

Developing a Comprehensive Perioperative Education Curriculum for Internal Medicine Residency Training

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Abstract

Background Patients undergoing surgery are becoming increasingly complex and internists are becoming more involved in their perioperative care. Therefore, new requirements from the ACGME/ABIM necessitate education in this area. We aim to discuss how our institution adapted a perioperative curriculum to fill this need.

Methods Perioperative education is primarily given to the residents during their one month rotation through the General Internal Medicine Consult Service rotation. This is an inpatient rotation that provides perioperative expertise to surgical teams, medicine consultation to medical

subspecialty teams, and outpatient preoperative evaluations.

Results Our implementation complies with ACGME/ABIM requirements and ensures that the educational and clinical needs of our institution are met.

Conclusions Developing a new curriculum can be daunting. We hope that this explanation of our approach will aid others who are working to develop an effective perioperative curriculum at their institutions.

Background

The most recent data from 2010 reveals that over 51 million inpatient surgical procedures were performed in the United States¹. This probably represents about half of all surgeries². As our population continues to age, the risks associated with surgery will continue to rise³. Risk factors for poor surgical outcomes are also increasing, including obesity, type 2 diabetes mellitus, and chronic kidney disease⁴⁻⁶. For these reasons, internists are increasingly

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involved in the management of patients in the perioperative setting. The study by Mollema et al. found that the involvement of internists resulted in better management of medical conditions and an increase in appropriate cancellation of surgery⁷.

A survey of surgeons in 2008 revealed that they felt the most important roles of the internist are risk stratification and medication management⁸. A 2007 survey found that most surgeons desired help with order writing related to medical issues. Orthopedists favored a true co-management relationship with Internal Medicine being the primary service on medically complex patients⁹. Despite the important role internists play with regards to perioperative consultation and co-management there is no published information on how to train internists to provide this care. This is in contrast to the existence of much more robust literature regarding anesthesia and surgical training

surrounding the perioperative timeframe¹⁰⁻¹². Since the internist plays an integral role in the perioperative process, there is a need to develop, to test, and to report on training in this important area.

In 2015, the American College of Graduate Medical Education (ACGME) and American Board of Internal Medicine (ABIM) collaborated to identify core components of residency education. This project yielded a transition from the previously subjective peer-based assessments (comparison to other learners) to a more standardized outcomes-based assessment in medical education. Six core competencies were delineated: patient care (PC), medical knowledge (MK), systems-based practice (SBP), practice-based learning and improvement (PBLI), professionalism (PROF), and interpersonal and communication skills (ICS)¹³. These new requirements led to a new evaluation system which is called “the ACGME Next Accreditation System (NAS).”

To meet requirements of NAS, the American Board of Medical Specialties introduced 22 competency-based developmental outcomes which are termed reporting milestones (these can be found on the ACGME website: http://www.acgme.org/portals/0/pdfs/milestones/internalmedicine_milestones.pdf)¹³. Each milestone maps to a core competency. These reporting milestones are knowledge, skills, attitudes, and other attributes that measure the development from an early learner to one who is ready for unsupervised practice. For each of these, a learner is graded on a scale from “Critical Deficiencies” to “Ready for Unsupervised Practice” to “Aspirational.” Milestone performance data for each training program’s residents are reviewed, as part of the NAS, to determine whether trainees are progressing satisfactorily¹³.

It should be noted that the sub-competencies/milestones were developed as reporting tools for residency programs, and not for individual assessment^{13, 14}. Therefore, entrustable professional activities (EPAs) and observable practice activities (OPAs) were created to facilitate the assessment of sub-competencies in medical education-based patient care settings. EPAs are designed to

assess the learner’s demonstrated level of responsibility in patient care¹⁵⁻¹⁷. EPAs have been noted to be useful for clinical assessment because they are based in behavioral anchors. This allows for objective measurements of learner’s competency across multiple domains¹⁴.

In addition to these changes, the ACGME and ABIM require all Internal Medicine training programs to educate residents in perioperative medicine. For some programs, this may represent documenting the education that is already occurring, while for others it may mean developing a new curriculum for an area that has been previously ignored. This can prove to be challenging in either case. Although several national organizations have published EPAs for assessment of medical learners, there are no published EPAs for perioperative medicine¹⁸⁻²⁰. Therefore individual programs must develop additional EPAs to determine learners’ progress and readiness for advancement in their specific clinical environments¹⁹.

The aim of this paper is to describe our approach to review and redesign our perioperative curriculum while ensuring that our rotation met ACGME and ABIM requirements for perioperative education and also meeting the needs of our institution, educators, and learners. We will discuss the mapping of competencies, the selection of curriculum topics and supporting literature, and the overall structuring of the rotation. We hope this discussion will be helpful to other programs and residencies in developing their own curriculum as no other paper to our knowledge addresses this.

Methods

Perioperative medicine education is accomplished at the Mayo Clinic during the General Internal Medicine Consult Service rotation. This includes inpatient management and outpatient clinic. The inpatient service works at the Mayo Clinic Hospital, St. Mary’s campus, which is a 1,265 bed Level One Trauma Center in southeast Minnesota. The care team consists of a core faculty member (on rotation one to two weeks at a time) and four senior medical residents (on rotation four to five weeks at a time).

At times, a fourth-year medical student also joins our team. The care team rounds together each morning in the hospital. Each learner maintains care for the patients for whom he or she performs initial consultation for that hospitalization, except when that learner is off-duty. In the afternoon, the on-call residents will take consults for that day and night. The other two on-duty residents will perform outpatient preoperative evaluations for medically complex individual under the supervision of a core faculty member who is not currently assigned to the hospital service.

There are two central educational goals for residents during this rotation: 1) to learn to serve as a generalist consultant to a variety of non-Internal Medicine services; and 2) to become competent in the basics of perioperative medical care. Although much of the care that the General Internal Medicine Consult Service provides is perioperative, the team also provides consultations for patients on non-surgical inpatient teams including Neurology, Physical Medicine and Rehabilitation, and Psychiatry. These central goals were at the core of our redesign of our curriculum and development of EPAs for this rotation.

As there are no published EPAs for perioperative medicine, EPAs for this rotation were developed and “mapped” to the broader EPAs established by the ACGME and ABIM (Table 1). For example, the first EPA we developed for perioperative medicine is “Accuracy and completeness of gathered information.” This EPA maps back to several ACGME/ABIM EPAs including “Provide perioperative assessment and care” and “Provide general Internal Medicine consultation to nonmedical specialties.” The rotation director was responsible for creating and mapping the EPAs. The final perioperative EPAs were approved by consensus of all Internal Medicine faculty involved in perioperative medicine.

An educational curriculum for the General Internal Medicine Consult Service/Presurgical Medical Evaluation Clinic was developed to reflect these EPAs. A literature review focusing on guidelines, position papers, and review articles relevant to perioperative medicine was

conducted to ensure goals and objectives for this rotation are grounded in evidence. Input regarding rotation goals and objectives was sought from all faculty members who staff this service. The final curriculum was approved by the core faculty. Faculty input and approval also were obtained, regarding core topics for the resident lecture series, which is derived directly from the curriculum goals and objectives. Each core topic and objective is associated with one to two key articles, which are accessible through the Internal Medicine Residency Electronic Curriculum site and through the Division of General Internal Medicine Mayo Clinic intranet site.

Updated rotation informational documents (Medical Consult Service Introduction, Guidelines for co-management, Medical Consult Service Core curriculum goals and objectives) and core curriculum articles for this rotation are provided to learners and faculty via e-mail (one week prior to beginning the rotation), in addition to being accessible through the Internal Medicine Residency electronic curriculum site and through the Division of General Internal Medicine Mayo Clinic intranet site. Learners and faculty are directed to read the informational documents prior to beginning this rotation. Goals and objectives for the rotation can be found in Table 2.

Education on this rotation is provided through inpatient care rounds, regularly scheduled case-based/evidence-based teaching sessions, the General Internal Medicine Presurgical Medical Evaluation Clinic, self-directed learning, and a formal post-test. Learners are encouraged to review the core curriculum articles regularly during this rotation. Resources from major society guidelines including the American Society of Anesthesiologists, the American College of Cardiology and the American Heart Association, as well as others who provide guidance relevant to the practice of perioperative medicine are carefully selected for their importance in providing high quality patient care and knowledge important for board certification.²¹⁻²⁷ The key articles are updated regularly to reflect new literature and serve as the basis for teaching and self-directed learning on the rotation. These

articles contain all applicable information needed for the required rotation post-test. Learners may use these articles and other resources when completing this exam. The intent of the post-test is to reinforce and further develop knowledge from this rotation.

Results

The extent to which these objectives are achieved will be analyzed in the future as sufficient data from the post-test is currently being accumulated. In addition, feedback from the residents and faculty is solicited at the end of the rotation. This feedback will be used to continually improve the structure and content of the rotation.

Discussion

The importance of perioperative care will inevitably continue to expand. As such, the ACGME and ABIM wisely sought to ensure that training institutions, educators, and learners acquire an understanding and appreciation for this medically diverse field. The requisite knowledge, skills, and attitudinal aspects necessary for the successful practice of perioperative medicine ultimately led to the mapping of entrustable professional activities (EPAs), observable practice activities (OPAs), and various milestones applicable specifically to perioperative medicine.

In response to these changes, our institution created an educational curriculum and clinical practice that strives to provide our trainees with the necessary foundation, while also meeting the needs of our consulting services, institution, and patients. We were able to achieve this via the diligent mapping of specific EPAs, OPAs, and competencies to perioperative medicine. These aspects include our formal didactic sessions, daily inpatient rounds, informational documents, and core curriculum articles.

To our knowledge, this discussion is the first to address the rationale of the changes made by the ACGME and ABIM as it pertains specifically to the field of perioperative medicine. More so, this discussion includes the mapping of competencies, the selection of core curriculum topics and supporting literature, and the overall structuring of the rotation to meet the needs of our patients, institution, and learners, all while creating a framework to successfully achieve the competencies recently set forth. By taking these measures, we have been able to translate our innovations into an effective educational experience for our learners. As we continue to collect data, we look forward to reassessing our progress and make any necessary modifications to continually improve the educational and clinical experience of our residents.

As with any curriculum development endeavor, the largest limitations are the applicability and generalizability of the herein provided information. We do note that any similar venture will require adequate resources, experienced educators, and ongoing collaborations inter- and intra-departmentally.

In hopes of developing their own applicable perioperative curriculum, we are optimistic that other institutions will be able to benefit from the methodical process laid out here. We strongly recommend closely reviewing our attempts at translating the required EPAs, OPAs, and milestones into focused and pre-specified goals and objectives to be achieved during the rotation. Every institution will inevitably have differing needs; our goal is that this information can be used as a starting point for further discussion and exploration.

Table 1 Entrustable Professional ActivitiesIndex of ACGME/ABIM EPAs:

1. Manage care of patients with acute common diseases across multiple care settings.
2. Manage care of patients with acute complex diseases across multiple care settings.
3. Manage care of patients with chronic diseases across multiple care settings.
4. Provide age-appropriate screening and preventative care.
5. Resuscitate, stabilize, and care for unstable or critically ill patients.
6. Provide perioperative assessment and care.
7. Provide general Internal Medicine consultation to nonmedical specialties.
8. Manage transitions of care.
9. Facilitate family meetings.
10. Lead and work within interprofessional health care teams.
11. Facilitate the learning of patients, families, and members of the interdisciplinary team.
12. Enhance patient safety.
13. Improve the quality of health care at both the individual and systems level.
14. Advocate for individual patients.
15. Demonstrate personal habits of lifelong learning.
16. Demonstrate professional behavior

List of Mayo Clinic perioperative medicine EPAs

1. Accuracy and completeness of gathered information (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 10, 12, 13, 14, 16).
2. Effective and concise case presentations (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 10, 12, 13, 14, 16).
3. Interprets patient data (history, physical examination, and test results) effectively (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 10, 12, 13, 14).
4. Selection of diagnostic testing appropriate for patient care and cost-effectiveness (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 10, 11, 12, 13, 14).
5. Formulation of an effective strategy and implementation plan for patient care (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 10, 11, 12, 13, 14, 16).

6. Development of core knowledge and practical application of Perioperative Medicine and other Consultative General Internal Medicine (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 8, 10, 11, 12, 13, 14, 16).
7. Commitment to his/her education (maps to ACGME/ABIM EPAs # 15, 16)
 - a. Use of information technology.
 - b. Self-directed learning.
 - c. Conference participation
 - d. Asks questions appropriate to care situation and level of training.
8. Effectively conducts transitions of care (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 8, 10, 11, 12, 13, 14, 16).
 - a. Clear, professional, effective communication with all involved.
 - b. Assures patient safety.
 - c. Avoids interruptions or distractions during handoffs.
 - d. Supports continuity of care.
 - e. Allows for questions or clarifications.
9. Effective communications with all members of health care team, within and across disciplines (providers, allied health staff, support staff) (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 8, 10, 12, 13, 14, 15, 16).
 - a. Informative
 - b. Concise
 - c. Understandable
 - d. Respectful
 - e. Allows for questions or clarifications
 - f. Facilitates decision making process
10. Effective communication with patients and their families (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16).
 - a. Informative
 - b. Concise
 - c. Understandable
 - d. Compassionate
 - e. Respectful of their beliefs and preferences

- f. Allows for questions or clarifications
 - g. Facilitates decision making process
11. Level of integrity (maps to ACGME/ABIM EPAs #10, 16).
- a. Honesty
 - b. Trustworthiness
 - c. Reliability
12. Effectively utilizes health care system to optimize patient care (maps to ACGME/ABIM EPAs #1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16).

Table 2 General Internal Medicine Consult Service Goals and Objectives

Goal #1:

Orientation to the General Internal Medicine Consult Service. Residents will learn to collaborate with other consulting teams and with the referring primary services, to best address the needs of the patients.

Objectives:

- Review, "Medical Consult Service Introduction" and "Medical Consult Service Guidelines for Co-Management."
- Residents will understand the principles of effective medical consultation.
- Residents will learn the differences between consultation and co-management.
- Residents will learn to function as part of a multidisciplinary team, caring for medically and surgically complex patients.
- Residents will learn effective communication with patients and their families, in the unique consultative general medical role.

Goal #2:

Residents will learn preoperative risk assessment and risk reduction.

Objectives:

- Residents will learn parameters for general preoperative testing, based upon the history and physical examination. Necessity and cost effectiveness will be discussed.
- Residents will learn a systematic approach to preoperative cardiac event risk assessment and risk reduction, using the history and physical exam as the foundation. This will include identification of patient-specific and procedure-specific risk.

- Residents will understand how to select and interpret preoperative cardiac tests, when indicated.
- Residents will learn the indications for perioperative cardiac intervention.
- Residents will learn perioperative cardiovascular surveillance of high-risk patients, when indicated.
- Residents will learn perioperative VTE risk stratification.
- Residents will learn appropriate VTE prophylaxis, based on patient-specific and procedure-specific factors.
- Residents will integrate VTE risk and prophylaxis information to develop a clinically meaningful estimate of overall benefits and harms.
- Residents will learn infectious endocarditis prophylaxis.
- Residents will learn perioperative pulmonary risk assessment and risk reduction measures.

Goal #3:

Residents will learn to optimize perioperative medical management. Patient-specific and procedure-specific factors will be included.

Objectives:

- Residents will learn the perioperative management of patients with prior coronary intervention.
- Residents will learn guidelines for perioperative cardiovascular medical management. This includes perioperative management of antiplatelet, anticoagulant, beta-blocker, ACE-I, ARB, and alpha-2 agonist therapies.
- Residents will learn perioperative management of cerebrovascular disease.
- Residents will learn perioperative management of diabetes mellitus.

Goal #4:

Residents will demonstrate the ability to manage commonly-encountered perioperative problems, in cooperation with the surgical teams.

Objectives:

- Residents will learn evaluation and management of postoperative fever.
- Residents will learn evaluation and treatment of perioperative anemia.
- Residents will learn evaluation and management of perioperative renal dysfunction.

- Residents will learn evaluation and management of postoperative gastrointestinal tract problems including nausea and vomiting, constipation, and ileus.
- Residents will learn evaluation and management of perioperative delirium.

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