



## Teaching and assessing the ACGME competencies in surgical residency

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**T**he Accreditation Council for Graduate Medical Education (ACGME) Outcome Project is an educational reform that shifts the process of program accreditation from a system that valued a program's potential to train its residents to a system that requires the actual measurement of educational outcomes among residents.<sup>1</sup> The Outcome Project requires residency programs to implement a curriculum covering six core competencies and to provide evidence of resident learning within these competencies via assessment by July 2011.<sup>2</sup> With this date only three years away, many programs are adopting and implementing new curricular materials and assessment to meet the Outcome Project requirements.

The six core competencies—patient care, medical knowledge, practice-based learning and improvement (PBLI), interpersonal and communication skills, professionalism, and systems-based practice (SBP)—were developed by the ACGME in the early 1990s and officially endorsed in 1999. Beginning in 2001, the ACGME constructed a three-phase timeline that culminates with the full integration of the competencies and their assessment in resident education by 2011. The fourth and final phase of the Outcome Project involves the identification of benchmark programs and the nationwide adoption of generalizable materials and methods from these programs.<sup>2</sup>

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Since creation of the competencies, numerous publications have addressed their implementation and evaluation in a variety of medical specialties. Although some of this material is applicable to surgical training programs, there are many ways in which our training varies significantly from these other specialties and therefore may require unique solutions to specifically address the competencies. This article will review the current state of the competencies in general surgery residencies and suggest some methods to teach and evaluate them.

## Patient care

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.<sup>2</sup>

Traditionally, patient care has been taught on the floors and in the operating room using direct attending-resident interactions. This method is largely unregulated and the experience varies depending on the individuals involved. In an effort to standardize teaching of patient care and to comply with ACGME regulations, most programs have included or improved existing clinical teaching sessions, departmental conferences, and institutional core curriculum lectures. In particular, the morbidity and mortality (M&M) conference has been a hallmark of general surgery residency training. This conference, traditionally used to teach and assess patient care and medical knowledge, is now evolving in an effort to address the other four ACGME competencies.<sup>3</sup>

Several programs have used standardized patients to simulate particular disease processes and train residents in the nonoperative skills of patient care.<sup>4</sup> To cut down on the cost of implementation, programs have used senior residents or friends and relatives as standardized patients. A similar instrument is the Objective Structured Clinical Exam (OSCE), where residents complete a series of clinically based stations or tasks, often involving standardized patients and/or procedure stations. OSCEs are considered the gold standard for postgraduate clinical evaluation by some educators and appear to be able to

differentiate between the skills of faculty, senior, and junior residents.<sup>5</sup>

Written evaluation of residents' performance is a well-used method to assess patient care. Patient survey questionnaires, completed by patients after a resident encounter, are sometimes used for this purpose. However, multiple survey responses per resident are needed to give reliable results and the patient's evaluation of the resident evaluation is influenced by his or her overall experience during the visit.<sup>6</sup> Another tool commonly used is the 360-degree global evaluation. This instrument captures information from all who come in contact with the resident during the performance of his or her duties (including faculty, peer physicians, medical students, nurses, allied health personnel, patients, families, and others).<sup>7</sup> Even though this is a valuable tool, it is limited by the potential "halo" (a well-liked person can do no wrong) and "millstone" (a less-liked person can do no right) phenomena.

Unlike other medical specialties, acquisition of technical skills is a basic tenet of surgical residency. Mannequins, animal procedure laboratories, computer simulators, virtual reality, and other tools are increasingly being used to teach and assess procedural skills.<sup>8</sup> Reznick and colleagues described the use of standardized bench model simulations to teach and assess technical competence in surgical residency.<sup>9</sup> All of these methods have the advantage of allowing residents to learn under direct observation of someone who can give feedback and assess their skills without concerns about patient safety. However, there is significant cost involved in the acquisition and maintenance of some of these instruments.

The patient care competency—in particular, its technical skills component—is the most commonly taught and demonstrated competency in the operating room.<sup>10</sup> Taking into account that this is the place where surgical residents spend a large amount (if not most) of their training time, it becomes the perfect setting for evaluating resident performance in patient care. Standardized faculty evaluations of particular procedures and supervised case logs are ways to achieve this. For example, Anderson and colleagues developed a standardized form that the faculty completes

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at the end of a surgical procedure evaluating the trainee in terms of skills displayed during the case.<sup>11</sup>

Although patient care has been traditionally at the center of residency teaching, as resident education evolves into a more standardized process, such instruments will need to be progressively incorporated into residency programs, undoubtedly leading to the refinement of existing techniques, inception of newer assessment tools, and their integration into the final certification process of surgical graduates.

### Medical knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.<sup>2</sup>

In the Halstedian model of surgical training, medical knowledge has been mainly accumulated on the wards, in the emergency room, or in the operating room and reinforced by lectures from attending surgeons, grand rounds, teaching conferences, journal clubs, and textbook reading by residents in their spare time. The changes in residency training resulting from the introduction of the 80-hour workweek have pushed residents to be more efficient and resourceful in terms of time management. In 2004, the American Surgical Association (ASA) Blue Ribbon Committee recommended development of a standardized national curriculum to provide the fundamentals of surgery. This would ensure that all trainees received a common education in basic principles of surgical disease and patient care.

Various methods to increase resident participation in teaching and improve retention of medical knowledge have been evaluated, including use of a core curriculum program based on a principal textbook to address a different topic per week. Attendance in such classes has correlated with improved performance in the American Board of Surgery (ABS) In-Training Examination (ABSITE).<sup>12</sup> It appears that structured faculty interaction and monitored attendance are important for such a curriculum to be

successful, as it has been shown that voluntary Web-based curriculum reviews do not improve ABSITE performance.<sup>13</sup>

Standardized evaluation of medical knowledge in surgical residency is not new. For more than 30 years, the ABSITE has been used as a measure of medical knowledge attainment. Performance on this exam has been correlated with success in the ABS Qualifying Examination.<sup>14</sup> However, this method of assessment is limited as it does not measure noncognitive and technical abilities that could be considered part of “medical knowledge” within the context of surgical residencies.<sup>15</sup>

Many residency programs have used mock oral board examinations to evaluate the residents in preparation for the certifying exam in surgery. These examinations can also allow evaluation of other competencies such as interpersonal and communication skills. Mock oral examinations are also used to determine if there are programmatic deficiencies with an individual training program.

### PBLI

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices.<sup>2</sup>

PBLI involves the development of skills to identify areas of possible improvement in clinical practice; to obtain, analyze, and assimilate scientific evidence; to plan and implement changes; and to evaluate the impact of those interventions. Each step involves a different set of skills with unique challenges in terms of training and assessment, making PBLI one of the most difficult competencies to integrate into surgical residency.

There are several ways to identify possible areas of improvement. Primary review of the literature provides an easy approach. However, for PBLI to be truly educational, areas of improvement should be derived from the reflection and analysis of the resident’s own practice. Lyman and colleagues at the University of Virginia developed a Web-based system that provided internal medicine residents aggregate reports

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of their own clinical ambulatory practice.<sup>16</sup> Residents could obtain statistical information on their practice (such as how many patients were current with recommended breast screening guidelines) and compare these statistics with those of other residents and faculty, then propose and implement quality improvement initiatives based on the information. Another approach that could be more easily integrated into surgical residency is to encourage residents to include on their case log a “learning need” for each patient encounter or operation.<sup>17</sup> This learning need could represent information residents wished they knew before, what they learned from the encounter, or what they would like to research at a later time.

The development of critical appraisal skills for the analysis and assimilation of scientific literature forms the basis of journal clubs. A few modifications—such as emphasizing different critical appraisal skills on each session, discussing in detail the methodology of the studies, and assessing and documenting progress—can improve the utility of this format for PBLI.

Residency programs have used different methods to teach planning and implementation of changes into practice. They include offering didactic courses on quality improvement skills (such as systems thinking, error investigation, and root cause analysis),<sup>16</sup> encouraging participation of residents in hospital-wide quality improvement committees, and having residents design projects to improve their own residency system<sup>18</sup> or clinical practice.<sup>16,19,20</sup>

A reasonable approach to document progress in PBLI is the creation of resident portfolios—which might include case logs, literature searches, research assignments, and quality improvement projects—to provide evidence of learning and achievement.<sup>21,22</sup> Webb and colleagues had residents choose a case they had encountered over the previous month and submit in their portfolios a written report including history, differential diagnoses, management options, lessons learned, and a brief literature review.<sup>23</sup>

Perhaps one of the least intrusive methods to address PBLI is to transform the morbidity and mortality conference into a PBLI tool. Residents involved in the care of patients chosen for discussion can present the hospital course

and conduct a brief discussion including areas of improvement and a brief literature review. The resident can then submit a written PBLI log analyzing the factors contributing to the complication, opportunities for system improvement, and what can be done to avoid the complication in the future.<sup>3</sup>

All methods will likely add some burden to residency programs and residents themselves. Program directors will need to use PBLI skills to develop or adapt instruments to teach and assess PBLI within their own residency context.

### **Interpersonal and communication skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, their patients’ families, and professional associates.<sup>2</sup>

Physicians’ communication skills have been linked with important outcomes, including patient satisfaction and liability. Given the nature of surgery, it is essential for surgeons to have expertise in patient education and counseling. Physician communication skills have now become a standard component of the medical school curriculum.<sup>24</sup> However, there has been traditionally little emphasis placed in the attainment of these skills during surgical residency. Assessment has also been difficult, as many evaluation systems are prone to bias and ABSITE scores bear no correlation at all with interpersonal and communication skills.<sup>25</sup>

The traditional method of learning communication skills has been by observation of role models and by trial and error, relying mostly on residents’ self-assessment. Recently, recognizing the limitations of the traditional method, some residency programs have offered workshops and role-play scenarios to teach specific communication skills. These sessions have been deemed useful by participants<sup>26</sup> but require additional time allotment in an already constrained resident schedule. The real impact of such innovative methods on the actual improvement of interpersonal and communication skills among residents is still largely unknown.

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The global evaluation encompassing all six competencies is perhaps the most popular assessment method currently in use. As part of this evaluation, a Likert scale is used to evaluate different domains. This system is flawed by assessment bias and, because traditionally only faculty members complete these evaluations, a full picture of the residents' performance, especially as it pertains to interpersonal and communication skills, is not really obtained. The multisource 360-degree global evaluation has been suggested and adopted by some programs in response to these limitations. All members of the health care team, including nurses and allied health practitioners, would have the opportunity to evaluate residents' performance with this assessment tool. This instrument works best if a variety of evaluators is used, as some educators believe it does not provide any additional information if there is high correlation between evaluator groups.<sup>27</sup>

To obtain a more objective evaluation, other methods have been described, including standardized questionnaires and OSCEs, which are effective in assessment of resident communication skills<sup>28,29</sup> and use of standardized patients, which has been advocated by the ACGME to provide a fair, reliable, and valid method of assessing competence in interpersonal and communication skills. However, these methods may have financial limitations.

It is clear that there is no best method to teach and assess interpersonal and communication skills to surgical residents. However, a combination of some of the methods described will probably serve a better role than the traditional methods in training residents.

## Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to diverse patient population.<sup>2</sup>

Professionalism includes virtues such as honesty, altruism, service, suspension of self-interest, commitment to excellence, communication, and accountability.<sup>30</sup> Traditionally, residents have learned professional values and

behavior from exposure to attending physician role models. With the 80-hour workweek regulations, this method is severely curtailed. Furthermore, exposure to professional behavior does not necessarily translate into acquisition of such behavior. Therefore, professionalism training should be formally integrated into the residency curriculum.

Core curriculum lectures improve knowledge and awareness of professional issues but fail to change attitudes, personality, or professional conduct.<sup>31</sup> Home visit programs and ethical case conferences have been used to sensitize residents to professionalism issues at hand and try to impart professionalism skills.<sup>32,33</sup> In some cases, educational, cultural, religious, and business leaders in the community who are experts in their respective fields are enlisted to instruct residents in aspects of professionalism discussing theoretical implications and providing practical examples. For example, college ethicists, local clergy members, and regional organ procurement representatives might discuss topics such as confidentiality, informed consent, end-of-life decisions, recognition of bias and conflict of interests, harassment, and use of human subjects in research.<sup>34</sup>

Modified essay questions or simulated clinical case studies can be used to promote self-reflection and assess some professionalism topics. Using open-ended questions and step-wise case studies, these instruments can assess the knowledge of ethical concepts and arguments, as well as sensitivity to ethical conflict and ability to reason critically and justify a course of action. Their real limitation is the perceived detachment from real patient exposure.<sup>35</sup>

OSCEs have been deemed valid and reliable ways of assessing ethical issues among residents. Stations with standardized patients can focus on professional issues like refusal of care, informed consent, multicultural sensitivity, communicating bad news, and end-of-life scenarios. Evaluation then focuses not only on the right-or-wrong answer but also on the soundness of the reasoning employed.<sup>36</sup>

Patient questionnaires and 360-degree global evaluations by providers (including nurses and allied health care professionals) offer different perspectives on residents' professional conduct.<sup>37</sup>

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Large numbers of evaluations are sometimes needed for reliable results, but these methods may provide the most accurate assessment of professional conduct.

Teaching and assessment of professional competence in residency may be a way to ensure common understanding of basic principles, policies, and procedures in residents. However, how these instruments translate into improvements in real-world professionalism is still largely unknown.

## **SBP**

Residents must 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.<sup>2</sup>

SBP is proving to be one of the most challenging competencies to teach and assess in general surgery residencies. SBP competency topics such as health care access, quality of care, patient safety, and disparities in health care do not lend themselves to daily discussions in a typical residency program. In an intraoperative observational study of the core competencies, Greenberg and colleagues found that no teaching events within the SBP competency were observed over the course of nine different operations.<sup>10</sup> Despite these findings, several programs have created innovative and effective methods to teach and assess the SBP competency.

At Southern Illinois University in Carbondale, Dunnington and Williams created a curriculum that specifically addresses the six core competencies.<sup>38</sup> In order to ensure teaching within SBP, second-year residents were expected to serve on a hospital committee that focused on quality improvement and patient safety for one year. The residents were made to keep logbooks of all the issues discussed during their tenure on this committee and how these discussions would affect their practice. In addition, residents completed a quality-related project, such as a root-cause analysis of a systems error that affected the care of one of their patients, which they would present during surgical grand rounds.<sup>38</sup>

Siri and colleagues at the University of Florida

chose a multidisciplinary approach to teaching SBP.<sup>39</sup> In their model, teams of residents focused on one of four quality assessment variables of preoperative care: bowel preparation, prophylactic antibiotic use, perioperative beta-blockade, or deep venous thrombosis prophylaxis. Each team performed a literature review and formulated a standardized management approach based on the best available evidence. These findings were then presented at a surgical grand rounds along with presentations from the departments of anesthesia, medicine, and nursing. The purpose of this multidisciplinary format was to include all personnel involved in the preoperative treatment of surgical patients so that the new treatment recommendations would be standardized for all preoperative patients.

Kerfoot and colleagues employed a Web-based program where residents and students across a variety of disciplines completed a series of validated modules on patient safety and the U.S. health care system over a nine-week time period.<sup>40</sup> With this program, the authors were able to demonstrate significant, durable learning in these topics.

While these examples show that teaching within the SBP is certainly possible, they also demonstrate that additional elements had to be incorporated into residency programs to ensure there was teaching within this competency, which is likely to be true in an overwhelming majority of surgical residencies across the country. Although it will require some effort to implement one of these methods or a similar program, the long-term benefits to patient care and resident education outweigh the initial costs of implementation.

## **Conclusion**

In the last few years, we have experienced major changes in resident education in the U.S.—the 80-hour workweek and the ACGME's six competencies probably being the two most radical. Overall, residency programs are now being required to provide adequate, focused, and relatively equivalent training in less time while documenting residents' actual learning. The focus of residency learning is thus being shifted from imbibing of knowledge and skills by merely

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being exposed to the problems in the hospital to a more focused and potentially more meaningful educational experience. Whether the changes in the work hours and the implementation of the set of competencies will accomplish these goals is still to be determined.

When the ACGME put forth the six competencies a few years ago, little guidance was given as to how to best implement their teaching and assessment as part of residency training. Residency programs have tried to design and adapt educational and assessment instruments to try to comply with the new mandate.

It is clear that there is no perfect instrument to teach and measure all competencies in all different environments. Over the ensuing years, residency programs will need to choose and adapt those methods that they believe will work best for them, taking into account their own context, resource constraints, and collective evidence. To help residency programs choose and implement some of these instruments, the ACGME and the American Board of Medical Specialties have published a document with a toolbox describing different resident evaluation methods, feasibility, and use. This toolbox can be found at [www.acgme.org/outcome/assess/toolbox.asp](http://www.acgme.org/outcome/assess/toolbox.asp).

Also as part of this initiative, the ACGME has been developing a Web-based portfolio to help with residents' self-reflection and lifelong learning.<sup>41</sup> This portfolio is designed to allow residents to document their learning experiences and reflections and document their experiences in the form of case logs, project documents, presentations, formal and informal evaluations, and so on. This portfolio is currently undergoing alpha testing in a few programs.

Surgical residencies pose an additional challenge since a great component of the core learning of our specialty represents the acquisition of technical skills. Programs will therefore have to develop and adapt tools to assess these technical skills as part of the evaluation of the ACGME competencies.

In 2006, the Surgical Council on Resident Education (SCORE) was created in an effort to reduce the variability in surgical residency programs and to ensure that residents are being appropriately trained in the core aspects of

general surgery.<sup>42</sup> This Council is composed of representatives from the ABS, American College of Surgeons, ASA, Association for Surgical Education, Association of Program Directors in Surgery, and the Residency Review Committee for Surgery of the ACGME. The main initiatives being pursued by SCORE are the development of a comprehensive, competency-based curriculum for general surgery residency, a national Web site for general surgery education, and a structured technical skills curriculum. As part of the development of the competency-based curriculum for general surgery, SCORE added to its scheme a seventh competency relevant to surgical training: "technical ability." In April 2008, SCORE released an outline with the topics that would form part of the general surgery curriculum in terms of the patient care competency.<sup>43</sup> It is expected that SCORE will develop specific learning objectives and then a full curriculum including educational content, teaching materials, instructional methods, and assessment for this competency. The curriculum for the other six competencies is to follow.

The drafting of the six—or seven—competencies and the push to document residents' learning experience in these domains merely represent the first steps toward ensuring adequate education across the diverse number of residency programs in the U.S. There is still much work to be done. Programs will now need to decide which instruments are most appropriate for them, implement the necessary changes to use them, and longitudinally assess their effectiveness in residents' training. We believe these times provide a unique opportunity for programs and residents alike to revise and improve surgical education. □

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