

Toward a Common Taxonomy of Competency Domains for the Health Professions and Competencies for Physicians

Robert Englander, MD, MPH, Terri Cameron, MA, Adrian J. Ballard, Jessica Dodge, Janet Bull, MA, and Carol A. Aschenbrener, MD

Abstract

Although health professions worldwide are shifting to competency-based education, no common taxonomy for domains of competence and specific competencies currently exists. In this article, the authors describe their work to (1) identify domains of competence that could accommodate any health care profession and (2) extract a common set of competencies for physicians from existing health professions' competency frameworks that would be robust enough to provide a single, relevant infrastructure for curricular resources in the Association of American Medical Colleges' (AAMC's) MedEdPORTAL and Curriculum Inventory and Reports (CIR) sites.

The authors used the Accreditation Council for Graduate Medical Education (ACGME)/American Board of Medical Specialties six domains of competence and 36 competencies delineated by the ACGME as their foundational reference list. They added two domains described by other groups after the original six domains were introduced: Interprofessional Collaboration (4 competencies) and Personal and Professional Development (8 competencies). They compared the expanded reference list (48 competencies within eight domains) with 153 competency lists from across the medical education continuum, physician specialties and subspecialties, countries,

and health care professions. Comparison analysis led them to add 13 "new" competencies and to conflate 6 competencies into 3 to eliminate redundancy.

The AAMC will use the resulting "Reference List of General Physician Competencies" (58 competencies in eight domains) to categorize resources for MedEdPORTAL and CIR. The authors hope that researchers and educators within medicine and other health professions will consider using this reference list when applicable to move toward a common taxonomy of competencies.

Public demand for accountability is driving a paradigm shift to competency-based education in the health professions worldwide.^{1,2} The first step in developing

Dr. Englander is senior director, Competency-based Learning and Assessment, Association of American Medical Colleges, Washington, DC.

Ms. Cameron is director, Curriculum Management, Association of American Medical Colleges, Washington, DC.

Mr. Ballard is educational content specialist, Association of American Medical Colleges, Washington, DC.

Ms. Dodge is a second-year medical student, University of Connecticut School of Medicine, Farmington, Connecticut.

Ms. Bull is lead specialist, Competency-based Learning and Assessment, Association of American Medical Colleges, Washington, DC.

Dr. Aschenbrener is chief medical education officer, Association of American Medical Colleges, Washington, DC.

Correspondence should be addressed to Dr. Englander, Association of American Medical Colleges, 2450 N St., NW, Washington, DC 20037; telephone: (202) 828-0255; fax: (202) 828-1125; e-mail: renglander@aamc.org.

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a competency-based system is defining the outcomes desired at the end of the educational pathway. To date, however, competency frameworks implemented in medicine and other health professions have varied in the delineation of and language used to describe specific outcomes. In medicine, for example, different frameworks for physician competencies have been developed in different countries—these include the Outcome Project³ of the Accreditation Council for Graduate Medical Education (ACGME) and American Board of Medical Specialties (ABMS) in the United States, the CanMEDS Framework⁴ of the Royal College of Physicians and Surgeons of Canada, the Scottish Doctor Project⁵ in Scotland, and the Framework for Undergraduate Medical Education in the Netherlands.⁶ Whereas some health professions, such as nursing, have used competency frameworks for decades,^{7–11} others, such as dentistry,¹² have described the required competencies of their professions more recently. In all cases, delineation of the set of competencies in a given field has resulted from a multistep, multiyear, systematic process that often was not coordinated with the similar efforts of other health professions.^{3,4,13}

At the Association of American Medical Colleges (AAMC), we identified a need for a "master" taxonomy, or classification structure, for use in cataloguing resources in the AAMC's curriculum warehouse, MedEdPORTAL (www.MedEdPORTAL.org), and Curriculum Inventory and Reports (CIR; www.aamc.org/cir). Faced with a wide range of competencies required of physicians and other health care professionals, we undertook a project to compile and compare a representative sample of competency frameworks from medicine (i.e., the continuum of physician education, physician specialties, subspecialties, and other countries) as well as other health professions.

Our goals for this project were twofold: first, to identify domains of competence that could accommodate the competency frameworks used by any health care profession; and second, to extract from existing frameworks a standard set of competencies for physicians across the medical education continuum that would be robust enough to provide a relevant infrastructure for any health professional using the MedEdPORTAL and CIR sites. We sought as our end products (1) a set of domains of competence to which any

of the health professions' competencies could be mapped or linked within these two sites, and (2) a reference list of general physician competencies that would both include all of the concepts put forth by the various competency frameworks and eliminate redundancy.

In this article, we describe our cross-classification method and share the resulting set of domains of competence and the reference list of competencies that the AAMC will use to classify curricula and learning resources for physician education and training. We do not intend or suggest that these supplant any current regulatory structures or training requirements. We hope, however, that they can be used across medicine and other health professions as a first step toward a common taxonomy of competencies.

Process for Comparing Competency Frameworks

For the purposes of this project, we defined five key terms—*competency*, *competence*, *competency list*, *domains of competence*, and *competency framework*—based on both published definitions^{14,15} and our experience (List 1).

Using PubMed, Google, and Web sites of selected health care organizations, we searched for published competency frameworks representing

- the continuum of physician education, from premed through medical school, residency, fellowship, and practice;
- multiple specialties and subspecialties within medicine;

- specific content areas in medicine (e.g., cultural competence, geriatrics, women's health);
- physicians in nations other than the United States; and
- multiple health care professions.

We used the original ACGME/ABMS framework delineated in 1999¹⁶ and its most recent updates^{17,18} as the foundational reference list of competencies against which we compared all other competency frameworks and their competency lists. We chose this framework because it currently forms the basis for all accredited residency and fellowship training programs in the United States and has been adopted for the ABMS Maintenance of Certification (MOC) Program. Additionally, as at least one-third of U.S. medical schools use the ACGME/ABMS framework to ground their competency expectations¹⁹ for medical students, this framework has by far the broadest reach across the AAMC constituency.

The ACGME/ABMS framework identifies six domains of competence: Patient Care (PC), Medical Knowledge (MK), Interpersonal and Communication Skills (ICS), Professionalism (P), Practice-Based Learning and Improvement (PBLI), and Systems-Based Practice (SBP). Each domain includes a set of competencies. We built our foundational reference list on the original 1999¹⁶ set of 28 competencies and updated it on the basis of comparisons with the 2010¹⁷ and 2012¹⁸ ACGME Common Program Requirements, adding new competencies and eliminating redundancies. This resulted in 36 total competencies for the ACGME's current

framework (PC = 10; MK = 2; ICS = 5; P = 5; PBLI = 8; SBP = 6).

Before comparing this foundational competency list with other lists, we sought to identify and fill any gaps in the ACGME/ABMS framework. First, we changed the domain of competence "Medical Knowledge" to "Knowledge for Practice" (KP) to accommodate a broad range of health professions' competency frameworks. Second, we identified two domains of competence that were described after the original ACGME/ABMS domains were delineated. The first domain is "Interprofessional Collaboration" (IPC),²⁰ for which the Interprofessional Education Collaborative defined four competencies. One of the IPC competencies was nearly identical to one of the SBP competencies; we subsumed the competency under IPC. The second domain arose from the work of the Pediatrics Milestone Working Group and the Association of Pediatric Program Directors, who identified a set of 8 competencies which they classified under a domain of "Personal and Professional Development" (PPD).²¹ Interestingly, we were able to match a number of the PPD competencies to competencies in the CanMEDS⁴ and Scottish Doctor⁵ frameworks. Adding IPC and PPD to our foundational reference list resulted in a draft reference list composed of 48 competencies in eight domains against which we compared all other competency frameworks and lists.

Three of us (T.C., A.B., J.D.) used mapping standards based on the World Wide Web Consortium's Simple Knowledge Organization System (SKOS)²² to structure the process of comparing each competency list with our draft reference list. The SKOS mapping schema is used to indicate the nature of relationships between various concepts, or degrees of matching between various ideas. Match types include "exact," "close," "narrow," "broad," and "related." One rater initially matched each comparison list. To ensure the raters were using the same definitions of the match types, they randomly chose lists to review as a team for interrater calibration. Only competencies rated as exact or close matches were ultimately matched to the competencies on the draft reference list. The raters reviewed all of the "unmatched" competencies—those not

List 1

Definitions of Key Concepts

- *Competency framework*: "An organized and structured representation of a set of interrelated and purposeful competencies."¹⁴
- *Domains of competence*: Broad distinguishable areas of competence that in the aggregate constitute a general descriptive framework for a profession. (Authors' definition)
- *Competency list*: The delineation of the specific competencies within a competency framework. (Authors' definition)
- *Competence*: "The array of abilities [knowledge, skills, and attitudes, or KSA] across multiple domains or aspects of performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes with time, experience, and setting."¹⁵
- *Competency*: "An observable ability of a health professional, integrating multiple components such as knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition."¹⁵

rated as an exact or close match—for common themes. They grouped the unmatched competencies by theme to inform the articulation of additional competencies that they added to the list. They also reviewed the group of matched competencies and revised the language of some to most closely match the broadest number of competencies in the group. The other authors (R.E., J.B., C.A.) then vetted the final reference list and made only minor modifications to the language.

Outcome of the Comparisons

We identified 153 competency lists and compared them with our draft reference list of 48 competencies in eight domains. Thirty-two lists (comprising 28 frameworks) were outside the ACGME/ABMS framework. Fourteen of these lists were from nine other health professions: nursing,^{7–10} pharmacy,²³ chiropractic,²⁴ optometry,²⁵ public health/global health,^{26–28} physician assistants,²⁹ dental,³⁰ health professionals—general,³¹ and veterinary medicine.³² Eighteen lists were from medicine: osteopathic medicine,³³ international physicians (CanMEDS,⁴ Scottish Doctor),⁵ premedical students,^{34–36} medical students—general (Medical School Objectives Project),³⁷ medical student clerkships,^{38–44} and medical students—content-specific^{45–48} (e.g., cultural competencies, geriatric competencies). We found impressive overlap between and among these lists of competencies. For example, for 17 of the 48 competencies, half of the lists had either an exactly or closely matching competency.

The other 121 competency lists we reviewed were developed by ACGME specialty review committees to fit within the ACGME/ABMS framework: 1 transitional year residency, 26 specialty residency, and 94 subspecialty residency or fellowship lists (see Supplemental Digital Appendix 1, <http://links.lww.com/ACADMED/A138>). As these lists were essentially modified from the ACGME framework, we expected and were not surprised to find nearly 100% overlap with competencies on our draft reference list.

After completing the matching process for all 153 lists, we determined that only 13 themes representing individual competencies were sufficiently different from the 48 on the draft reference list

to merit inclusion in our final reference list. Three of these additions were simply more granular delineations of the KP competency related to application of knowledge. In compiling the final list, we also conflated 6 competencies from the draft list into 3 because of redundancy within or between domains. Our final “Reference List of General Physician Competencies” (List 2) consists of 58 competencies in eight domains (PC = 11; PBLI = 10; ICS = 7; KP, P, and SBP = 6 each; IPC = 4; PPD = 8).

Lessons Learned

Shared language is important in leading adaptive change. When people begin to use the same words with the same meaning, they communicate more effectively, minimize misunderstandings, and gain the sense of being on the same page, even while grappling with significant differences on the issues.^{49(p9)}

The paradigm shift to competency-based medical education represents an adaptive change driven by public demands for increased accountability for the physicians the medical education system produces.¹ One of the barriers to implementation has been the lack of a common language describing domains of competence in the health professions and the specific competencies that are critical to the formation and continuing development of physicians.

As noted above, this lack precluded development of a classification system that would allow MedEdPORTAL and CIR resources to be matched to domains of competence and individual competencies. We therefore began this endeavor with the goal of establishing a robust reference list of competencies that could be mapped to any curriculum within the continuum of medical education.

We learned two lessons from our review of 153 competency lists. First, the ACGME/ABMS framework is quite robust. Our Reference List of General Physician Competencies adds only two domains of competence (IPC²⁰ and PPD,²¹ encompassing 12 competencies) and 13 “new” competencies that mapped to the six ACGME/ABMS domains¹⁶ but had not been captured by the original or updated frameworks.^{16–18}

Second, the resultant eight domains of competence can serve as a template for

the health professions in general, as other health professions’ competency lists map well to them. Toward that end, our list proposes broadening the title of one domain—changing “Medical Knowledge” to “Knowledge for Practice”—to incorporate other health care professions. We did not set out to establish a master list of competencies for all health care professions, but we hope our reference list will provide a solid foundation for other health care professionals, particularly those that may wish to use MedEdPORTAL or CIR resources.

Limitations

Our work has limitations. First, the 153 competency lists represent a convenience sample; we did not conduct an exhaustive search in the world literature. There is a clear bias toward competency lists adapted from the ACGME/ABMS framework (121/153; 79%), and we may have missed competencies from frameworks we did not review. Second, the authors who reviewed the lists examined only a sampling of matches between lists as a team for interrater calibration. Thus, a small subset of competencies that were not rated as an exact or close match by one of the raters might have been so categorized by another. However, to avoid omitting any of the concepts addressed in the competency lists, those three authors reviewed all of the unmatched competencies at the end of the process to group them by themes, which led to the addition of 13 competencies (see List 2). The result is that we are likely to have some errors of commission (i.e., 2 competencies that significantly overlap in meaning) rather than of omission (i.e., competencies or concepts that should be present on the list but are not).

Finally, we modified the language of some of the 48 draft reference list competencies and all of the 13 “new” competencies. Our goal was to capture the most common intended meaning for a given competency from among the many lists. The potential unintended consequence is that we may have changed the language of individual competencies in ways that result in a substantively different meaning. We are confident, though, that our process resulted in a final reference list that in the aggregate captures all of the ideas expressed in the many frameworks we examined.

List 2

Reference List of General Physician Competencies*.***1. Patient Care**

Provide patient-centered care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health

- 1.1 Perform all medical, diagnostic, and surgical procedures considered essential for the area of practice
- 1.2 Gather essential and accurate information about patients and their conditions through history-taking, physical examination, and the use of laboratory data, imaging, and other tests
- 1.3 *Organize and prioritize responsibilities to provide care that is safe, effective, and efficient²¹
- 1.4 *Interpret laboratory data, imaging studies, and other tests required for the area of practice^{29,33,37,39,RC}
- 1.5 Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- 1.6 Develop and carry out patient management plans
- 1.7 Counsel and educate patients and their families to empower them to participate in their care and enable shared decision-making
- 1.8 *Provide appropriate referral of patients including ensuring continuity of care throughout transitions between providers or settings, and following up on patient progress and outcomes^{9,44,RC}
- 1.9 Provide health care services to patients, families, and communities aimed at preventing health problems or maintaining health
- 1.10 *Provide appropriate role modeling²¹
- 1.11 *Perform supervisory responsibilities commensurate with one's roles, abilities, and qualifications^{30,32,RC}

2. Knowledge for Practice⁵

Demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care

- 2.1 Demonstrate an investigatory and analytic approach to clinical situations
- 2.2 Apply established and emerging bio-physical scientific principles fundamental to health care for patients and populations
- 2.3 *Apply established and emerging principles of clinical sciences to diagnostic and therapeutic decision-making, clinical problem-solving, and other aspects of evidence-based health care^{RC}
- 2.4 *Apply principles of epidemiological sciences to the identification of health problems, risk factors, treatment strategies, resources, and disease prevention/health promotion efforts for patients and populations^{4,5,26,33,34,36,37,44}
- 2.5 *Apply principles of social-behavioral sciences to provision of patient care, including assessment of the impact of psychosocial and cultural influences on health, disease, care seeking, care compliance, and barriers to and attitudes toward care^{9,34,37,44}
- 2.6 *Contribute to the creation, dissemination, application, and translation of new health care knowledge and practices^{4,9,30}

3. Practice-Based Learning and Improvement

Demonstrate the ability to investigate and evaluate one's care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning

- 3.1 Identify strengths, deficiencies, and limits in one's knowledge and expertise
- 3.2 Set learning and improvement goals
- 3.3 Identify and perform learning activities that address one's gaps in knowledge, skills, and/or attitudes
- 3.4 Systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement
- 3.5 Incorporate feedback into daily practice
- 3.6 Locate, appraise, and assimilate evidence from scientific studies related to patients' health problems
- 3.7 Use information technology to optimize learning
- 3.8 Participate in the education of patients, families, students, trainees, peers, and other health professionals
- 3.9 Obtain and utilize information about individual patients, populations of patients, or communities from which patients are drawn to improve care
- 3.10 *Continually identify, analyze, and implement new knowledge, guidelines, standards, technologies, products, or services that have been demonstrated to improve outcomes^{4,9,23,30,35,37}

4. Interpersonal and Communication Skills

Demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals

- 4.1 Communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds
- 4.2 Communicate effectively with colleagues within one's profession or specialty, other health professionals, and health related agencies (see also 7.3)
- 4.3 Work effectively with others as a member or leader of a health care team or other professional group (see also 7.4)
- 4.4 Act in a consultative role to other health professionals
- 4.5 Maintain comprehensive, timely, and legible medical records
- 4.6 *Demonstrate sensitivity, honesty, and compassion in difficult conversations, including those about death, end of life, adverse events, bad news, disclosure of errors, and other sensitive topics^{9,32,40}
- 4.7 *Demonstrate insight and understanding about emotions and human responses to emotions that allow one to develop and manage interpersonal interactions^{33-35,37,40}

(Continues)

List 2

(Continued)

5. Professionalism*Demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles*

- 5.1 Demonstrate compassion, integrity, and respect for others
- 5.2 Demonstrate responsiveness to patient needs that supersedes self-interest
- 5.3 Demonstrate respect for patient privacy and autonomy
- 5.4 Demonstrate accountability to patients, society, and the profession
- 5.5 Demonstrate sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation
- 5.6 Demonstrate a commitment to ethical principles pertaining to provision or withholding of care, confidentiality, informed consent, and business practices, including compliance with relevant laws, policies, and regulations

6. Systems-Based Practice*Demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care*

- 6.1 Work effectively in various health care delivery settings and systems relevant to one's clinical specialty
- 6.2 Coordinate patient care within the health care system relevant to one's clinical specialty
- 6.3 Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care
- 6.4 Advocate for quality patient care and optimal patient care systems
- 6.5 Participate in identifying system errors and implementing potential systems solutions
- 6.6 *Perform administrative and practice management responsibilities commensurate with one's role, abilities, and qualifications^{30,32}

7. Interprofessional Collaboration*Demonstrate the ability to engage in an interprofessional team in a manner that optimizes safe, effective patient- and population-centered care*

- 7.1 Work with other health professionals to establish and maintain a climate of mutual respect, dignity, diversity, ethical integrity, and trust
- 7.2 Use the knowledge of one's own role and the roles of other health professionals to appropriately assess and address the health care needs of the patients and populations served
- 7.3 Communicate with other health professionals in a responsive and responsible manner that supports the maintenance of health and the treatment of disease in individual patients and populations
- 7.4 Participate in different team roles to establish, develop, and continuously enhance interprofessional teams to provide patient- and population-centered care that is safe, timely, efficient, effective, and equitable

8. Personal and Professional Development*Demonstrate the qualities required to sustain lifelong personal and professional growth*

- 8.1 Develop the ability to use self-awareness of knowledge, skills, and emotional limitations to engage in appropriate help-seeking behaviors
- 8.2 Demonstrate healthy coping mechanisms to respond to stress
- 8.3 Manage conflict between personal and professional responsibilities
- 8.4 Practice flexibility and maturity in adjusting to change with the capacity to alter one's behavior
- 8.5 Demonstrate trustworthiness that makes colleagues feel secure when one is responsible for the care of patients
- 8.6 Provide leadership skills that enhance team functioning, the learning environment, and/or the health care delivery system
- 8.7 Demonstrate self-confidence that puts patients, families, and members of the health care team at ease
- 8.8 Recognize that ambiguity is part of clinical health care and respond by utilizing appropriate resources in dealing with uncertainty

* This list is not intended to supplant any current regulatory requirements. It is solely intended as a robust reference list of physician competencies that captures the essence of competency frameworks published as of June 2012.

† Unless otherwise indicated, the domains of competence are reproduced or adapted from the following sources: Domains 1–6, Accreditation Council for Graduate Medical Education, General Competencies¹⁶ and Common Program Requirements^{17,18}; Domain 7, Interprofessional Education Collaborative Expert Panel, Core Competencies for Interprofessional Collaborative Practice²⁰; Domain 8, Pediatrics Milestone Working Group, Pediatrics Milestone Project.²¹ Some of the competencies in each domain represent modifications or adaptations of original language to accommodate overlapping concepts from a number of competency lists.

‡ These competencies were added on the basis of the authors' review of 153 competency lists. The sources from which the "new" competencies were adapted are cited. RC indicates that at least one was a specialty/subspecialty review committee's list of competencies. See Supplemental Digital Appendix 1 (<http://links.lww.com/ACADMED/A138>) for the list of RC sources.

§ This domain is titled "Medical Knowledge" in the ACGME framework.^{16–18} The authors revised the domain name in this reference list to incorporate frameworks from other health professions.

Moving Forward

We believe the comprehensive list of competencies presented in this article has multiple uses. First, it can serve as a reference list that describes the current

sum total of physician competencies from a wide sample of competency frameworks. Second, it represents a first step toward establishing a common taxonomy of competencies so essential

to adaptive change. Third, it enables researchers and educators to begin to track at a detailed level where and how learners are being exposed to content and experiences that help them build

these competencies, as well as the ways in which these competencies are being assessed. Ultimately, through the use of shared assessment items and tools that are matched at the competency level, it may be possible to build some general theories of the developmental acquisition of competencies across the educational continuum.

Our Reference List for General Physician Competencies will soon become the organizing framework for MedEdPORTAL and CIR, allowing users to link their submissions or search for resources by specific competencies or domains of competence. Over time, this standardized language will help us gain a better understanding of how medical educators are addressing competencies through curricula and assessment and should allow the identification of curricular gaps and resource needs. We will need to revisit the list frequently as medical educators across the continuum adapt their vision of the 21st-century physician and the competencies he or she requires to meet the ever-changing needs of the health care system and the public.

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