

## Residency Education

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# The Future of Residency Education: Implementing a Competency-based Educational Model

Frederick D. Edwards, MD; Keith A. Frey, MD

*Graduate medical programs are faced with increasing calls for competency-based education. All accredited residencies and fellowships must now demonstrate that graduates are competent in six key areas, and outcomes data must be used to improve each program. The transition to competency-based education has challenged programs in all specialties. We describe the design, implementation, and outcomes measurement of a comprehensive, competency-based family medicine curriculum that uses multiple educational components and assessment tools in various settings and relies on both formative and summative feedback. Components include inpatient and outpatient core competencies, a longitudinal didactic curriculum, a competency-based procedures curriculum, and use of medical evidence to improve individual patient care in ambulatory practice. In addition to multiple evaluation tools (eg, video monitoring, rotation-specific evaluations, adviser-advisee meetings, faculty meetings, and checklist evaluations of procedures and physical examinations), residents receive feedback from patients, faculty, nurses, transcriptionists, and referring physicians. The curriculum demonstrates resident competence in six core areas and resident confidence in skills acquired by the completion of training. The evaluation system promotes greater objectivity in information provided to future employers and hospitals about residents. This model provides a curricular template for other accredited residency programs.*

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Since its commitment in September 1997 to the use of educational outcomes as an accreditation tool, the Accreditation Council for Graduate Medical Education (ACGME) has moved the accreditation of graduate education programs toward a competency-based educational model through an initiative called the Outcome Project. Prior to 1997, the ACGME's accreditation decisions about a program's potential to educate were based on its structure, compliance with requirements, and the presence of a satisfactory curriculum with evaluation mechanisms. With the new emphasis on competency-based education, the ACGME's focus has shifted to assessment of program outcomes and whether graduates are competent when they complete their training.

In 1999, the ACGME adopted six core competencies and required their incorporation into the Residency Review Committee's requirements for each specialty.

These six areas of competence (medical knowledge, patient care, interpersonal and communication skills, professionalism, practice-based learning and improvement, and systems-based practice)<sup>1</sup> delineate the required outcomes for accredited training programs. Programs must develop both measurable learning objectives that define competence in each area and valid assessment tools to determine whether the objectives have been attained before graduation.

With the arrival of the 2006 deadline for implementation, many programs are searching for ways to incorporate the competencies into their curricula. A review by Leach<sup>2</sup> describing the project did not provide specific guidelines for implementation. Similarly, the ACGME has collected descriptions of various evaluation tools,<sup>3</sup> but little has been published on how to use them to create a comprehensive evaluation system addressing all six competencies.

A survey of family medicine residency program directors highlights the confusion that surrounds implementation of the competencies.<sup>4</sup> Nearly 19% of program directors were unaware that the ACGME will

cite programs for not implementing the competencies, and a large number also did not recognize existing evaluation tools within their programs, such as the American Board of Family Medicine (ABFM) In-Training Exam and patient satisfaction surveys administered by sponsoring institutions or insurance payers.<sup>4</sup> The educational and evaluation system created by the family medicine residency of Mayo Clinic, Scottsdale, Ariz, is reviewed in this report as an example of how new and existing tools may help achieve the goals of the ACGME Outcome Project.

### **Instructional System**

Our instructional system at Mayo Clinic, Scottsdale, includes six core elements. These are (1) outpatient competencies developed by the Society of Teachers of Family Medicine (STFM) Task Force on Competency-based Education,<sup>5</sup> (2) inpatient competencies developed by the program itself, (3) a competency-based procedures curriculum, (4) a 3-year curriculum of didactic lectures, (5) an information mastery curriculum, and (6) a required year-long practice improvement project called the Collaborative Care Team Project.

#### *Outpatient and Inpatient Competencies*

The STFM outpatient competencies<sup>5</sup> consist of 27 competencies in the five key realms of clinical acumen, interpersonal skills, organizational skills, business practices, and personal and professional growth and development. To achieve “competence,” residents must consistently demonstrate specific behaviors and skills. Similarly, the inpatient competencies reflect skills and behaviors appropriate for the inpatient setting.

#### *Procedures Curriculum*

The Competency-based Procedures Curriculum both teaches and assesses resident procedural competence. The core procedures of the specialty of family medicine are categorized as required (competence required before graduation), recommended (but not required for graduation), and elective (requiring additional training through use of elective time) (Table 1).

A detailed competency assessment sheet listing step-by-step instructions for each procedure is available on our institutional intranet for review anytime. A faculty physician certifies that the procedure is performed in an acceptable manner and renders an opinion of competence at the completion of the procedure by answering the question: “In your overall assessment, is the resident competent to perform this procedure without direct supervision, prompting, or other assistance from the preceptor?”

#### *Didactics*

The structured curriculum of didactic lectures ensures that each resident is exposed to the core knowledge of family medicine during the 3-year residency.

All residents are required to attend a half-day workshop every 2 weeks. The first 2 hours of each workshop consist of a series of lectures covering 234 topics over 3 years. The curriculum is set 3 years in advance to ensure that all topics are covered.

#### *Information Mastery*

The information mastery curriculum begins during the first month of training when first-year residents attend a demonstration of critical appraisal skills, perform literature searches, and participate in an Internet resources workshop where they answer clinical questions using Web-based resources.

With the commencement of patient care in the outpatient setting, they complete monthly educational prescriptions in which one resident from each class develops a clinical question from actual patient encounters and works with the preceptor to find the best answer using secondary sources of evidence. The results are presented during lecture workshops and emphasize recommendations for practice improvement or changes in clinical care.

As residents gain experience with evidence-based medicine, they progress to a more-involved project called the Mayo Education Research and Information Technology conference. Working as pairs of second- and third-year residents, they outline a clinical scenario that demonstrates a need for information, develop a clinical question, and search the primary literature for the single best piece of evidence to answer the question. The findings are presented at an evening meeting and must include a description of their search strategy, the results of their consultation with a librarian, a rating of the evidence, and a critical appraisal of the selected article. They must also describe the relevance of the evidence and whether it points to the need for clinical practice changes. Finally, their two-page critically appraised topic summary is published on the institution’s intranet Web site.

#### *Collaborative Care Team Project*

The Collaborative Care Team Project, a required group project completed by the third-year class of residents, builds on these evidence-based medicine skills. The residents select a disease or condition commonly encountered in primary care, develop a clinical guideline outlining the best care for that condition based on current evidence, lead its implementation in the Family Medicine Center, and guide a chart review assessment of the effectiveness of their efforts. Select faculty members serve as mentors and coach the residents through each phase of the project.<sup>6-8</sup>

In addition to these activities, block rotations have been created or modified to specifically address areas of emphasis for the Outcome Project. The community medicine block rotation has been modified to include online modules introducing residents to the system

Table 1  
Competency-based Procedures Curriculum

<i>Treatment Focus</i>	<i>Core Procedures*</i>	<i>Recommended Procedures</i>	<i>Elective Procedures†</i>
Dermatology	Abscess incision and drainage Cryosurgery Dermabond‡ application Incisional biopsy Laceration repair Punch biopsy Shave biopsy Skin tag removal Wart destruction	Lipoma injection Lipoma removal Sebaceous cyst removal	
Eye, ear, nose, and throat	Management of epistaxis	Removal of corneal or conjunctival foreign bodies Removal of foreign bodies from the ear and nose	
Gastroenterology	Anoscopy	Thrombosed hemorrhoid treatment	Colonoscopy Flexible sigmoidoscopy Office treatment of hemorrhoids
Gynecology	Endometrial biopsy Papanicolaou smear or pelvic examination Wet mount or KOH preparation	Breast cyst aspiration Diaphragm fitting IUD insertion (both ParaGard§ and Mirena¶) IUD removal	Bartholin cyst or abscess treatment Colposcopy
Urology		Bladder catheterization Circumcision (Gomco or Mogen) Suprapubic aspiration	Vasectomy
Inpatient		Central line placement Endotracheal intubation IV placement Lumbar puncture NG tube placement Paracentesis Thoracentesis Venipuncture	
Nail	Subungual hematoma evacuation	Digital mucous cyst removal Ingrown toenail removal	
Orthopedics	Reduction of nursemaid's elbow	Reduction of shoulder dislocation; aspiration or injection of: carpal tunnel, De Quervain tenosynovitis, ganglion cyst, lateral epicondyle, medial epicondyle, trigger finger, trigger point, myofascial pain, trochanteric bursae, AC joint, CMC joint, knee, shoulder; casting of upper and lower extremities; splinting of upper and lower extremities	
Cardiology			ETT (ECG treadmill testing)
Nonallopathic therapies			Acupuncture Osteopathic manipulative therapy

AC—acromioclavicular  
CMC—carpometacarpal  
ECG—electrocardiogram  
ETT—exercise treadmill test  
IUD—intrauterine device  
IV—intravenous  
KOH—potassium hydroxide  
NG—nasogastric

\* Competency required for graduation.

† Requires use of elective rotation.

‡ Dermabond (Ethicon, Inc, San Diego)

§ ParaGard T380A (FEI Products, LLC, North Tonawanda, NY)

¶ Berlex (Montville, NJ)

Table 2  
Curriculum Overview

<i>ACGME Core Competency</i>	<i>Curricular Element</i>	<i>PGY Level</i>	<i>Evaluator</i>	<i>Format</i>	<i>Frequency</i>
Patient care	Outpatient core competency				
	IS1: Primacy of patient need	2 1,2,3	OP preceptor Video review	CSET 5-point Likert scale *	Each FR session Quarterly
	IS2: Values of family medicine	2	OP preceptor	CSET	Each FR session
	CA2: Develop hypothesis	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale * Yes/no question	Each FR session Quarterly Each FR session
	CA3: Evaluate problem(s)	1	OP preceptor	CSET	Each FR session
	CA4: Prioritize diagnoses	1	OP preceptor	CSET	Each FR session
	CA6: Develop action plan	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale * Yes/no question	Each FR session Quarterly Each FR session
	CA7: Implement plan	2 1,2,3	OP preceptor Patient	CSET Yes/no question	Each FR session Each FR session
	CA8: Additional sensitive issues	2	OP preceptor	CSET	Each FR session
	CA9: Referrals	2	OP preceptor	CSET	Each FR session
	CA10: Arrange follow-up	1 1,2,3	OP preceptor Patient	CSET Yes/no question	Each FR session Each FR session
	OS1: Health maintenance	2	OP preceptor	CSET	Each FR session
	OS2: Longitudinal care	2	OP preceptor	CSET	Each FR session
	OS4: Timely completion of tasks	3	OP preceptor	CSET	Each FR session
	OS5: Document the visit	1	OP preceptor	CSET	Each FR session
	Checklist physical examination performance	1	Preceptor	Yes/no checklist	Once
	Procedures curriculum	1,2,3	Preceptor	Yes/no checklist	Each procedure
	Inpatient core competency				
	Triage patient to appropriate care level	1	IP preceptor	4-point scale <sup>†</sup>	Weekly on service
	Interpret laboratory data accurately	1	IP preceptor	4-point scale	Weekly on service
	Interpret vital signs correctly	1	IP preceptor	4-point scale	Weekly on service
	Call for help appropriately	1	IP preceptor	4-point scale	Weekly on service
	Perform appropriate physical examination	1	IP preceptor	4-point scale	Weekly on service
	Manage inpatient time	1	IP preceptor	4-point scale	Weekly on service
	Interpret imaging studies	1	IP preceptor	4-point scale	Weekly on service
	Interpret electrocardiograms	1	IP preceptor	4-point scale	Weekly on service
	Develop and implement management plans	2	IP preceptor	4-point scale	Weekly on service
	Recognize deterioration and stabilize	2	IP preceptor	4-point scale	Weekly on service
	Understand workup and management of specific disease states (list of 14)	2	IP preceptor	4-point scale	Weekly on service
	Able to make decisions	3	IP preceptor	4-point scale	Weekly on service
	Manage cardiac arrest or acute destabilization	3	IP preceptor	4-point scale	Weekly on service
	Supervise less-experienced learners	3	IP preceptor	4-point scale	Weekly on service
	Assess and manage fluid status	3	IP preceptor	4-point scale	Weekly on service
	Use antimicrobials appropriately	3	IP preceptor	4-point scale	Weekly on service
	Use pressors and antiarrhythmics	3	IP preceptor	4-point scale	Weekly on service
	Provide consultations and perioperative management to other services	3	IP preceptor	4-point scale	Weekly on service
	Supervise care of multiple patients	3	IP preceptor	4-point scale	Weekly on service
	Manage telephone calls	3	IP preceptor	4-point scale	Weekly on service

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Table 2  
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<i>ACGME Core Competency</i>	<i>Curricular Element</i>	<i>PGY Level</i>	<i>Evaluator</i>	<i>Format</i>	<i>Frequency</i>
Medical knowledge	Outpatient core competency				
	CA2: Develop hypothesis	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale Yes/no question	Each FR session Quarterly Each FR session
	CA3: Evaluation of problem	1	OP preceptor	CSET	Each FR session
	CA4: Prioritizing diagnoses	1	OP preceptor	CSET	Each FR session
	ABFM In-training Exam	1,2,3	ABFM	Multiple choice	Annually
	Procedures curriculum	1,2,3	Preceptor	Yes/no checklist	Each procedure
	Rotation-specific evaluation forms	1,2,3	Various	5-point Likert scale	With each rotation
	MERIT conference	2,3	Research director	Yes/no checklist	Annually
	Inpatient core competency				
	Use of guidelines and algorithms	1	IP preceptor	4-point scale	Weekly on service
	Fund of medical knowledge	1,2	IP preceptor	4-point scale	Weekly on service
	Participation during teaching sessions	1	IP preceptor	4-point scale	Weekly on service
	Clinical decision making	2	IP preceptor	4-point scale	Weekly on service
	Ability to formulate differential diagnosis	2	IP preceptor	4-point scale	Weekly on service
	Care of elderly or dying patients	2	IP preceptor	4-point scale	Weekly on service
	Provision of palliative care	2	IP preceptor	4-point scale	Weekly on service
	Rounding and morning report leadership	3	IP preceptor	4-point scale	Weekly on service
	Bedside teaching	3	IP preceptor	4-point scale	Weekly on service
	Application of quality improvement efforts	3	IP preceptor	4-point scale	Weekly on service
Interpersonal and communication skills	Outpatient core competency				
	CA1: Reason for visit	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale * Yes/no question	Each FR session Quarterly Each FR session
	CA3: Evaluate the problem	1	OP preceptor	CSET	Each FR session
	CA5: Present diagnosis to patient	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale * Yes/no question	Each FR session Quarterly Each FR session
	CA10: Arrange follow-up	1 1,2,3	OP preceptor Patient	CSET Yes/no question	Each FR session Each FR session
	IS1: Primacy of patient needs	2 1,2,3	OP preceptor Video review	CSET 5-point Likert scale *	Each FR session Quarterly
	IS2: Values of family medicine	2	OP preceptor	CSET	Each FR session
	IS3: Foster nurturing relationship	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale * Yes/no question	Each FR session Quarterly Each FR session
	IS4: Work with staff	3	360 review	CSET	Each FR session
	IS5: Work with colleagues	3	360 review	CSET	Each FR session
	IS6: Work with professionals	3	360 review	CSET	Each FR session
	OS5: Document the visit	1	OP preceptor	CSET	Each FR session
	OS6: Update medication and problem lists	2	OP preceptor	CSET	Each FR session
	360 Evaluation	1,2,3	Multiple*	5-point Likert scale	Semiannually
	Evaluation by referring physicians	3	Outpatient PCPs	Yes/no questions	5 weeks on service

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Table 2  
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<i>ACGME Core Competency</i>	<i>Curricular Element</i>	<i>PGY Level</i>	<i>Evaluator</i>	<i>Format</i>	<i>Frequency</i>
	Inpatient core competency				
	Communicate with patients without jargon	1	IP preceptor	4-point scale	Weekly on service
	Consent patients for procedures	1	IP preceptor	4-point scale	Weekly on service
	Document patient care	1	IP preceptor	4-point scale	Weekly on service
	Provide patient education	1	IP preceptor	4-point scale	Weekly on service
	Conduct comprehensive and complete history and physical	1	IP preceptor	4-point scale	Weekly on service
	Update daily sign-out sheet	1	IP preceptor	4-point scale	Weekly on service
	Communicate with allied health staff	1	IP preceptor	4-point scale	Weekly on service
	Formulate discharge summary	1	IP preceptor	4-point scale	Weekly on service
	Quality of charting	2	IP preceptor	4-point scale	Weekly on service
	Lead family conferences	2	IP preceptor	4-point scale	Weekly on service
	Address end-of-life issues	2	IP preceptor	4-point scale	Weekly on service
	Assist junior learners with patient care	2	IP preceptor	4-point scale	Weekly on service
	Formulate questions for consultants	2	IP preceptor	4-point scale	Weekly on service
	Communicate empathetically	3	IP preceptor	4-point scale	Weekly on service
	Deliver feedback to junior learners	3	IP preceptor	4-point scale	Weekly on service
	Coordinate care of multiple specialists	3	IP preceptor	4-point scale	Weekly on service
	Reconcile differences within care team	3	IP preceptor	4-point scale	Weekly on service
Professionalism	Outpatient core competency				
	CA6: Develop action plan	1 1,2,3 1,2,3	OP preceptor Video review Patient	CSET 5-point Likert scale* Yes/no question	Each FR session Quarterly Each FR session
	CA8: Additional sensitive issues	2	OP preceptor	CSET	Each FR session
	PGD1: Continuing medical education	3	Advisor	CSET	Quarterly
	PGD2: Growth activities	3	Advisor	CSET	Quarterly
	PGD3: Anticipate future and advocate reform	3	Advisor	CSET	Quarterly
	BP1: Bill appropriately	1	OP preceptor	CSET	Each FR session
	BP2: Marketing	3	OP preceptor	CSET	Each FR session
	OS3: Time efficiency and professionalism	2 1,2,3	OP preceptor Video review	CSET 5-point Likert scale*	Each FR session Quarterly
	360 Evaluation	1,2,3	Multiple*	5-point Likert scale	Semiannually
	Inpatient core competency				
	Punctuality	1	IP preceptor	4-point scale	Weekly on service
	Respect for patient confidentiality	1	IP preceptor	4-point scale	Weekly on service
	Collaborate to distribute workload	1	IP preceptor	4-point scale	Weekly on service
	Timely response to pages and floor calls	1	IP preceptor	4-point scale	Weekly on service
	Adhere to HIPPA and Mayo Clinic conduct standards	2	IP preceptor	4-point scale	Weekly on service
	Manage patient concerns appropriately	2	IP preceptor	4-point scale	Weekly on service
	Settle collegial differences professionally	2	IP preceptor	4-point scale	Weekly on service
	Assist colleagues with excess patient loads	3	IP preceptor	4-point scale	Weekly on service
	Foster team unity and collaboration	3	IP preceptor	4-point scale	Weekly on service
	Deal with difficult patients with tact	3	IP preceptor	4-point scale	Weekly on service
	Assume a leadership role	3	IP preceptor	4-point scale	Weekly on service

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Table 2  
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<i>ACGME Core Competency</i>	<i>Curricular Element</i>	<i>PGY Level</i>	<i>Evaluator</i>	<i>Format</i>	<i>Frequency</i>
Systems-based practice	Collaborative care team project	3	Research director GRSE Self	Yes/no questions 5-point Likert scale 5-point Likert scale	Project completion Grand rounds Project completion
	Outpatient core competency				
	PGD3: Anticipate future and advocate reform	3	Advisor	CSET	Quarterly
	IS6: Work with professionals	1,2,3 1,2,3	360 review Rotation director	5-point Likert scale 5-point Likert scale	Weekly on service Semiannually Each rotation
	Evaluation by referring physicians	3	Outpatient PCPs	Yes/no questions	5 weeks on service
	Community medicine block rotation	2	Rotation director	5-point Likert scale	End of rotation
	Practice management block rotation	2	Rotation director	5-point Likert scale	End of rotation
	Inpatient core competency				
	Utilize electronic record systems	1	IP preceptor	4-point scale	Weekly on service
	Integrate role of allied professions into care	1	IP preceptor	4-point scale	Weekly on service
	Apply EBM principles to care	2	IP preceptor	4-point scale	Weekly on service
	Foster team approach and interdisciplinary care	2	IP preceptor	4-point scale	Weekly on service
	Coordinate transition of care and discharge	2	IP preceptor	4-point scale	Weekly on service
	Assist patient with system complexities	2	IP preceptor	4-point scale	Weekly on service
	Partner with social services to facilitate care	3	IP preceptor	4-point scale	Weekly on service
	Understand inpatient billing codes	3	IP preceptor	4-point scale	Weekly on service
	Understand medicolegal issues (competency, DNR)	3	IP preceptor	4-point scale	Weekly on service
	Allocate resources cost-effectively	3	IP preceptor	4-point scale	Weekly on service
Practice-based learning	Collaborative care team project MERIT conference	3 2,3	Research director Research director	Yes/no questions Yes/no checklist	End of project Annually
	Inpatient core competency				
	Advance knowledge of patients via reading	1	IP preceptor	4-point scale	Weekly on service
	Use informatics to enhance knowledge and skill	1	IP preceptor	4-point scale	Weekly on service
	Conduct literature searches relevant to patient care	1	IP preceptor	4-point scale	Weekly on service
	Apply EBM to inpatient care	2	IP preceptor	4-point scale	Weekly on service
	Adapt information technology to care	2	IP preceptor	4-point scale	Weekly on service
	Teach medical students and oversee their care	2	IP preceptor	4-point scale	Weekly on service
	Utilize online clinical services	3	IP preceptor	4-point scale	Weekly on service
	Promote junior resident learning	3	IP preceptor	4-point scale	Weekly on service
	Appraise and apply clinical evidence	3	IP preceptor	4-point scale	Weekly on service

ABFM—American Board of Family Medicine, ACGME—Accreditation Council for Graduate Medical Education, BP—business practice, CA—clinical acumen, CSET—competency-specific evaluation tool (with five competency-specific anchors, the two highest of which are “Competent” and “Mastery”), DNR—do not resuscitate, EBM—evidence-based medicine, FR—focus resident, GRSE—grand rounds speaker evaluations (from attendees at grand rounds presentation), HIPPA—Health Insurance Portability and Privacy Act, IP—inpatient, IS—interpersonal skill, MERIT—Mayo Education Research and Information Technology, OP—outpatient, OS—organizational skill, PGD—professional growth and development, PGY—postgraduate year

\* Video review 5-point Likert scale with anchors “Yes,” “Somewhat,” and “No.”

† Inpatient 4-point scale of “below expected level,” “at expected level,” “able to progress to next level,” and “mastery.”

‡ 360-degree review completed by nurses, schedulers, administrative assistants, program coordinators, transcriptionists, and faculty physicians.

resources available for patients. A block rotation in practice management has also been created to ensure that residents develop the ability to create the operational infrastructure required for appropriate patient care.

### Assessment System

The program uses various standard and novel assessment tools. These tools are available as Appendices 1-3 on the Family Medicine Digital Resources Library (FMDRL) Web site. The curriculum and assessment system is summarized in Table 2. In addition to conventional evaluations by supervising faculty, the program uses both live and videotaped reviews; evaluations by patients, referring physicians, and allied health staff; checklist evaluations of both physical examination and procedure performance; quarterly reviews with faculty advisors and the entire core faculty; rotation-specific evaluation forms; the ABFM In-training Exam; and evaluations of the various components of the evidence-based medicine curriculum.

During each patient care session, one resident is selected as the "focus resident" who sees every consenting patient in an audiovisually monitored examination room. These patient encounters are monitored by a preceptor who assesses each outpatient competency pertinent to the resident's year of training (Appendix 1 on the FMDRL Web site at [www.fmdrl.org/907](http://www.fmdrl.org/907)). Evaluation sheets describe specific levels of performance for each competency, with the two highest levels being "competence" and "mastery."

A resident is deemed competent when three different preceptors rank the resident at the competence level of functioning on three different occasions. Each resident has one focus resident session videotaped quarterly, and the videotapes are reviewed with the program's behaviorist using a scoring sheet that parallels the outpatient competencies. Patients are also asked to rate the focus resident's performance on selected competencies by way of a questionnaire completed at the end of each visit (Appendix 2 on FMDRL Web site at [www.fmdrl.org/908](http://www.fmdrl.org/908)).

At the beginning of each academic year, all new residents must conduct a live history and a physical examination in a video-monitored room. Their performance is measured using a checklist of the accepted departmental standards that includes many of the skills and behaviors delineated by the STFM competencies. Demonstration of an acceptable level of performance is required before the resident can begin supervised patient care activities.

Throughout training, residents undergo semiannual "360-degree reviews" that solicit feedback from nursing, transcription, administration, front desk, and scheduling personnel. The competencies assessed include interpersonal and communication skills, profes-

sionalism, ability to function as a member of the health care team, and ability to function within the larger context of the health care system. In addition, each third-year resident receives feedback from primary care physicians whose patients are admitted and cared for by the family medicine inpatient team. This feedback focuses on issues of professionalism, communication skills, and ability to function within the larger context of the health care system.

Another key evaluation component is use of rotation-specific evaluation forms (Appendix 3 on FMDRL Web site at [www.fmdrl.org/909](http://www.fmdrl.org/909)). The performance of residents is evaluated on every rotation using a form that not only asks general questions about professionalism, patient care abilities, and interpersonal and communication skills but also requests specific feedback on the resident's level of competence in the medical knowledge, skills, and attitudes specific to that rotation as set forth in its learning goals and objectives. Satisfactory completion of a given rotation requires achievement of a competent level of functioning for each component of the evaluation.

All residents are also required to sit annually for the ABFM In-training Exam. Low scores are addressed through individualized educational activities. Metrics have also been created for each phase of the information mastery curriculum.

### Results

This integrated instructional and assessment system allows evaluation of all six ACGME core competencies. The components that assess each competency are outlined in Table 2. Many system components address more than one competency. Implementation of the system has created an unambiguous infrastructure to help provide objective resident assessment. Since inception of the system, all difficulties encountered by problem learners have been framed within the context of unmet competencies. Doing so allows for both an objective description of the problem and creation of a remediation plan based on the competencies.

The system has received a high level of acceptance from faculty and residents alike. Continuous tracking of evaluations with follow-up of missing forms by residency administrative staff is required. Residents receive feedback in several ways: review of outpatient competency evaluations at the end of each focus resident session, monthly reviews of rotation evaluations, quarterly review of resident files with a faculty advisor, 3-hour quarterly review meetings involving all faculty, and semiannual meetings with the program director. A small faculty progress committee meets monthly to track and assist any residents whose performance is lagging.



Although the desired result of the Outcome Project is to produce better physicians, there has been insufficient time since its inception to allow for assessment of that goal. Even the assessment tools in the ACGME Toolkit are not well validated in residency settings. Consequently, intermediate outcomes must be used to assess program implementations. One such intermediate outcome will be whether the ACGME and its Residency Review Committee for family medicine look favorably on a given implementation strategy. Components of our system have withstood such scrutiny. A poster describing the Collaborative Care Team Project won first prize at an ACGME conference on implementation of the core competencies. Additionally, the family medicine Residency Review Committee commended the program for "its demonstrated substantial compliance with the ACGME's requirements" after a site visit in March 2005.

### Discussion

The creation of a competency-based educational system requires the thoughtful assembly of several key components and a plan to guide its successful implementation. Key components include both instructional and assessment pieces, as well as the energy and buy-in of dedicated faculty members. Specific learning objectives, valid assessment tools, and a safe learning environment where the learner feels comfortable disclosing self-identified deficiencies are essential.

The creation of the system described herein involved several faculty brainstorming sessions to develop assessment tools. These meetings created a level of faculty buy-in that allowed subsequent revisions and additions to the system to be accomplished by smaller groups without objection from the larger faculty. Resident involvement in these sessions, the use of the competencies to frame deficiencies, and the consequences of delayed advancement or postponed graduation for failing to achieve competence have enhanced resident acceptance.

Quarterly adviser-advisee meetings offer residents an opportunity to review their individual progress and provide time for discussions of professional development. A list of topics specific to each resident's level of training serves as a template for these discussions. Quarterly extended faculty meetings allow for the review of each resident, the creation of individual learning goals, and the identification of any problems.

The importance of feedback cannot be overemphasized. Implementation of the system has included regular grand rounds presentations on the delivery and reception of feedback. Workshops were created for the intern orientation month to review the competencies and feedback. Input from faculty and residents emphasized the need to avoid the terms "incompetent" or "not competent" on evaluation forms.

The Family Practice Center was modified physically by constructing a doorway between the resident workroom and an adjacent office. The preceptor's office thereby created houses the exam room monitors and posters detailing the competencies, which allows the preceptor to offer immediate, specific feedback to residents. Since the evaluation tools are either a part of a given activity (as in the procedures) or replace prior evaluation tools, they require little additional faculty time. Creation of the individualized, detailed checklists for performance of procedures has required the greatest amount of faculty time. Robust administrative support is required to track individual evaluations and deliver summarized data to residents and faculty. The collation and tracking of evaluations has required additional administrative time of as much as one fourth that of a full-time equivalent position.

### Conclusions

As graduate medical education moves forward in the new millennium, competency-based educational systems focused on educational outcomes are required to ensure that graduates are equipped to provide the safest, most appropriate, and most compassionate care possible. The Outcome Project clearly has this goal in mind, but its implementation may present challenges to many programs as they are forced to develop new educational objectives and assessment mechanisms. With a renewed focus on the principles of competency-based education and building on existing resources to develop new assessment tools, it is possible for programs to achieve the desired outcome.

Many of the competencies and assessment tools we have discussed are generalizable to other specialties. The assessment of procedural competence would require further development for surgical specialties, but the core elements of the ACGME competencies, aside from perhaps medical knowledge and patient care, are the same for all specialties. Each residency should select evaluation tools that are feasible to implement, applicable to their situation, reflective of the learning objectives being taught, and capable of providing meaningful information to both residents and faculty. The system of assessment should include several different tools used in multiple observations of the resident by several different evaluators. Implementation of such tools is best accomplished when the faculty members responsible for their use are involved in their creation.

Clearly, competency-based education is possible in a family medicine residency, and many of the tools used for its implementation are generalizable. The educational and assessment systems described herein are works in progress that will be further refined over time. The next step of the ACGME Outcome Project is to assess graduate competence and modify curricula based on those assessments.

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*Corresponding Author:* Address correspondence to Dr Edwards, Mayo Clinic, Department of Family Medicine, 13737 North 92nd Street, Scottsdale, AZ 85260. edwards.frederick@mayo.edu.

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