

Maintenance of Competence in Cardiovascular Training and Practices: Worth the Effort?

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ABSTRACT: Americans expect their doctors to have the competence to deliver high-quality care and expect safeguards to be in place that assure their doctors are competent. However, competence requires knowledge, and people have trouble assessing their own knowledge and level of competence. Because external assessment is required, several organizations have taken on the roles of defining and assuring medical competence. For example, professional organizations such as the American College of Cardiology (ACC) have developed consensus documents that define core competencies for cardiologists. External organizations such as the Accreditation Council for Graduate Medical Education and the American Board of Internal Medicine (ABIM) have defined training requirements for cardiologists, and the ABIM has developed a process to certify that physicians maintain their competence, although the process has generated considerable criticism from the profession. Recently, the ACC and ABIM have worked together to make the certification process less onerous and more meaningful. This paper provides a brief summary of the history and ongoing efforts to assure the competence of cardiologists.

INTRODUCTION

The high quality and intensity of health care in the United States is costly, and while cost is a serious concern, Americans likely think that the quality of care they receive is worth it. Americans assume that doctors will provide high quality care and expect them to be highly competent, just as they expect a pilot's competence when they board a commercial airliner. Americans assume that regulatory systems are in place and effective in assuring that their doctor is competent. Here we address how professional medical associations create, regulate, and assure physician competence in cardiovascular training and practice.

What does it mean to be competent? Competence is defined as "having sufficient knowledge, judgment, skill, or strength for a particular duty or in a particular respect."¹ It refers to actions that are required to function optimally. Competence differs from competency, which describes behaviors such as critical thinking and analytical skills. Whereas competency is a general term that describes a combination of innate ability and acquired skills, competence is a specific term that refers to particular tasks or processes that produce results.

Competence requires knowledge. For medicine, that knowledge includes both formal and experiential knowledge. Formal knowledge is the content of medical science; it comes to learners through textbooks, journals, and lectures and is easily measured through standardized testing. Experiential knowledge is know-how, the combination of intuition, technical skills, interpretive skills, interpersonal skills, and implicit or tacit knowledge that comes from experience. Many of

the competencies that can be overtly defined are listed in documents that outline the expectations of competency in cardiology.

DEFINING COMPETENCY, ACCREDITATION, AND CERTIFICATION IN CARDIOLOGY

In 1995, the American College of Cardiology (ACC) held the first "Core Cardiology Training Symposium" (COCATS) at Heart House in Bethesda, Maryland, and published the first COCATS training recommendations.² These recommendations have been updated over the years, and the term COCATS now means "Core Cardiology Training Statements." COCATS-4 recommendations were published in 2015 and consist of separate documents from 15 task forces (Table 1).³ These documents list the competencies in multiple knowledge and skill domains that are expected to be acquired by cardiologists during their years in training. Collectively, they define an overall curriculum for cardiovascular training program directors.

The COCATS documents list the expected outcomes of training and, as such, represent a departure from the former time-based requirements of training. Prior to COCATS, training was defined by a "dwell time," or the time that a trainee spent in training. Two years of training was all that was necessary to qualify a trainee to be board eligible. The idea was that trainees would likely pick up the expected skills if exposed to enough experience over time. However, this method seemed to be an unreliable way of assuring a trainee's competence. With the COCATS-4 document, cardiovascular training requirements shifted to a

TASK FORCE	
1	Training in Ambulatory, Consultative, and Longitudinal Cardiovascular Care
2	Training in Preventive Cardiovascular Medicine
3	Training in Electrocardiography, Ambulatory Electrocardiography, and Exercise Testing
4	Training in Multimodality Imaging
5	Training in Echocardiography
6	Training in Nuclear Cardiology
7	Training in Cardiovascular Computed Tomographic Imaging
8	Training in Cardiovascular Magnetic Resonance Imaging
9	Training in Vascular Medicine
10	Training in Cardiac Catheterization
11	Training in Arrhythmia Diagnosis and Management, Cardiac Pacing, and Electrophysiology
12	Training in Heart Failure
13	Training in Critical Care Cardiology
14	Training in the Care of Adult Patients with Congenital Heart Disease
15	Training in Cardiovascular Research and Scholarly Activity

Medical Education (ACGME), the organization that has had regulatory oversight of training in internal medicine and its subspecialties since 1981. The ACGME introduced six domains of clinical competency in 1999, and it began the process of restructuring accreditation to conform with those domains in 2009 (Table 2).⁴ Beginning with the COCATS-4 documents, the ACC's training statements were written to conform with the ACGME Core Competencies.

In addition to the core competencies, the COCATS documents also list what the ACGME has termed "entrustable professional activities" or EPAs, activities that all competent cardiologists are expected to be able to perform. For cardiology, the EPAs include (1) cardiovascular consultation, (2) acute cardiac care, (3) cardiovascular testing, (4) prevention, (5) team-based care, and (6) lifelong learning.³

In 2016, the ACC expanded the list of core competencies beyond the walls of training programs and created competency documents for the area of lifelong learning. Like the COCATS documents, the lifelong learning documents are organized around the ACGME's six competency domains and also include leadership and administrative competencies that are important for the real world of clinical practice. Lifelong learning competency statements are now available for general cardiology⁵ and clinical cardiac electrophysiology.⁶ Advanced subspecialty cardiovascular training documents are also available for clinical cardiac electrophysiology,⁷ advanced heart failure and transplant cardiology,⁸ and echocardiography.⁹

While the ACGME regulates training programs, the certification of competence for internal medicine subspecialties, which includes cardiology, is the function of the American Board of Internal Medicine

Table 1.
The American College of Cardiology 2015 Core Cardiovascular Training Statement 4 list of task forces.³

competence-based curriculum that set clear and explicit expectations for training programs and trainees. The breath of the documents defined the total curriculum content that was to be provided by training directors. These documents now provide three levels of overall competency: Level I (basic), Level II (additional competencies), and Level III (competent enough to teach others). The documents set milestones for reaching certain competencies during a physician's training. Learning stages

have been identified and can be used to evaluate trainees. Based on the list of competencies, trainees are graded at each stage on an empirical five-point scale: (1) having critical deficiencies, (2) being an early learner, (3) improving and needing supervision, (4) being an advanced learner, or (5) being ready for unsupervised practice.

The COCATS documents were created in parallel with the efforts of the Accreditation Council for Graduate

Patient Care	Treating patients appropriately, efficaciously, and with empathy.
Medical Knowledge	Understanding medical, clinical, and psychosocial sciences and translating this knowledge into patient care.
Practice-Based Learning and Improvement	Evaluating one's own approach to patient care and assimilating evidence-based medicine to improve care.
Interpersonal and Communication Skills	Effectively communicating with patients, families, and health care colleagues to facilitate trust, information exchange, and mutual understanding.
Professionalism	Fulfilling professional responsibilities with a high degree of integrity and sensitivity towards diverse patient populations.
Systems-Based Practice	Demonstrating awareness of the multifaceted complexities of health care and practicing judicious use of resources to optimize care and maximize value.

Table 2.

Core competencies from the Accreditation Council for Graduate Medical Education (ACGME). These minimum general competencies were endorsed by the ACGME in February 1999 (adapted from www.acgme.org).

(ABIM) and its Cardiovascular Board.¹⁰ The ABIM is one of 24 boards that comprise the American Board of Medical Specialties, which was founded in 1933 and certifies more than 800,000 physicians. The ABIM was founded in 1936 under the auspices of the American Medical Association and the American College of Physicians to establish more uniform standards for physicians' practices. It certifies more than 200,000 physicians in 20 internal medicine subspecialties and five cardiovascular subspecialties. The ABIM has worked to be both connected to and independent from physician groups, as demonstrated by its motto of being "of the profession and for the people."

Initial certification by the ABIM is meant to signify that a physician is ready for independent practice. Passing the comprehensive ABIM examination demonstrates that a doctor's post-training competence (knowledge and skill) is sufficient to practice a particular medical specialty or subspecialty. Passing the exam and obtaining certification verify that a physician is a certified member of a particular subspecialty in medicine.

MAINTENANCE OF CERTIFICATION

From 1936 to 1990, the ABIM issued lifetime certificates but started requiring diplomates to recertify in 1990. In 2014, the ABIM began a program that required "maintenance of certification," or MOC; this was meant to signify that a physician is keeping current within a discipline. External stakeholders, such as hospitals and payers, often use certification and MOC as assurance that a physician is keeping pace with the changing scientific knowledge base that is required for current practice.

When it started in 2014, MOC consisted of four parts. Part I was evidence of obtaining a medical license, Part II consisted of instructional modules of medical knowledge, Part III was a 10-year assessment, and Part IV was a module of practice improvement. MOC was considered a continuous process rather than an exercise to be repeated every 10 years. A physician was expected to reach milestones at 2, 5, and 10 years, with at least 10 points from Part II instruction required every 2 years, at least 100 points required every 5 years, and passing a secure examination every 10 years.

The ABIM received considerable pushback from the practicing community, particularly against the MOC's Part IV practice improvement requirement. Amid a firestorm of controversy, the ABIM underwent a major reorganization in 2015, creating a smaller governance board and establishing specialty boards. The specialty boards have been charged with overseeing the development of "blueprints" for each examination to assure that all of the competencies are addressed in the examinations.

Since the MOC program was introduced in 2014, there has been heated debate and commentary about how best to assure competence. People have questioned the validity of the ABIM's approach, and some have complained bitterly about the expense of MOC. In addition to the direct price of the MOC, many have complained about the indirect costs of exam preparation and time spent away from work. The ABIM responded by eliminating the requirement for the Part IV practice improvement module, and the ABIM has made a number of other structural changes in the requirements for subspecialty MOC.

The ABIM has also countered the criticism by asserting that their methods are valid, reliable, and fair. They rely on members of the profession to define the blueprint for examinations in an attempt to ensure that the testing content is relevant to practice. Each question goes through a rigorous process of topic development and analysis, and the passing score of each examination is also subjected to rigorous analysis. Rather than grading on a curve, the ABIM uses a science called psychometrics and a process called the Angoff method that establish the passing score for each examination in a way that is consistent from year to year regardless of the test-taking cohort. The ABIM has developed an infrastructure to administer the examinations in a secure fashion, virtually eliminating the possibility of gaming the system.

The rigor of ABIM certification is generally respected by external stakeholders, although it is not uniformly supported by participating physicians and is strongly opposed by a few vocal critics. Nevertheless, MOC remains a requirement for credentialing in most hospitals and for virtually all health plans in the United States. As a result of the ABIM's efforts, test takers for general cardiology will have an ultimate pass rate of 99% for certification and 98% for MOC.

Still, people complain about whether the testing is worth it. Few complain about the requirements for initial certification, but there is fairly broad dissatisfaction with many aspects of MOC. Some argue that CME should be sufficient to assure competence, while others argue that standardized testing doesn't test for the experiential knowledge and skills that are necessary for practice. A counterargument could be made that the MOC process is worth the effort because people, left to their own devices, generally do a poor job at assessing their own knowledge.¹¹

There are two potential problems with self-assessment: (1) People don't know what they don't know, and (2) people don't know what they should know. The first problem has been called the Dunning-Kruger effect, named after two Cornell psychologists who studied the capability of people to self-assess and found that most people have self-inflated estimates of their competence.¹² For example, people in the 12th percentile actually estimated that they were in the 62nd percentile of performance on testing for competence. This is a concerning deficiency and is hardly what the public would expect for assuring physician competence. The second problem is that it is hard to know the extent of knowledge that one should know in the rapidly changing field of medical science. Indeed, this is why having a carefully planned curriculum for any school or program makes sense. By convening a panel of experts or faculty for each specialty to define the blueprint for examination, the assessment of competence has a higher

likelihood of assuring patients and the public that their doctors are competent. Also, careful curriculum design should result in COCATS competency lists that align with the blueprints for the cardiovascular examinations, with closely corresponding learning and testing elements.

NEW MOC ALTERNATIVES

Since 2015, ABIM has looked for alternatives to the 10-year examination. Given the rapid and continuous evolution of medical knowledge, it didn't seem reasonable that an examination taken every 10 years could assure that doctors remain current. Also, the 10-year examination was considered a "high stakes" test that would often cause test takers to enroll in expensive prep courses. Beginning in 2018, the ABIM developed a "Knowledge Check-In" (KCI) option in which the participant could take a shorter examination every 2 years. The KCI option rolled out in 2018 for internal medicine and renal disease and for cardiovascular disease in 2019. KCI options for heart failure, electrophysiology, and interventional cardiology are expected this year and in 2023 for adult congenital heart disease. Under the KCI rules, a participant could fail one year, but if the participant passed the next KCI cycle, he or she would be considered as maintaining certification by the ABIM. If the participant failed the KCI examination two cycles in a row, he or she would then be required to pass the 10-year examination. The thought was that this would make the examination less "high stakes." One recognized problem with the KCI, however, is that the test taker would still be responsible for the entire breath of cardiology knowledge with each test, which retains some of the high-stakes nature of the KCI program.

In 2019, the ACC and ABIM collaborated to develop a new option called the Collaborative Maintenance Pathway (CMP), an additional alternative to the 10-year examination and 2-year KCI option. The idea of the CMP was to make the process modular, allowing the test taker to concentrate on a narrower area of knowledge each year. The testing would be directly tied to learning content provided by the ACC's Self-Assessment Program (SAP), emphasizing the learning more than the testing. The SAP would provide the educational content, practice test questions, and the online platform to take the formal examination. In 2019, the CMP for general cardiology was rolled out with a schedule to release the content and tests for competence each year for each of 5 modules of general cardiology over a 5-year cycle. If a cardiologist was successfully participating in the program, he or she would be deemed as maintaining certification by the ABIM. The ACC is collaborating with the Heart Rhythm Society, the Society for Cardiovascular Angiography and Interventions, and the Heart Failure Society of America to create CMPs in electrophysiology, interventions, and heart failure beginning in 2020.

The ACC's SAP is now available in two versions: one that can be used only for CME and one that can be used for CME and the CMP through a link with the ABIM. In the CME version, the ACC-SAP provides about 150 hours of CME over 5 years and "formative-only" practice questions. Having completed the program, participants will receive a Certificate of Continuing Cardiovascular Professional Optimization that they can submit to state licensing boards, payers, hospital credentialing committees, and any other certifying organization such as the National Board of Physicians and Surgeons.

The CMP version of ACC-SAP provides both formative practice questions and "summative" performance questions. If the participant passes the performance questions, he or she will fulfill the ABIM Part III requirements and, when completed, ABIM will recognize that the diplomate has maintained certification for 5 years. The cost of this program over 10 years is \$4,280 (\$1,500 to ACC for ACC-SAP and \$128/year to ABIM), which compares to a 10-year cost of \$2,480 to ABIM for either the 10-year examination option or the KCI option. The ABIM-only 10-year examination and KCI options do not include the educational content or 150 hours of CME credit.

SUMMARY

The question remains: Is maintenance of competence in cardiovascular training and practices worth the effort? It is a big effort, one that includes COCATS documents and lifelong learning competency statements, ACGME regulation, ABIM certification, and the combined efforts of the ACC and ABIM on the CMPs. Many practicing cardiologists are also concerned that it is difficult to maintain a clinical office practice with the proliferation of recertification requirements within the specific fields of cardiology, such as echocardiography, nuclear cardiology, and cardiac catheterization. Creating a close correspondence between the content of educational material and tests in a way that emphasizes the education more than the testing seems like a positive way to engage physicians to stay current and maintain competence.¹³

Ultimately, whether maintenance of physician competence is worth the effort probably depends on whom you ask. But because even doctors will themselves likely be patients at some point, assuring competence should be a priority rather than assuming that doctors will have the competence to provide high-quality care. We can all hope that our doctors will have some mechanism to remain competent and that systems will provide a mechanism to regulate and assure competence and, in turn, the delivery of high-quality care.

KEY POINTS

- Americans expect their doctors to have the competence to deliver high-quality care. The public expects that safeguards are in place to ensure that doctors have the necessary competence.
- Competence requires knowledge. Generally, people are suboptimal at assessing their own knowledge and level of competence. External assessment is generally recommended to certify the competence of physicians and other professionals.
- The American College of Cardiology (ACC) has developed consensus documents that define the core competencies for cardiologists. Organizations such as the Accreditation Council for Graduate Medical Education and the American Board of Internal Medicine (ABIM) have defined the training requirements for cardiologists. The ABIM has developed a process to certify that physicians maintain their competence, but the process has generated considerable criticism from the profession. Recently, the ACC has worked with the ABIM to make the certification process less onerous and more meaningful.

Conflict of Interest Disclosure:

The authors have completed and submitted the *Methodist DeBakey Cardiovascular Journal* Conflict of Interest Statement and none were reported.

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REFERENCES

1. The Merriam-Webster Dictionary [Internet]. Springfield, MA: Merriam-Webster, Incorporated; c2020 [cited 2020 Apr 1]. Available from: <https://www.merriam-webster.com/dictionary/competence>.
2. COCATS Guidelines. Guidelines for Training in Adult Cardiovascular Medicine, Core Cardiology Training Symposium. June 27-28, 1994. American College of Cardiology. *J Am Coll Cardiol*. 1995 Jan;25(1):1-34.
3. ACC.org [Internet]. Washington, DC: American College of Cardiology; c2020. ACC 2015 Core Cardiovascular Training Statement (COCATS 4) (Revision of COCATS 3); 2015 [cited 2020 Jun 29]. Available from: https://www.acc.org/-/media/non-clinical/files-pdfs-excel-ms-word-etc/guidelines/2015/031315_cocats4_unified_document.pdf.
4. Accreditation Council for Graduate Medical Education [Internet]. Chicago, IL: Accreditation Council for Graduate Medical Education; c2000-2020. Holmboe ES, Edgar L, Hamstra S. The Milestones Guidebook; 2016 [cited Apr 1].

- Available from: <https://www.acgme.org/Portals/0/MilestonesGuidebook.pdf>.
5. Williams ES, Halperin JL, Arrighi JA, et al. 2016 ACC Lifelong Learning Competencies for General Cardiologists: A Report of the ACC Competency Management Committee. *J Am Coll Cardiol*. 2016 Jun 7;67(22):2656-95.
 6. Tracy CM, Crossley GH, Bunch TJ, et al. 2017 ACC/HRS Lifelong Learning Statement for Clinical Cardiac Electrophysiology Specialists: A Report of the ACC Competency Management Committee. *J Am Coll Cardiol*. 2018 Jan 16;71(2):231-50.
 7. Zipes DP, Calkins H, Daubert JP, et al. 2015 ACC/AHA/HRS Advanced Training Statement on Clinical Cardiac Electrophysiology (A Revision of the ACC/AHA 2006 Update of the Clinical Competence Statement on Invasive Electrophysiology Studies, Catheter Ablation, and Cardioversion). *J Am Coll Cardiol*. 2015 Dec 22;66(24):2767-802.
 8. Jessup M, Drazner MH, Book W, et al. 2017 ACC/AHA/HFSA/ISHLT/ACP Advanced Training Statement on Advanced Heart Failure and Transplant Cardiology (Revision of the ACCF/AHA/ACP/HFSA/ISHLT 2010 Clinical Competence Statement on Management of Patients With Advanced Heart Failure and Cardiac Transplant): A Report of the ACC Competency Management Committee. *J Am Coll Cardiol*. 2017 Jun 20;69(24):2977-3001.
 9. Wiegers SE, Ryan T, Arrighi JA, et al. 2019 ACC/AHA/ASE Advanced Training Statement on Echocardiography (Revision of the 2003 ACC/AHA Clinical Competence Statement on Echocardiography): A Report of the ACC Competency Management Committee. *J Am Coll Cardiol*. 2019 Jul 23;74(3):377-402.
 10. American Board of Internal Medicine [Internet]. Philadelphia, PA: American Board of Internal Medicine; c2020 [cited 2020 Apr 2]. Available from: <https://www.abim.org/about/mission>.
 11. Bjork RA, Dunlosky J, Kornell N. Self-regulated learning: beliefs, techniques, and illusions. *Annu Rev Psychol*. 2013;64:417-44.
 12. Kruger J, Dunning D. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *J Pers Soc Psychol*. 1999 Dec;77(6):1121-34.
 13. Larsen DP, Butler AC, Roediger HL 3rd. Repeated testing improves long-term retention relative to repeated study: a randomised controlled trial. *Med Educ*. 2009 Dec;43(12):1174-81.