies, and if they furthered the programmatic goals of the residency, as well as if they were competency-based. Evaluative elements included those that were in current use, being reviewed for modification, or being proposed or under consideration. Our approach was to identify the components of the evaluation, identify how they were being implemented, and identify their desired goals and outcomes.

TABLE
Evaluative Programmatic Learning Elements

Nurse evaluation
Mini-CEX, clinical evaluation exercise
Rotation-based multiple choice question exam
Evaluation by ancillary hospital staff
Patient evaluation
Peer evaluation
Review of videotaped patient encounter
Evaluation of research project
Chart audit—outpatient progress note
Chart audit—hospital discharge summary
Monthly evaluation form

CEX = clinical evaluation exercise.

In the next step, by attaching each potential question to each LE, and then with the assistance of relevant personnel, identifying which questions made the most sense or were the most important to address, we came up with between two and six appropriate questions for each of these 76 learning elements, resulting in a set of 301 questions. Sample pages from this 76-page compendium, illustrating its general format and representative questions, are shown (Figs. 1–3). Individually, each of these questions represents a potential educational PI project, but the compendium as a whole represents both a blueprint of where the program is now, as well as a roadmap of where the program needs to go in order to achieve a relevant outcomes-based assessment.

The following cases will highlight the utility of this process.

Case 1: Didactic Small-Group Workshop

For the past several years, Dr. S. has been running a monthly small-group workshop as part of a series of ambulatory care teaching workshops. Her workshop focuses on a specialty outside of internal medicine, but integral to the training of the general internist. The format for this workshop has been a review of general topics in this specialty, with discussions of practical management issues in diagnosis and therapy. Dr. S. had some concerns about the value of her workshop in the overall training of the residents who attend it. She was concerned that the residents might have difficulty in applying the content to the clinical setting, that this was not the most effective or efficient format for teaching this material, and that the workshop was not contributing in a meaningful way to the residents' overall development. Recognizing that merely identifying this clinical content as important material to know was insufficient grounds for continued inclusion of

Fig. 1. Sample CEPI page, clinical outpatient service.

Component: MPC-Pap Smear Service Category: Clinical Setting: Outpatient clinics Faculty: Dr. A. Description: Residents see MPC patients for cervical cancer screening Competencies: All				
Question	Assessment	Competency	Personnel	Priority
Do residents find this rotation to be clinically useful?	Resident survey	All	Chief resident	
Is there a proper balance between service and learning?				
At the conclusion of this rotation, does the resident feel competent to perform a Pap smear?				
Is this an effective modality for learning this content?	Assessment of resident's mastery of this content, assessed by Board performance, in-service exam, or patient outcomes.	Professionalism	Dr. A	
Does this rotation have an impact on the resident's professional development?	Reflective learning: "Can you recall a particular experience you had in this rotation that was important to you?"			
Comments:				

the workshop in the program, we applied the CEPI approach to competency-based outcomes assessment. An instrument to objectively assess the acquisition of medical knowledge in this area (a multiple-choice question test) was developed, and external objective assessments (e.g., performance in this area on the in-service exam) were looked for. A questionnaire designed to assess the residents' subjective experience in this workshop was also developed—this questionnaire asked the residents to rank the importance to them of their experiences in the workshop, according to the criteria established by the competencies of *medical knowledge* and *patient care*. They were also asked to assess its value to them in terms of their professional development and in their actual ability to apply what they had learned in clinical settings. As a result of these assessments, Dr. S. was able to modify the curricular content and learning objectives of the workshop to be more congruent with the residents'

needs. She was able to have a better sense of the stage of training in which the workshop would have the most impact on the residents' clinical care, and also a better sense of the value of the workshop in the residents' professional development. The process also left Dr. S. with a heightened sense of professional satisfaction, knowing that she was maximizing her effectiveness as an educator, as well as participating in outcomes-based education research.

Case 2: Outpatient Clinical Experience

For many years, residents have been rotating on an elective basis through an outpatient experience in Dr. P.'s clinic, in which they encountered tertiary referral patients suffering from an uncommon (outside of this clinic) disease. Since most residents would not, in the course of their professional careers, be responsible for the management

Fig. 2. Sample CEPI page, didactic small group workshop.

Component: Poetry Workshop Category: Didactic Setting: Small-group workshop Faculty: Dr. R. Description: Monthly workshop in which poetry dealing with issues such as doctor-patient communication, the experience of illness, the experience of being a physician, and other relevant issues, is presented for discussion. Competencies: Professionalism, interpersonal skills and communication, patient care.				
Question	Assessment	Competency	Personnel	Priority
Do residents find the Poetry Workshop to be clinically useful?	Resident survey	Professionalism, interpersonal skills and communication, patient care	Chief resident	
Is this workshop effective in enhancing the resident's experience of being a physician?	Reflective learning: "I can recall a specific clinical encounter in which I thought about something we discussed in the Poetry Workshop."		Dr. R.	
Comments:				

Fig. 3. Sample CEPI page, clinical inpatient service.

Component: Elmhurst Hospice Service Category: Clinical Setting: Inpatient wards Faculty: Hospice faculty Description: Senior residents manage patients admitted to the Hospice service, under the supervision of faculty of the Department of Ambulatory Care. Competencies: All				
Question	Assessment	Competency	Personnel	Priority
Do residents find this rotation to be clinically useful?	Resident survey	All	Chief resident	
Is there a proper balance between service and learning?				
Is the level of supervision appropriate?	Assessment of resident's mastery of end-of-life palliative care, assessed by Board performance, in-service exam, or patient outcomes.			
At the conclusion of this rotation, does the resident feel comfortable managing palliative care patients at the end of life?				
Is this an effective modality for learning end-of-life care?				
Does this rotation have an impact on the resident's professional development?	Reflective learning: "Can you recall a particular experience you had in this rotation that was important to you?"	Professionalism	Hospice faculty	
Comments:				

of patients with this condition, concern arose over the programmatic value of this rotation, especially given the conflicting demands for residents' time. The CEPI approach was applied to address these issues. A resident survey was designed, asking residents about their views of the clinical value of the rotation, their perception of the balance between service demands and learning experiences, and their opinions about the role of the experience in their professional development. The residents' responses could then be analyzed both as a parallel to Dr. P.'s subjective assessment of each resident's mastery of the management of patients in this clinical setting, as well as the counterpart of an objective assessment of their synthesis of the clinical content. In this way, a comprehensive picture of the competency-based programmatic value of this rotation could be drawn, resulting in a refinement and redirection of its learning objectives and curricular goals. To bring the process full circle, the residents' subjective and objective responses to this curriculum refinement and redirection could then be assessed.

Case 3: Evaluative

Consistent with the ACGME's recommendation that formal resident evaluations be collected from professional staff members other than physicians, we developed an evaluative instrument in which ward nurses provided feedback on residents' performance in the competencies of *professionalism, systems-based practice, and interpersonal skills and communication*. Recognizing, however, that gathering data was easier than ensuring that the data contributed in a meaningful way to outcomes-based resident assessment, we endeavored to address this problem by the CEPI approach. In order to approach the question of whether or not the nurses' evaluations were adding new information about residents' performance, we compared, for each resident, the nurses' assessments of these competencies with that of other evaluators (e.g., attending physicians). We also looked for external measures of the attainment of these competencies (i.e., performance on a clinical evaluation exercise [mini-CEX] and summative scores submitted for each resident to the American Board of Internal Medicine) to correlate with the scores given by the nurses. Further, we looked to demonstrate the programmatic value of the process of nurse evaluation by examining its role in improving the quality of interpersonal and professional interactions between residents and nurses. By this approach, a comprehensive view of the overall programmatic value of instituting these evaluations was obtained.

Discussion

With the public's increasing concern with issues such as medical errors (5), patient safety (6), physician accountability and professionalism (7, 8), physician communication skills (9, 10), certification and licensure, and the overall quality and value of medical care (11), closer scrutiny has been given to the role and quality of medical training and education (2). The ACGME's elucidation of the six core competencies has helped us to define the qualities that comprise the effective physician, while the outcome project (see *Background*, above) has provided a framework for assessing and assuring the success of the training and education process. How exactly to apply these concepts to individual residents and programs, however, has remained a subject of debate among medical educators (12–14). The process described in this report provides one strategy that we have found to be useful. Specifically, we produced a 76-page compendium of 301 questions, which has provided us with a handy, portable document that can be disseminated widely to relevant personnel, including clinical and didactic faculty, residents at each training level, other members of the health care team, and administrators, as a means of collecting input and feedback as to the goals and directions of the program. It thus yields both a *blueprint* of where the program is, as well as a *roadmap* of the directions the program needs to go. It provides a mechanism for the coordinated and comprehensive assessment of diverse program elements.

As illustrated in the examples given above, this multi-step process has a number of strengths. It allows for the concurrent assessment of content- and process-based features with outcomes-based features of each programmatic learning element. It enables us to simultaneously assess a learning element's outcome (demonstration of competency-based effectiveness) and its programmatic value. It integrates the assessment of the cognitive aspects of a programmatic element with its clinical aspects, and it integrates the input of evaluators at various levels. It aids in identifying clinical elements that entail undue or excessive "service demands" and it facilitates the identification of the clinical learning environments where specific elements of learning may occur. Inasmuch as each question is applicable to each of the three years of training, it facilitates a coordinated, systematic evaluation of the progress of learning over the course of the program. In addition, it has the benefit of orienting faculty members to an evidence-based research mode of thinking and teaching.

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