

Identifying Entrustable Professional Activities in Internal Medicine Training

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Abstract

Background Entrustable professional activities (EPAs) can form the foundation of competency-based assessment in medical training, focused on performance of discipline-specific core clinical activities.

Objective To identify EPAs for the Internal Medicine (IM) Educational Milestones to operationalize competency-based assessment of residents using EPAs.

Methods We used a modified Delphi approach to conduct a 2-step cross-sectional survey of IM educators at a 3-hospital IM residency program; residents also completed a survey. Participants rated the importance and appropriate year of training to reach competence for 30 proposed IM EPAs. Content validity indices identified essential EPAs. We conducted independent sample *t* tests to determine IM educator-resident

agreement and calculated effect sizes. Finally, we determined the effect of different physician roles on ratings.

Results Thirty-six IM educators participated; 22 completed both surveys. Twelve residents participated. Seventeen EPAs had a content validity index of 100%; 10 additional EPAs exceeded 80%. Educators and residents rated the importance of 27 of 30 EPAs similarly. Residents felt that 10 EPAs could be met at least 1 year earlier than educators had specified.

Conclusions Internal medicine educators had a stable opinion of EPAs developed through this study, and residents generally agreed. Using this approach, programs could identify EPAs for resident evaluation, building on the initial list created via our study.

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Introduction

The public expects medical residents to reach competence for unsupervised practice by the completion of their training.^{1,2} Although competency assessment often focuses on discrete competencies³—defined qualities that trainees develop over time—medical practice involves integration of knowledge, attitudes, and skills from multiple competency

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domains. Entrustable professional activities (EPAs) are an approach to operationalize competency-based assessment in a holistic way. EPAs encompass real-life physician tasks essential for a particular specialty that require specific training and yield measurable outcomes.^{4,5} They describe features of work, whereas competencies are features of the trainee. EPAs facilitate competency-based assessment in clinical practice via supervisors' entrustment decisions, implying that a trainee is qualified to perform an EPA with a certain degree of independence.

To build an assessment system based on EPAs, the first critical step entails identifying physician tasks that exemplify essential activities. The selection of EPAs establishes evidence for the validity of the assessment by choosing EPAs that represent tasks central to clinical competence.⁶

This study aimed to identify EPAs aligned with national milestones, through a local Delphi study of internal medicine (IM) educators and residents, and to demonstrate a procedure applicable for identifying EPAs in other settings.

Methods

We used a 2-step cross-sectional survey study of IM educators and IM residents. We used a modified Delphi technique to generate consensus opinion about IM EPAs.

The setting for the study was the University of California at San Francisco (UCSF). The IM residency includes 128 categorical and 49 primary care residents. Residents rotate through 3 hospitals (tertiary care, public county, and Veterans Affairs).

Instrument Development

Three IM clinician educators (K.E.H., J.K., P.C.) and 1 education researcher (P.O.) drafted 30 potential EPAs from a review of the literature on EPAs, the American Board of Internal Medicine Milestones,⁷ the Residency Review Committee (RRC) and Accreditation Council for Graduate Medical Education Program Requirements,^{1,8} proposed pediatrics EPAs,⁹ and their own opinion of internists' essential activities (ie, the essential work of IM residents and practicing physicians, recognizing that different clinicians allocate their clinical time differently). The mapping of the potential EPAs to existing training standards and involvement of multiple experts contribute to evidence of content validity.⁶

Delphi Study

We then used the Delphi technique to develop a consensus opinion about proposed EPAs, with sequential anonymous surveys of experts, including quantitative feedback about prior responses and full inclusion of all data.¹⁰ Participants in the Delphi process included 68 department educational leaders (program, associate program, site, and fellowship directors; and chief residents). Participants were invited to

What was known

Entrustable professional activities (EPAs) are emerging as a core component of competency-based assessment and are an important concept in evidence-based decisions on supervision and resident physician autonomy.

What is new

A modified Delphi approach confirmed the content validity of 27 EPAs in internal medicine. For a number of these, residents felt they reached the entrustment stage 1 year earlier than the level specified by supervisors.

Limitations

Single-institution study, limited survey completion by some educators, and a potential for bias in favor of inpatient-oriented EPAs.

Bottom line

Educators and residents largely agreed on internal medicine EPAs. The approach could be used to identify additional EPAs for resident evaluation, building on the list created via this study.

2 half-day retreats, which provided an orientation to competency-based assessment and EPAs.

Round 1 At the first retreat, participants independently rated each EPA for importance by using a 0 to 4 scale (0 = absolutely do not include, 1 = not very important, 2 = kind of important, 3 = important, 4 = very important), and training year (postgraduate year 1 through 3) that an IM resident should be competent to conduct it independently (rating form provided as online supplemental material). Participants could suggest additional EPAs.

Round 2 At the second retreat, participants received the same rating sheet and their individual Round 1 ratings, mean group ratings and standard deviations for the importance question, and mode for the Round 1 training-year question. Participants independently rerated importance and year for each EPA. For additional evidence of content validity of candidate EPAs,⁶ we administered the survey to a convenience sample of 12 senior residents on their ambulatory care rotation.

The UCSF Institutional Review Board approved the study.

Analysis

We conducted several analyses to support the validity of the list of EPAs we developed. For each proposed EPA we calculated a content validity index¹¹ based on Round 2 ratings, along with the proportion of educator participants who rated importance as 3 or 4, with the expectation that items for which 80% or more of participants assigned those ratings had sufficient content validity. We also examined average variance changes between rounds to demonstrate that the method decreased variance. We conducted analysis of variance for each EPA final rating comparing primary care, hospitalist (including chief residents), and specialist physicians. Because our sample size was small, we examined effect size, partial eta-squared, defining effect

sizes less than 0.3 as small, effect sizes of approximately 0.5 as moderate, and effect sizes of approximately 0.8 or higher as large.¹² We compared educator-resident ratings by using *t* tests and report effect sizes.¹²

Results

Of 41 educator retreat participants, 36 completed at least 1 survey (87.8%) and 22 (53.6%) completed both. Respondents represented all 3 hospitals. Educator respondents included 16 hospitalists, 9 primary care physicians, and 11 specialists (instructor; assistant, associate, full professor). All 12 residents in our sample completed 1 survey.

The TABLE shows content validity indices for the 30 EPAs. Seventeen had a content validity index of 100%, 4 more exceeded 90%, 6 more exceeded 80%, and 3 fell below the 80% standard. The average variance for Round 1 EPA ratings was 0.54 and decreased as expected through the Delphi method to 0.43. The TABLE shows mean final (Round 2) importance ratings for the EPAs from educators and from residents' single survey. Three EPAs, all pertaining to inpatient general medicine teams, received mean ratings of 4.00 (SD = 0), indicating consensus about importance for IM trainees. Participants' write-in responses did not reveal thematic trends for additional EPAs, but identified components of listed EPAs, including professionalism, teamwork, quality, and teaching.

Educators and residents rated importance for 27 of 30 EPAs similarly. Residents rated "admit/manage a medical ICU [intensive care unit] patient" higher than did educators ($d = 0.88$), whereas educators rated "access medical information to provide evidence-based care" ($d = 1.06$) and "provide telephone management of an acute ambulatory problem" ($d = 0.75$) higher than did residents. There were 4 modest differences, in which educators rated the EPA higher than did residents (family meeting, discharge plan, serious news, access to care) and 2 in which residents assigned higher ratings (procedures, resuscitation). Educator and resident opinions differed about the training year by which residents should be trusted to perform multiple EPAs (TABLE). Residents rated 10 EPAs at least 1 year earlier than did educators.

Three ratings by primary care physicians, hospitalists, and specialists differed significantly with small effect sizes (0.22–0.23). For all 3, primary care physicians rated EPA importance higher than did hospitalists and specialists (TABLE).

Discussion

Meaningful assessment in graduate medical training requires evaluating performance of core professional activities. This study shows a procedure for identifying

activities that educators in a large IM training program identified as central to training. Resident respondents agreed with these ratings. This information can guide assessment focused on entrustment of trainees to perform EPAs independently.

We found greatest consensus and highest ratings for inpatient-oriented EPAs. This endorsement may indicate familiarity with inpatient training, based on historical training models rather than the ideal structure of the future, or the inclusion of the many hospitalists in our sample. Proposals for enhancing the amount and nature of ambulatory IM training reinforce the importance of both ambulatory and inpatient EPAs for robust skills assessment.¹³

Residents rated year of training earlier than did educators for one-third of proposed EPAs, consistent with findings of research in anesthesiology training.¹⁴ This discrepancy likely reflects differences in clinical experience and the reality of clinical practice in teaching institutions, in which trainees assume wide-ranging responsibilities, perhaps when they themselves may not feel qualified. Responsibilities are typically assigned by year of training rather than assessments demonstrating qualification. Innovative service redesign may help align teaching and supervision with service requirements.¹⁵ Interestingly, educators in our 3 specialty groups perceived the importance of EPAs similarly, a finding that adds support to the EPA list's validity, or at minimum offers evidence of a common institutional perspective.

Limitations of our study include the single-institution design and that some educators only completed 1 survey. The large proportion of hospitalists in our sample reflects the proportion of teaching faculty overall and the time residents spend on the inpatient service. However, it could have resulted in an increased emphasis on inpatient-oriented EPAs.

From our careful review of requirements for IM programs, including those from the RRC, we have reasonable confidence that the list of EPAs covers the field of general IM and represents core activities of the specialty. It is possible that other clinicians, educators, or training programs would prioritize other activities, or use other wording for the listed activities. The 4 educators who developed our list used national resources and also considered how internists allocate their time. There may be other relevant EPAs not included in our survey, but none of the participants offered such suggestions. Study strengths include the range of educational leader participants from 3 diverse teaching hospitals.

This study presents the foundation for using specific EPAs for competency- and milestones-based assessment of IM residents. Our participants supported the value of core inpatient and outpatient EPAs that could form the basis of

TABLE

VALIDITY INFORMATION FOR 30 PROPOSED INTERNAL MEDICINE (IM) ENTRUSTABLE PROFESSIONAL ACTIVITIES (EPAs)

EPa	CVI Rating 3 or 4, ^a %	IM Educator, Mean Rating ^b (SD)	Resident, Mean Rating ^b (SD)	Effect Size ^c	Mode Training Year ^d by IM Educator	Mode Training Year ^d by Resident	Partial Eta- Squared ^e
Evaluate and manage a new problem in a continuity ambulatory patient requiring coordination of care between providers and across settings	100	4.00 (0.00)	4.00 (0.00)	N/A	2	2	N/A
Admit and manage a medical inpatient with a new acute problem on a medical floor	100	4.00 (0.00)	4.00 (0.00)	N/A	2	1	N/A
Admit and manage a medical inpatient with an acute exacerbation of a chronic problem on a medical floor	100	4.00 (0.00)	4.00 (0.00)	N/A	2	2	N/A
Lead a family meeting to discuss serious or sensitive news with patient and/or family and other health providers	100	4.00 (0.00)	3.92 (0.29)	0.51	2	2	N/A
Perform initial H&P, develop problem list, and plan for new ambulatory patient in continuity practice	100	3.96 (0.19)	4.00 (0.00)	0.25	1	1	0.05
Provide continuity care, conducting interval visits, for primary care patients with multiple chronic conditions	100	3.96 (0.19)	4.00 (0.00)	0.25	3	2	0.11
Develop and implement a safe discharge plan for a patient from the acute care setting	100	3.96 (0.19)	3.83 (0.39)	0.48	1	1, 2	0.11
Discuss serious news with a patient and/or family (bad news, end-of-life care planning)	100	3.93 (0.26)	3.75 (0.45)	0.54	2	2	0.10
Provide continuity care, conducting interval visits, for primary care patients	100	3.93 (0.26)	3.92 (0.29)	0.04	2	1, 2	0.06
Triage medically ill patients to an appropriate level of care	100	3.93 (0.26)	4.00 (0.00)	0.32	2	1, 2	0.03
Access medical information to provide evidence-based care for adult patients	100	3.93 (0.26)	3.50 (0.52)	1.06	3	1	0.23
Identify and manage acute, emergent problems	100	3.93 (0.26)	3.92 (0.29)	0.04	2	2	0.03
Provide urgent and emergent cross-coverage care to medicine inpatients	100	3.78 (0.42)	3.58 (0.79)	0.36	1	1	0.19
Lead a team in managing multiple inpatients	100	3.75 (0.44)	3.58 (0.52)	0.43	2	2	0.12

TABLE VALIDITY INFORMATION FOR 30 PROPOSED INTERNAL MEDICINE (IM) ENTRUSTABLE PROFESSIONAL ACTIVITIES (EPAs) CONTINUED							
EPA	CVI Rating 3 or 4, ^a %	IM Educator, Mean Rating ^b (SD)	Resident, Mean Rating ^b (SD)	Effect Size ^c	Mode Training Year ^d by IM Educator	Mode Training Year ^d by Resident	Partial Eta-Squared ^e
Recognize and diagnose common non-internal medicine (surgical, neurological, dermatologic, etc) problems and appropriately refer to subspecialty care	100	3.68 (0.48)	3.83 (0.39)	0.33	2	1, 2	0.10
Diagnose conditions for and co-manage patients with complex problems needing subspecialty care (inpatient or outpatient)	100	3.56 (0.51)	3.67 (0.49)	0.18	3	2	0
Manage information and knowledge for personal learning to improve care delivery and to educate others (journal club, etc)	100	3.46 (0.51)	3.42 (0.52)	0.08	3	2	0.08
Institute palliative care appropriately in collaboration with palliative care specialists	96.4	3.46 (0.69)	3.25 (0.87)	0.27	2	2	0.02
Perform behavioral counseling with a patient	92.9	3.36 (0.62)	3.08 (0.67)	0.44	2	1	0.23
Provide medical consultation for patients receiving nonmedical services	92.6	3.07 (0.47)	2.92 (0.79)	0.26	3	3	0.02
Admit and manage a medical ICU patient	92	3.16 (0.55)	3.67 (0.49)	0.88	2	2	0.05
Identify and address a quality improvement need in a clinical setting	89.3	3.07 (0.54)	2.83 (1.03)	0.34	3	2	0.01
Provide telephone management of an acute problem for an ambulatory patient	88.9	3.41 (0.69)	2.83 (0.94)	0.75	3	2	0.12
Provide care to an inpatient or outpatient non-English-speaking patient, using appropriate translator services	88.9	3.30 (0.67)	3.42 (0.67)	0.15	1	1	0.05
Develop and implement an action plan based on review of performance data for one's ambulatory patient panel	85.7	3.14 (0.65)	2.92 (0.90)	0.28	3	2, 3	0.22
Provide inpatient and outpatient care for patients with challenges in access to care that appropriately address those challenges	82.1	3.21 (0.74)	2.83 (0.94)	0.47	3	1, 2, 3	0.10
Conduct or participate in a scholarly project (research, QI, education, other)	82.1	2.93 (0.54)	2.67 (1.16)	0.34	3	3	0.15

TABLE

VALIDITY INFORMATION FOR 30 PROPOSED INTERNAL MEDICINE (IM) ENTRUSTABLE PROFESSIONAL ACTIVITIES (EPAs) CONTINUED

EPA	CVI Rating 3 or 4, ^a %	IM Educator, Mean Rating ^b (SD)	Resident, Mean Rating ^b (SD)	Effect Size ^c	Mode Training Year ^d by IM Educator	Mode Training Year ^d by Resident	Partial Eta-Squared ^e
Participate in and lead an inpatient cardiopulmonary resuscitation	64.3	2.79 (0.79)	3.17 (0.84)	0.47	3	3	0.03
Provide initial management and contribute to postoperative care for patients presenting with surgical problems	60.7	2.75 (0.70)	2.58 (1.00)	0.21	3	2	0.02
Perform common procedures in internal medicine (LP, thoracentesis, central line, arthrocentesis)	46.4	2.57 (0.69)	3.00 (0.95)	0.54	3	2	0.02

Abbreviations: CVI, content validity index; H&P; history and physical examination; ICU, intensive care unit; LP, lumbar puncture; N/A, not applicable; QI, quality improvement.

^a The percentage of respondents who rated this EPA as 3 (important) or 4 (very important).

^b Rating scale: 0 = absolutely do not include, 1 = not very important, 2 = kind of important, 3 = important, 4 = very important.

^c Effect size = absolute value (faculty mean – resident mean)/pooled standard deviation.

^d Training year by which trainee should be trusted to perform this activity independently.

^e Effect size for comparing differences across primary care, hospitalist, and specialist physician ratings; not applicable when all physicians gave the same rating.

an assessment system grounded in core professional activities of the specialty. The degree to which EPAs can balance common national goals and institution-specific priorities remains to be determined. Studies tracking development of competence could provide additional evidence of validity regarding “relationship to other variables,”⁶ such as in-training examinations or future clinical performance, for particular EPAs. However, studies should acknowledge that, by definition, EPAs allow for trainees to achieve competence at different rates. Further research is needed to determine methods of implementing EPAs as well as supervisors’ ability and willingness to trust residents to perform activities with increasing independence.

References

- 1 The Accreditation Council for Graduate Medical Education. Core competencies. <http://www.acgme-nas.org/assets/pdf/CPR-Categorization-TCC.pdf>. Accessed November 28, 2012.
- 2 The CanMEDS Physician Competency Framework. <http://www.royalcollege.ca/portal/page/portal/rc/canmeds>. Accessed January 26, 2012.
- 3 Lurie SJ, Mooney CJ, Lyness JM. Measurement of the general competencies of the Accreditation Council for Graduate Medical Education: a systematic review. *Acad Med*. 2009;84(3):301–309.
- 4 ten Cate O, Snell L, Carraccio C. Medical competence: the interplay between individual ability and the healthcare environment. *Med Teach*. 2010;32(8):669–675.
- 5 Jones MD Jr, Rosenberg AA, Gilhooly JT, Carraccio CL. Perspective: competencies, outcomes, and controversy—linking professional activities to competencies to improve resident education and practice. *Acad Med*. 2011;86(2):161–165.
- 6 Messick S. Standards of validity and the validity of standards in performance assessment. *Educ Meas Issues Pract*. 1995;14(1):5–8.
- 7 Green ML, Aagaard EM, Caverzagie KJ, Chick DA, Holmboe E, Kane G, et al. Charting the road to competence: developmental milestones for IM residency training. *J Grad Med Educ*. 2009;1(1):5–20.
- 8 Accreditation Council for Graduate Medical Education (ACGME). ACGME program requirements for graduate medical education in internal medicine. https://www.acgme.org/acgme/web/Portals/0/PFAssets/ProgramRequirements/140_internal_medicine_07012009.pdf. Accessed November 28, 2012.
- 9 Hicks P. Pediatrics Milestones Project: the approach to and progress in construction of developmentally anchored milestones. *J Grad Med Educ*. 2010;2(3):410–418.
- 10 Landeta J. Current validity of the Delphi method in social sciences. *Technol Forecast Soc Change*. 2006;73:467–482.
- 11 Lynn MR. Determination and quantification of content validity. *Nurs Res*. 1986;35(6):382–385.
- 12 Hojat M, Xu G. A visitor’s guide to effect sizes: statistical significance versus practical (clinical) importance of research findings. *Adv Health Sci Educ*. 2004;9(3):241–249.
- 13 Horwitz RI, Kassirer JP, Holmboe ES, Humphrey HJ, Verghese A, Croft C, et al. Internal medicine residency redesign: proposal of the Internal Medicine Working Group. *Am J Med*. 2011;124(9):806–812.
- 14 Sterkenburg A, Barach P, Kalkman C, Gielen M, ten Cate O. When do supervising physicians decide to entrust residents with unsupervised tasks? *Acad Med*. 2010;85(9):1408–1417.
- 15 O’Connor AB, Lang VJ, Bordley DR. Restructuring an inpatient resident service to improve outcomes for residents, students, and patients. *Acad Med*. 2011;86(12):1500–1507.