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CURRENT Diagnosis & Treatment

Surgery

GERARD M. DOHERTY

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CURRENT
Diagnosis & Treatment Surgery

SIXTEENTH EDITION

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Preface

Current Diagnosis & Treatment: Surgery is a ready source of information about diseases managed by surgeons. Like other books in this Lange series, it emphasizes quick recall of major diagnostic features and brief descriptions of disease processes, followed by approaches for definitive diagnosis and treatment. Epidemiology, pathophysiology, and pathology are discussed to the extent that they contribute to the ultimate purpose of the book, which is guidance for patient care. About one-third of the book is focused on general medical and surgical topics important in the management of all patients.

The book also includes limited current references to literature for the reader who wishes to pursue specific additional detail. Because of the concise nature of this text, more focused exploration may be useful to gain detail in specific areas.

OUTSTANDING FEATURES

- To maintain currency of the information, this text is revised and updated frequently. The most recent edition was published in 2020. With each revision, particular subjects are completely, substantially, partially, or minimally rewritten as indicated by the progress in each field. New authors and chapters are introduced for the text as needed.
- This edition includes major revisions of many chapters, and entirely new chapters on:
  - Operating Room Safety
  - Imaging- & Computer-Assisted Surgery
  - Inflammation, Infection, & Antibiotics
  - Anesthesiology
  - Breast
  - Thoracic Wall, Pleura, Mediastinum, & Lung
  - The Heart: Acquired Diseases
  - The Heart: Congenital Diseases
  - Appendix
  - Small Intestine
  - Large Intestine
  - Anorectum
  - Abdominal Wall Hernias
  - Adrenals
  - The Eye & Ocular Adnexa
  - Hand Surgery

INTENDED AUDIENCE

- Students: This is an authoritative introduction to surgery as the discipline is taught and practiced at major teaching institutions.
- Residents: This is a ready reference for concise discussions of the diseases faced each day, as well as the less common ones calling for quick study.
- Medical practitioners: Those who have occasion to counsel patients needing surgical referrals appreciate the concise readability of this book.
- Practicing surgeons: A most useful guide to current management strategies.

ORGANIZATION

This book is arranged chiefly by organ system. Early chapters provide general information about the relationship between surgeons and their patients (Chapter 1), training and professionalism (Chapter 2), preoperative care (Chapter 3), postoperative care (Chapter 4), and surgical complications (Chapter 5). Subsequent chapters deal with wound healing, inflammation, infection, antibiotics, fluid and electrolyte management, and surgical metabolism and nutrition. The main series of body systems topics begins with the chapter on head and neck tumors and ends with the chapter on hand surgery. Further chapters on pediatric surgery, oncology, weight management, and organ transplantation complete the coverage.

MULTIPLE-CHOICE QUESTIONS

Along with the customary revision of all sections as called for by changing concepts in each field covered, in this edition, multiple-choice questions and answers have been added to supplement most chapters.

ACKNOWLEDGMENTS

The editor and contributors continue to acknowledge their gratitude to J. Englebert Dunphy, MD, for the inspiration to begin the first edition of this text, and his lifetime of service to the practice and teaching of surgery, and to Lawrence W. Way, the long-time editor of editions 2 through 12, and the conscience of the University of California, San Francisco (UCSF) surgical training program. Dr. Way passed away in December 2022 after a long and incredibly productive career. He was a mentor to me and many other trainees and faculty members at UCSF and around the world, including many who have contributed to the textbook and its previous editions.

I am particularly grateful for the important contributions that the staff at McGraw Hill has made to ensuring an accurate, high-quality text. I am also grateful to colleagues and readers who have offered comments and criticisms to guide preparation for future editions. I hope that anyone with an idea, suggestion, or criticism regarding this book will contact me.

Finally, I thank my wife, Faith Cuenin, our children Kevin and Megan, and our grandson Christopher for their constant love and support.

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March 2024

1

Approach to the Surgical Patient

J. Englebert Dunphy, MD*
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The management of surgical disorders requires not only the application of technical skills and training in the basic sciences to the problems of diagnosis and treatment, but also a genuine sympathy, and indeed love, for the patient. The surgeon must be a doctor in the old-fashioned sense: an applied scientist, an engineer, an artist, and a minister to their fellow human beings. Because life or death often depends upon the validity of surgical decisions, the surgeon's judgment must be matched by courage in action and by a high degree of technical proficiency.

THE HISTORY

At their first contact, the surgeon must gain the patient's confidence and convey the assurance that help is available and will be provided. The surgeon must demonstrate concern for the patient as a person who needs help and not just as a "case" to be processed. This is not always easy to do, and there are no rules of conduct except to be gentle and considerate. Most patients are eager to like and trust their doctors and respond gratefully to a sympathetic and understanding person. Some surgeons are able to establish a confident relationship with the first few words of greeting; others can only do so by means of a stylized and carefully acquired bedside manner. It does not matter how it is done, so long as an atmosphere of sympathy, personal interest, and understanding is created. Even under emergency circumstances, this subtle message of sympathetic concern must be conveyed.

Eventually, all histories must be formally structured, but much can be learned by letting the patient ramble a little. Discrepancies and omissions in the history are often due as much to overstructuring and leading questions as to the fallibility of the patient. The enthusiastic novice asks leading questions; the cooperative patient gives the answer that seems to be wanted; and the interview concludes on a note of mutual satisfaction with the wrong answer thus developed.

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Building the History

History taking is detective work. Preconceived ideas, snap judgments, and hasty conclusions have no place in this process. The diagnosis must be established by inductive reasoning. The interviewer must first determine the facts and then search for essential clues, realizing that the patient may conceal the most important symptom—for example, the passage of blood by rectum—in the hope (born of fear) that if it is not specifically inquired about or if nothing is found to account for it in the physical examination, then it cannot be very serious.

Common symptoms of surgical conditions that require special emphasis in the history taking are discussed in the following paragraphs.

A. Pain

A careful analysis of the nature of pain is one of the most important features of a surgical history. The examiner must first ascertain how the pain began. Was it explosive in onset, rapid, or gradual? What is the precise character of the pain? Is it so severe that it cannot be relieved by medication? Is it constant or intermittent? Are there classic associations, such as the rhythmic pattern of small bowel obstruction or the onset of pain preceding the limp of intermittent claudication?

One of the most important aspects of pain is the patient's reaction to it. The overreactor's description of pain is often obviously inappropriate and so is a description of "excruciating" pain offered in a casual or jovial manner. A patient who shrieks and thrashes about is either grossly overreacting or suffering from renal or biliary colic—that is, pain not exacerbated by movement. Very severe pain—due to infection, inflammation, or vascular disease—usually forces the patient to restrict all movement as much as possible.

Moderate pain is made agonizing by fear and anxiety. Reassurance of a sort calculated to restore the patient's

confidence in the care being given is often a more effective analgesic than an injection of morphine.

B. Vomiting

What did the patient vomit? How much? How often? What did the vomitus look like? Was vomiting projectile?

C. Change in Bowel Habits

A change in bowel habits is a common complaint that is often of no significance. However, when a person who has always had regular evacuations notices a distinct change, particularly toward intermittent alternations of constipation and diarrhea, colon cancer must be suspected. Too much emphasis is placed upon the size and shape of the stool—for example, many patients who normally have well-formed stools may complain of irregular small stools when their routine is disturbed by travel or a change in diet.

D. Hematemesis or Hematochezia

Bleeding from any orifice demands the most critical analysis and can never be dismissed as due to some immediately obvious cause. The most common error is to assume that bleeding from the rectum is attributable to hemorrhoids. The character of the blood can be of great significance. Does it clot? Is it bright or dark red? Is it changed in any way, as in the coffee-grounds vomitus of slow gastric bleeding or the dark, tarry stool of upper gastrointestinal bleeding?

E. Trauma

Trauma occurs so commonly that it is often difficult to establish a relationship between the chief complaint and an episode of trauma. Children, in particular, are subject to all kinds of minor trauma, and the family may attribute the onset of an illness to a specific recent injury. On the other hand, children may be subjected to severe trauma, though their parents may be unaware of it. And the possibility of trauma having been inflicted by a parent must not be overlooked.

When there is a history of trauma, the details must be established as precisely as possible. What was the patient's position when the accident occurred? Was consciousness lost? Retrograde amnesia (inability to remember events just preceding the accident) always indicates some degree of cerebral damage.

In the case of gunshot wounds and stab wounds, knowing the nature of the weapon, its size and shape, the probable trajectory, and the position of the patient when hit may be very helpful in evaluating the nature of the resultant injury.

The possibility that an accident might have been caused by preexisting disease such as epilepsy, diabetes, coronary artery disease, or hypoglycemia must be explored.

When all of the facts and essential clues have been gathered, the examiner is in a position to complete the study of the present illness. By this time, it may be possible to rule out (by inductive reasoning) all but a few diagnoses.

Family History

The family history is of great significance in a number of surgical conditions. Polyposis of the colon is a classic example, but diabetes, Peutz-Jeghers syndrome, chronic pancreatitis, multiple endocrine neoplasia syndromes, other endocrine abnormalities, and cancer are often better understood and better evaluated in the light of a careful family history.

Past History

The details of the past history may illuminate obscure areas of the present illness. It has been said that people who are well are almost never sick, and people who are sick are almost never well. It is true that a patient with a long and complicated history of diseases and injuries is likely to be a much poorer risk than even a very old patient experiencing a major surgical illness for the first time.

In order to make certain that important details of the past history will not be overlooked, the system review must be formalized and thorough. By always reviewing the past history in the same way, the experienced examiner never omits significant details. Many skilled examiners find it easy to review the past history by inquiring about each system as they perform the physical examination on that part of the body. Alternatively, it may be efficient and thorough to have the patient complete a previsit questionnaire that can be reviewed at the visit.

In reviewing the past history, it is important to consider the nutritional background of the patient. There is a clear awareness throughout the world that the underprivileged malnourished patient responds poorly to disease, injury, and operation. Malnourishment may not be obvious on physical examination and must be elicited by questioning.

Acute nutritional deficiencies, particularly fluid and electrolyte losses, can be understood only in the light of the total (including nutritional) history. For example, low serum sodium may be due to the use of diuretics or a sodium-restricted diet rather than to acute loss. In this connection, the use of any medications must be carefully recorded and interpreted.

A detailed history of acute losses by vomiting and diarrhea—and the nature of the losses—is helpful in estimating the probable trends in serum electrolytes.

It is essential for the surgeon to think in terms of nutritional balance. It is often possible to begin therapy before the results of laboratory tests have been obtained because the specific nature and probable extent of fluid and electrolyte

losses can often be estimated based on the history and the physician's clinical experience. Laboratory data should be obtained as soon as possible, but knowledge of the probable level of the obstruction and of the concentration of the electrolytes in the gastrointestinal fluids will provide sufficient grounds for the institution of appropriate immediate therapy.

The Patient's Emotional Background

Behavioral health consultation is seldom required in the immediate management of surgical patients, but there are times when it is of great help. Emotionally and mentally disturbed patients require surgical operations as often as others, and full cooperation between the psychiatric service and surgeon is essential, especially if perioperative medication management is important to the patient's well-being. Furthermore, either before or after an operation, a patient may develop a major psychotic disturbance that is beyond the ability of the surgeon to appraise or manage. Prognosis, drug therapy, and overall management require the participation of a psychiatrist.

On the other hand, there are many situations in which the surgeon can and should deal with the emotional aspects of the patient's illness rather than resorting to psychiatric assistance. Most psychiatric consultative services prefer not to be brought in to deal with minor anxiety states. As long as the surgeon accepts the responsibility for the care of the whole patient, such services may be included by the primary team.

Surgeons are increasingly aware of the importance of psychosocial factors in surgical convalescence. Recovery from a major operation is greatly enhanced if the patient is not worn down with worry about emotional, social, and financial problems that have nothing to do with the illness itself. Incorporation of these factors into the management plan contributes to better total care of the surgical patient.

THE PHYSICAL EXAMINATION

The complete examination of the surgical patient includes the physical examination, certain special procedures such as gastroscopy and esophagoscopy, laboratory tests, x-ray examination, and follow-up examination. In some cases, all of these may be necessary; in others, special examinations and laboratory tests can be kept to a minimum. It is just as poor practice to insist on unnecessary thoroughness as it is to overlook procedures that may contribute to the diagnosis. Painful, inconvenient, and costly procedures should not be ordered unless there is a reasonable chance that the information gained will be useful in making clinical decisions.

Often, initial visit examination may be limited to interaction via videoconference. While the physical examination is necessarily limited, there is a great deal of highly valuable information available to the astute clinician. How briskly does the patient respond to questions? Do they move easily about the video screen? While the examination may be limited to these observations, the opportunity to gather some information and to plan on-site interactions in efficient ways (combining a clinic visit with imaging or other procedures) may make this an efficient strategy for the patient and clinician.

The Elective Physical Examination

The elective physical examination should be done in an orderly and detailed fashion. One should acquire the habit of performing a complete examination in exactly the same sequence so that no step is omitted. When the routine must be modified, as in an emergency, the examiner recalls without significant effort what must be done to complete the examination later. The regular performance of complete examinations has the added advantage of familiarizing the beginner with what is normal so that what is abnormal can be more readily recognized.

All patients are sensitive and somewhat embarrassed at being examined. It is both courteous and clinically useful to put the patient at ease. The examining room and table should be comfortable, and drapes should be used if the patient is required to strip for the examination. Most patients will relax if they are allowed to talk a bit during the examination, which is another reason for taking the past history or review of systems while the examination is being done.

A useful rule is to first observe the patient's general physique and habitus and then to carefully inspect the hands. Many systemic diseases show themselves in the hands (cirrhosis of the liver, hyperthyroidism, Raynaud disease, pulmonary insufficiency, heart disease, and nutritional disorders).

Details of the examination cannot be included here. The beginner is urged to consult special texts.

Inspection, palpation, and auscultation are the time-honored essential steps in appraising both the normal and the abnormal. Comparison of the two sides of the body often suggests a specific abnormality. The slight droop of one eyelid characteristic of Horner syndrome can only be recognized by comparison with the opposite side. Inspection of the female breasts, particularly as the patient raises and lowers her arms, will often reveal slight dimpling indicative of an infiltrating carcinoma barely detectable on palpation.

Successful palpation requires skill and gentleness. Spasm, tension, and anxiety caused by painful examination procedures may make an adequate examination almost impossible, particularly in children.

Another important feature of palpation is the laying on of hands that has been called part of the ministry of medicine. A disappointed and critical patient often will say of a doctor, "He hardly touched me." Careful, precise, and gentle

palpation not only gives the physician the information being sought but also inspires confidence and trust.

When examining for areas of tenderness, it may be necessary to use only one finger in order to precisely localize the extent of the tenderness. This is of particular importance in examination of the acute abdomen.

In surgery, auscultation of the abdomen and peripheral vessels may help to guide the clinician in obtaining or interpreting imaging. The nature of an ileus or the presence of a variety of vascular lesions is revealed by auscultation.

A. Examination of the Body Orifices

Complete examination of the ears, mouth, rectum, and pelvis is accepted as part of a complete examination. Palpation of the mouth and tongue is as essential as inspection. Every general surgeon should acquire familiarity with the use of the anoscope and sigmoidoscope and should use them regularly in doing complete physical examinations.

The Emergency Physical Examination

In an emergency, the routine of the physical examination must be altered to fit the circumstances. The history may be limited to a single sentence, or there may be no history if the patient is unconscious and there are no other informants. Although the details of an accident or injury may be very useful in the total appraisal of the patient, they must be left for later consideration. The primary considerations are the following: Is the patient breathing? Is the airway open? Is there a palpable pulse? Is the heart beating? Is massive bleeding occurring?

If the patient is not breathing, airway obstruction must be evaluated. If the patient is unconscious, the respiratory tract should be intubated and mouth-to-mouth respiration started. If there is no pulse or heartbeat, start cardiac resuscitation.

Serious external loss of blood from an extremity can be controlled by elevation and pressure. Tourniquets are sometimes required.

Every victim of major blunt trauma should be suspected of having a vertebral injury capable of causing damage to the spinal cord unless rough handling is avoided.

Some injuries are so life-threatening that action must be taken before even a limited physical examination is done. Penetrating wounds of the heart, large open sucking wounds of the chest, massive crush injuries with flail chest, and massive external bleeding all require emergency treatment before any further examination can be done.

In most emergencies, however, after it has been established that the airway is open, the heart is beating, and there is no massive external hemorrhage—and after antishock measures have been instituted, if necessary—a rapid survey examination must be done. Failure to perform such an examination can lead to serious mistakes in the care of the patient. It takes no more than 2 or 3 minutes to carefully examine the head, thorax, abdomen, extremities, genitalia, and back. If cervical spine damage has been ruled out, it is essential to turn the injured patient and carefully inspect the back, buttocks, and perineum.

Tension pneumothorax and cardiac tamponade may easily be overlooked to devastating effect if there are multiple injuries.

Upon completion of the survey examination, control of pain, splinting of fractured limbs, suturing of lacerations, and other types of emergency treatment can be started.

LABORATORY AND OTHER EXAMINATIONS

Laboratory Examination

Laboratory examinations in surgical patients have the following objectives:

1. Screening for asymptomatic disease that may affect the surgical result (eg, unsuspected anemia or diabetes)
2. Appraisal of diseases that may contraindicate elective surgery or require treatment before surgery (eg, uncontrolled diabetes or heart failure)
3. Diagnosis of disorders that require surgery (eg, hyperparathyroidism or pheochromocytoma)
4. Evaluation of the nature and extent of metabolic or septic complications

Patients undergoing major surgery, even though they seem to be in excellent health except for their surgical disease, should have situation-appropriate laboratory examination. A history of renal, hepatic, or heart disease requires detailed studies. Medical consultation may be helpful in the total preoperative appraisal of the surgical patient. It is essential, however, that the surgeon does not become totally dependent upon a medical consultant for the preoperative evaluation and management of the patient. The total management must be the surgeon's responsibility and is not to be delegated. Moreover, the surgeon is the only one with the experience and background to interpret the meaning of laboratory tests in the light of other features of the case, particularly the history and physical findings.

Imaging Studies

Modern patient care calls for a variety of critical radiologic examinations. The closest cooperation between the radiologist and the surgeon is essential if serious mistakes are to be avoided. This means that the surgeon must not refer the patient to the radiologist, requesting a particular examination, without providing an adequate account of the history

and physical findings. Particularly in emergency situations, review of the films and consultation are needed.

When the radiologic diagnosis is not definitive, the examinations must be repeated or extended to additional studies in the light of the history and physical examination. At times, the history and physical findings are so clearly diagnostic that operation is justifiable despite negative imaging studies.

Special Examinations

Special examinations such as cystoscopy, gastroscopy, esophagoscopy, colonoscopy, angiography, laryngoscopy, and bronchoscopy are often required in the diagnostic appraisal of surgical disorders. The surgeon must be familiar with the indications and limitations of these procedures and be prepared to consult with colleagues in medicine and the surgical specialties as required.

2 Training, Communication, Professionalism, & Systems-Based Practice

Gerard M. Doherty, MD

TRAINING

The process of medical education and surgical training in the United States is overseen by an interconnected group of organizations. Each of these organizations has its specific focus; however, the common theme is continuous process improvement encouraged by intermittent external review (Table 2–1). The ultimate goal is the provision of a consistent, qualified, and professional workforce for medical care in the United States.

Medical Student Education

The Liaison Committee on Medical Education (LCME) is the group that provides accreditation for medical schools in the United States and Canada. *Accreditation* is the process of quality assurance in postsecondary education that assesses whether an institution meets established standards. Accreditation by the LCME is effectively necessary for schools to function in the United States. Without accreditation, the schools cannot receive federal grants for medical education or participate in federal loan programs. Graduation from an LCME-accredited school enables students to sit for medical licensing examinations (the USMLE) and to achieve licensure in most states around the country. Graduation from an LCME-accredited medical school is also necessary for acceptance into an Accreditation Council for Graduate Medical Education (ACGME)-accredited residency program (see below) for graduates of U.S. medical schools. The authority for the LCME to provide this accreditation is delegated by the U.S. Department of Education and the Committee on Accreditation of Canadian Medical Schools (CACMS).

Each accredited medical school is reviewed annually for appropriateness of its function, structure, and performance. Formal site visits are conducted periodically with more in-depth review and reaccreditation at that time. The usual period of full accreditation is 8 years. At the time of this in-depth accreditation visit, and in the intervals between, the LCME works to disseminate best practices and approve the overall quality of education leading to the MD degree.

Graduate Medical Education

The ACGME is responsible for the accreditation of post-MD medical training programs within the United States. Accreditation is accomplished through a peer review process based on established standards and guidelines. The member organizations of the ACGME as an accrediting group are the American Board of Medical Specialties (ABMS), the American Hospital Association (AHA), the American Medical Association (AMA), the Association of American Medical Colleges (AAMC), and the Council of Medical Specialty Societies. The ACGME creates and ensures a basic set of standards for training in residencies and fellowships. The ACGME sets and review the institutional clinical learning environment requirements for development of the skills, knowledge, and attitudes necessary to take personal responsibility for the individual care of patients. These requirements are designed to facilitate an environment where residents and fellows can interact with patients under the guidance and supervision of qualified faculty members who give value, context, and meaning to those interactions. ACGME-accredited residency programs must adhere to the ACGME common program requirements that apply to all residencies, as well as specific program requirements that apply to each training program. The institutional requirements that must be met for overall accreditation of the institution to house training programs are reviewed periodically as a part of Clinical Learning Environment Reviews (CLER site visits).

The ACGME has identified six general competency areas that must be addressed during every graduate residency training program (Table 2–2). The specific application of these competency areas varies widely among training

Table 2–1. U.S. organizations with medical education oversight.

Organization	Acronym and Website	Purpose
Liaison Committee on Medical Education	LCME www.LCME.org	Accreditation of medical schools in United States and Canada
Accreditation Council for Graduate Medical Education	ACGME www.ACGME.org	Accreditation of post-MD training programs in some specialties
American Board of Surgery	ABS www.absurgery.org	Certifies and recertifies individual surgeons who have met standards of education, training, and knowledge
American College of Surgeons	ACS www.facs.org	Scientific and educational association of surgeons to improve the quality of care for the surgical patient

programs. However, each rotation of each residency must include attention to, and assessment of, progress in fulfilling the general competency requirements. The ACGME has established *milestones* for programs to use in the clinical competency assessments of trainees and is beginning the implementation of *entrustable professional activities (EPAs)* as a structure for residency progression.

The review and accreditation of specialty residency programs are undertaken by a committee specific for that field. In surgery, the group is the Residency Review Committee for Surgery (RRC-S). The RRC-S assesses program compliance with accreditation standards both at the common program requirement level and at the program-specific level. The Residency Review Committees also control the number of positions that each program is accredited to have. This effectively sets the maximum number of graduates that can finish from a given training program in any given year.

American Board of Surgery

The American Board of Surgery (ABS) is an independent, nonprofit organization with the purpose of certifying individual surgeons who have met defined standards of education, training, and knowledge. The distinction between the ACGME and the ABS is that the ACGME accredits training institutions and programs, while the ABS certifies individuals. This distinction is similar for specialty boards in other disciplines. The ABS also recertifies practicing surgeons and has made a fundamental philosophical change from periodic retesting for recertification to a more continuous *maintenance of certification (MOC)* plan.

The ACGME and the specialty boards interact. The success of individuals in achieving board certification is considered an important measure of graduate medical education program success, and the measures that can be required of an individual for board certification must somehow also reflect the education that is offered to them through their graduate medical education. Thus, although these entities have different purposes, they must, optimally, constructively mesh their efforts.

Board certification within a defined period after completing residency is necessary for privileging to perform surgery in many hospitals in the United States. Thus, the most straightforward route into surgical practice in the United States includes graduation from an LCME-accredited medical school, completion of an ACGME-accredited residency training program, and satisfactory completion of the *Qualifying Examination* (written board examination) and *Certifying Examination* (oral board examination) of the ABS.

There are other entry points into surgical practice in the United States, most prominently by physicians who have graduated from medical schools in countries outside the United States and Canada. These graduates can be certified by the Educational Commission for Foreign Medical Graduates (ECFMG). Once an individual graduate has been certified by the ECFMG, then they are eligible to train in an ACGME-approved residency training program and can thus be eligible for board certification.

Table 2–2. ACGME general competencies for graduate medical education.

General Competency
• Patient care
• Medical knowledge
• Interpersonal and communication skills
• Professionalism
• Practice-based learning
• Systems-based practice

American College of Surgeons

The American College of Surgeons (ACS) is a scientific and educational association of surgeons whose mission is to

improve the quality of care for the surgical patient by setting high standards for surgical education and practice. The ACS has members, known as fellows, who are entitled to use the letters "FACS" after their name. Membership as a fellow implies that the surgeon has met standards of education, training, professional qualifications, surgical competence, and ethical conduct. However, despite these requirements, the ACS is a voluntary professional membership group and does not certify individuals for practice. The ACS does sponsor a wide variety of educational and professional support programs both for practicing surgeons and trainees. In addition, they have membership categories for surgeons in training and students and for those surgeons who have completed training but have not yet met all the requirements for fellowship (associate fellow). The ACS also engages in important advocacy roles on behalf of patients and the surgeon members.

COMMUNICATION

Efficient and effective communication skills are a critical resource for all clinicians, including surgeons. A surgeon must be capable of establishing rapport with the patient and family quickly and reliably. This mutual respect is critical to a therapeutic relationship. The patient and family must be confident of the competence of the surgeon in order to participate in the recommended management and recovery. Judgments about surgeon competence frequently come within the first few moments of interaction based on the surgeon's ability to communicate. In addition to communicating with patients, clinicians must communicate with referring and collaborating physicians and also within their own healthcare teams.

Communicating With Patients

Communication with patients requires attention to several aspects. First, the clinician must demonstrate respect for the patient as a person. Second, the clinician must display effective listening to the patient's message, followed by demonstrated empathy to their situation or concerns. Finally, the clinician must have clarity in the response. If any of these items are omitted, then the interaction will be less effective than it could be. Many surgeons try to jump straight to a very clear, concise statement of the plan; however, unless the first three steps have occurred, the patient may not listen to the plan at all.

Respect

It is critically important to show respect for the patient and family as people. The healthcare environment is often inconvenient and encountered during a time of stress. Patients are out of their normal venue and comfort zone. They are often frightened by the prospect of what they may learn. Showing respect for their identity will place the patient at more ease and encourage their trusting communication with the clinician. Failing to show respect will have the contrary effect. Thus, meeting an adult for the first time and addressing them by their first name can immediately put many patients on guard with respect to their personal independence and control. Similarly, referring to the mother of a pediatric patient as "Mom," rather than using her name, implies lack of attention to her as an individual worthy of learning her identity. On initial meetings, the clinician should use the patient's last name preceded by an honorific title (eg, Mr. Smith or Ms. Jones). Pay attention to specific requests for uses of pronouns and honorifics, as these choices are important to patients and families.

In addition, engaging in brief small talk regarding some aspect of a patient's life other than the medical matter at hand can further put them at ease ("It must be interesting to be a dog trainer. Do you have a favorite breed?"). These efforts will be rewarded by a more trusting patient and a more efficient interview, with a better therapeutic relationship over the long term.

Listening

Listening to the patient is critical to establishing a correct diagnosis and appropriate therapeutic plan for the individual. Every patient who comes to the medical system with a problem has a story that they have thought through and decided to tell. It is important to let them do so. Not only is the patient likely to reveal critical issues regarding the clinical matter, but they are also often determined to tell the story eventually, whether they are allowed to do so at the outset or not. Allowing and, in fact, encouraging them to tell the story at the beginning of the interview relieves them of this burden of information and allows the clinician to move on to discussion and interpretation.

Listening should be an active, engaged activity. The clinician should appear comfortable, settled, and positioned upon as much of an even eye level with the patient as possible. It is important not to appear rushed, inattentive, or bored by their account. Interjecting questions for clarity or intermittent, brief verbal encouragements will let the patient know that the clinician is engaged with the problem.

It may be helpful at the outset of the listening phase to let the patient know what materials have been reviewed. For example, telling the patient that the clinician has reviewed the referral letter from the primary physician, the results of the last two operations, and their recent laboratory work may help the patient to be more concise in their discussion.

Empathy

Once the patient has recounted their history and the other aspects of the examination and data review have been completed, it is important to review this material with the patient in a way that demonstrates empathy with their situation. A surgeon's understanding of the problem is important for the patient, but the problem is not confined to the medical issue; the problem must be understood in the context of the patient. For this reason, demonstration of empathy is important to the patient's trust of the physician. Establishing this connection with the patient is crucial to their engagement in the process of care.

Clarity

Having established respect for the patient, heard and understood their story, and empathized with their situation, the physician must speak clearly, using vocabulary understood by the individual, about the recommendations for further evaluation or care. This portion of the conversation should include a clear distinction between what is known about the patient's diagnosis or condition and what is not known but might be anticipated. When appropriate, likelihoods of various outcomes should be estimated in a way that the patient can grasp. The recommended approach to next steps should be listed clearly, along with alternative approaches. Patients always have at least one alternative to the recommended choice, even if this is only to decide not to have further medical care. This portion of the conversation can be augmented with illustrations or models that may improve the patient's understanding. Often, reviewing radiologic studies directly with the patient or family at this time can help their understanding.

The risk taken by failing to establish this relationship with the patient is great. This can lead to errors in judgment about diagnosis or management. It also precludes the opportunity to engage the patient as an ally in their care. If things go badly during treatment, it also can make subsequent communication about problems or complications difficult or impossible. Finally, the surgeon who communicates poorly excludes themself from enjoying a personally and professionally satisfying physician–patient relationship.

Communication With Collaborating Physicians

Surgeons often work with other physicians in collaboration of care for patients. Communication in these settings is important to the overall patient outcome, particularly when the surgeon will be involved in the patient's care for some defined interval that has been preceded and will be followed by the ongoing care provided by the primary care physician. The communication in these settings can be separated into two basic types: routine and urgent. Routine communication can take place in a variety of ways depending on the healthcare setting. This communication is typically asynchronous and written. It may take the form of a note in the patient's electronic medical record or a letter sent to the physician's office. This is an appropriate way to communicate reasonably expected information that does not need to be acted on urgently. For example, a patient who is referred to a surgeon for cholecystectomy and who has a plan made for cholecystectomy can have routine communication back to the referring physician.

Urgent communication should occur to collaborating physicians when there are unexpected or adverse outcomes. Again, there are a variety of communication modes that may be utilized for this, but the communication is more often synchronous via a direct conversation either in person or by telephone. The communication is more than courtesy to the collaborating physician, as knowledge of these events allows them to participate constructively on behalf of the patient. Examples of situations that warrant more urgent communication include new diagnosis of significant cancers, life-altering complications from interventions, and certainly death of the patient.

Clarity in transfer of care responsibility is critical to the continuous optimal care of the patient. For that reason, any communication with collaborating physicians should indicate either the ongoing role of the surgeon in the patient's care or the deliberate transfer of responsibility for ongoing care issues back to other collaborating physicians.

Communications Within Teams

Surgical care is often provided in a team setting, and communication within these teams has become a recent focus of several groups. Systems have been built to both teach and assess these skills, the most predominant being the Nontechnical Skills for Surgeons (NOTSS) work done in Scotland and the United States. Current surgical teams typically include physicians, nonphysician mid-level providers (often physician assistants or nurse practitioners), and a variety of students. The student trainees may include students in medical school, physician assistant programs, and nursing school. These teams have become increasingly complex, and the information that they manipulate as a team to provide patient care is voluminous. In addition, the transfer of information from one provider to another as shifts or rotations change is recognized as a weak point in the patient care continuum.

With these complex teams and extensive information, the keys to efficient and effective team processes appear to be clarity of roles and designing processes that involve writing things down only once. The advent of electronic medical records has allowed the generation of electronic tools to transfer

information from team member to team member. This may be useful to facilitate this process. Careful attention to transfers of care from one provider to another and explicit recognition that this is a potential time for errors are important.

PROFESSIONALISM

Professionalism denotes a series of behaviors that demonstrate that a person has achieved status as a professional. A *professional* in this context is implied to possess the specialized knowledge and have gone through long and intensive academic preparation for their vocation. These behaviors affect the interactions that professionals have both with patients and with other healthcare professionals. For optimal effectiveness, the surgeon should behave in a professional way both with patients and within their healthcare institutions. The AMA has promulgated a set of medical ethical principles that apply equally well to surgical practice and that can help to guide professional behavior.

The ethics of surgical practice are complex and can be approached from a variety of theoretical frameworks. The most commonly applied framework for the evaluation of ethical dilemmas for individual patient decisions in medicine, known as "The Principles Approach," involves four principles: autonomy, beneficence, nonmaleficence, and justice, as promulgated by Beauchamp and Childress (Table 2–3). A detailed analysis of these principles is beyond the scope here; however, the need for a code of medical ethics that is distinct from general societal ethics is the basis for medical professionalism. There are five features of medical relationships that provide the moral imperatives underlying the profession and the requirement for a separate ethical code from other forms of business.

Table 2–3. Principles of medical ethics.

Principle	Definition
Autonomy	Deliberated self-rule; the patient has the right to choose or refuse their treatments; requires physicians to consult and obtain patient agreement before doing things to them.
Beneficence	A practitioner should act in the best interest of the patient, without regard to physician self-interest.
Nonmaleficence	Do no harm; the practitioner should avoid treatments that harm the patient.
Justice	Rendering what is due to others; affects the distribution of medical care among patients and populations.

1. The inequality in medical knowledge, and attendant vulnerability, of the patient
2. The requirement for the patient to trust the physician, known as the fiduciary nature of the relationship
3. The moral nature of medical decisions that encompass both the technical aspects of health management and the ultimate effect on the patient's life
4. The nature of medical knowledge as a public property that physicians receive in order to apply to the practical improvement of patients' lives
5. The moral complicity of the physician in the outcome of the prescribed care, in that no formal medical care can take place without the physician's collusion

Because of these characteristics of the relationship between physicians and their patients, physicians must adhere to a set of ethical constraints specific to their profession.

Although these imperatives are not generally understood explicitly by patients, patients can clearly grasp when these principles are in danger. They may even be suspicious that their physician or surgeon has motives that compete with the patient's best interest. One of the goals of the physician–patient interaction is to allay these fears and construct a trusting relationship based on the patient's needs, within the principles noted above.

Interaction With Patients

The interactions with patients should be characterized by polite and possibly somewhat formal manners. These manners will aid the professional in their communication efforts, as noted above. In order to meet the patient's expectations of what the physician or surgeon should be, proper socially acceptable manners should be observed. The purpose of these manners is to put the patient at ease that the physician is an empathetic person with the self-awareness to recognize the way that they appear to other people. The manners that the physician projects affect the credibility of the subsequent interactions. These conventions extend to the type of dress that is worn in a professional setting. The details of whether a physician wears a white coat, formal business clothing, or a "working uniform" such as scrubs are best left to local custom and practice but, most importantly, should be based on patient expectations. The mode of dress in general should be neat and clean, rather than casual, and not distracting to the interaction.

Another aspect of professionalism is the capability of the physician to do the right thing for the patient and the family even when that course is difficult or unpleasant. This includes such situations as frankly and openly disclosing errors made during care or delivering bad news about new or unexpected diagnoses. Although human

nature can make these interactions difficult, the professional must rise to the task and perform it well. Avoiding the opportunity to do so not only obviates the professional's role as advisor on the issue at hand but also affects the physician's credibility in the remainder of that therapeutic relationship.

Interactions With Healthcare Personnel

Surgeons frequently work in complex, multilayered organizations. The behavior of the surgeon within this group should always remain productive and patient centered. In any complex organization with multiple people and personalities, conflicts arise. In that context, it is not appropriate for the surgeon to necessarily shrink from the conflict, but rather the surgeon should take up the role of constructive evaluator and team builder to resolve the issue. At all times, the surgeon must avoid personal attacks on people based on their personal characteristics but may legitimately criticize behavior or decisions. Professional comportment in these matters will be rewarded with progress in resolving the issue.

Reputation is a fragile and valuable commodity. All healthcare professionals have a reputation, and it works either for or against them in achieving their patient care and professional goals. Careful adherence to professional behavior in dress, speech, manners, and conflict resolution will create the professional reputation that is most advantageous for the surgeon. With a positive reputation, the surgeon's behavior in ambiguous situations will be interpreted in a benevolent way. The reputation of any clinician is as valuable as their education or certification.

SYSTEMS-BASED PRACTICE

Systems-based practice is one of the core competencies defined by the ACGME as a necessary skill to be developed by graduate medical trainees. These residents must demonstrate an awareness of, and responsiveness to, the larger context and system of healthcare and the ability to effectively call on system resources to provide care that is of optimal value. The process of teaching and learning systems-based practice has been in place for many years. This is what might be considered the practical part of graduate medical training. However, it is only more recently that it has become a focus and metric for performance by training programs.

As a part of training, then, residents must learn how different types of medical practice and healthcare delivery systems differ from one another, including methods that they use to control healthcare costs and allocate resources. They must use this knowledge to practice cost-effective healthcare and resource allocation that limits the compromise of quality of care. They must advocate for quality patient care and assist patients in dealing with complexities of the healthcare delivery system. They must also understand how to work with healthcare managers and other collaborating healthcare providers to assess, coordinate, and improve healthcare for patients.

In practice, this is easier to understand. The role of the resident in identifying both the healthcare needs of the patient and the capability of the system to meet those needs is well established. Surgery residents in their senior years are often important resources for hospital systems by understanding how to manipulate the system to meet the needs of the patient. Medical students and surgical trainees must also recognize their role as a part of these complex systems.

Reference

Nontechnical Skills for Surgeons (NOTSS). https://www.notss.org. Accessed May 20, 2023.

MULTIPLE-CHOICE QUESTIONS

1. All of the following are true of the principles of medical ethics, *except:*

   A. Beneficence and nonmaleficence are synonyms.
   B. Justice addresses the distribution of medical care among patients and populations.
   C. Autonomy includes the concept that the patient has the right to choose or refuse their treatments.
   D. Beneficence asserts that a practitioner should act in the best interest of the patient, without regard to physician self-interest.
   E. Autonomy requires physicians to consult and obtain patient agreement before doing things to them.

2. The LCME and the ACGME:

   A. Both accredit institutions to provide education or training.
   B. Provide diplomas and credentialing to individual practitioners.
   C. Conduct periodic reviews to ensure that institutions maintain their programs.
   D. Are units of the U.S. Department of Commerce.
   E. Both A and C are true.

3. ACGME general competencies include all of the following, *except:*

   A. Interpersonal and communication skills.
   B. Professionalism.
   C. Technical skills.
   D. Practice-based learning.
   E. Systems-based practice.

4. The American Board of Surgery and the American College of Surgeons:
   A. Are both a part of the American Medical Association.
   B. Both report directly to the RRC-S of the ACGME.
   C. Work together to accredit individuals to practice general surgery.
   D. Are separate organizations that credential surgeons and educate surgeons, respectively, as primary parts of their missions.
   E. A and C.

5. Effective communication with patients requires:
   A. Demonstrated respect for the patient as a person.
   B. Effective listening to the patient's message.
   C. Clarity in the physician's response to the patient.
   D. Family members who can reinforce messages.
   E. A, B, and C.

3 Preoperative Preparation

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INTRODUCTION

Preoperative preparation is part of the continuum of care that begins with the surgeon's initial assessment and optimization of the patient. This ideally involves a multidisciplinary collaboration in a culture of excellence and high standards. The surgeon determines the risks and benefits of proceeding with an operation versus the natural history of the condition if left untreated. The surgeon may collaborate with the patient's primary care physician, other specialists, and a preoperative clinic to ensure the best care. A successful operation depends on the surgeon's comprehension of the biology of the disease and keen patient selection.

This chapter will consider preoperative preparation from the perspectives of the patient, operating room facility and equipment, operating room and perioperative staff, and surgeon. The surgeon is usually the only professional involved in each phase of care, including preoperative evaluation, immediate preoperative setting, intraoperative phase, early postoperative recovery, and postdischarge convalescence. Therefore, the surgeon bears the ultimate responsibility for meticulous planning and coordination throughout the phases to ensure the best outcome for the patient.

PATIENT PREPARATION

History & Physical Examination

The initial assessment involves eliciting a thorough history and conducting a good physical examination. The history of present illness includes details about the presenting symptoms, including acuity, chronicity, quality and duration, precipitating or alleviating factors, concurrent symptoms, and features of pain (eg, radiation). Secondary symptoms should also be assessed. Fevers, sweats, or chills may suggest a concurrent infection, and unplanned weight loss may increase the suspicion of malignancy. Family members, friends, or guardians accompanying the patient may provide useful information and should be engaged when appropriate. Outside records can be indispensable and avoid costly redundant tests, especially when electronic copies of outside imaging studies are available. The primary care physician may also be consulted when necessary. In the case of a reoperation, prior operative reports and pathology reports are essential (eg, when planning a neck reexploration for primary hyperparathyroidism).

The past medical history should consider previous operations and comorbidities, particularly a history of venous thromboembolism (VTE), such as deep vein thromboses (DVT) or pulmonary emboli (PE), bleeding disorders, prolonged bleeding associated with prior operations or modest injuries (eg, epistaxis, gingival bleeding, or unprovoked ecchymoses), and complications during or after other operations or procedures. One must secure a list of active medications with dosages and schedule. Moreover, it is beneficial to inquire about corticosteroid usage within the past 6 months to avoid perioperative adrenal insufficiency. Medication allergies and adverse reactions should be elicited; knowledge about environmental and food allergies is also valuable and should be recorded so that these exposures are avoided during the hospital stay. Some anesthesiologists are reluctant to use propofol in patients with egg allergies, and reactions to shellfish suggest the possibility of intolerance of iodinated contrast agents.

The social history classically involves inquiries about tobacco, alcohol, and unprescribed or illicit drug usage. This portion of the history also offers the opportunity to establish a personal relationship with patients (and their loved ones). It is fun and often stimulating to learn about patients' occupations, avocations, exercise routines, interests, accomplishments, fears, expectations, and family lives. Patients' regular activities offer insight into physiologic reserve; an elite athlete should tolerate nearly any major operation, whereas a frail, sedentary patient may be a poor candidate for even relatively minor operations.

A family history includes questions pertinent to the patient's presenting condition. For example, if a patient with a colorectal cancer has relatives with similar or other malignancies, genetic conditions such as familial adenomatous polyposis or hereditary nonpolyposis colorectal cancer may be implicated. This scenario would have screening implications for both the patient and family members. In addition, one should also elicit a family history of VTE complications, bleeding disorders, and anesthesia complications. For example, a sudden and unexpected death of a relatively young family member during an operation could suggest the possibility of a pheochromocytoma, particularly in the setting of a medullary thyroid cancer or related endocrine disorder. A strong family history of allergic reactions might imply hypersensitivity to medications.

A comprehensive review of systems is important to assess other active issues. A systemic assessment includes neurologic, head and neck, cardiovascular, pulmonary, gastrointestinal, genitourinary, musculoskeletal, integumentary, hematologic, endocrine, and psychological systems. Unveiling symptoms such as exertional chest pain, shortness of breath, cough, low energy, or neurologic concerns may certainly alter the preoperative evaluation and change the risk-benefit analysis. Regardless of degree of specialization, surgeons and their teams are capable of identifying and investigating potentially confounding conditions.

A careful physical examination is necessary, including traditional vital signs (eg, pulse, blood pressure, respiratory rate, and temperature), but it is also important to record the patient's baseline oxygen saturation on room air, weight, height, and body mass index (BMI) prior to many operations. The physical examination includes an assessment of general fitness, exercise tolerance, cachexia, or obesity, while also focusing on the patient's specific condition. Additional findings may detect cardiopulmonary abnormalities, bruits, absent peripheral pulses, adenopathy, compromised skin integrity, incidental masses, hand dominance, neurologic deficits, or deformities. An abdominal exam may include digital anorectal and pelvic examinations. The surgeon should also appreciate potential airway problems, particularly if general anesthesia is anticipated. Each specialist will obviously conduct meticulous exams of the relevant organ systems. Of note, the coronavirus disease 2019 (COVID-19) pandemic has disrupted traditional preoperative investigations, with some patients undergoing operations after exclusively meeting the surgeon via video conference. The ramifications and long-term advisability of this approach are yet to be fully determined.

Preoperative Testing

Preoperative laboratory tests and imaging are tailored to the patient's comorbidities and operation. There should be not be a "routine" battery of studies for all patients. Not only is this practice costly and unsupported, but also it may delay the needed operation while unnecessarily pursuing findings, especially false-positive results. Instead, tests should be selected based on the patient's age, comorbidities, cardiopulmonary risk factors, medications, and general health, as well as the complexity of the underlying condition and proposed operation. For example, children uncommonly require preoperative lab tests. However, a complete blood count, chemistries, and electrocardiogram are proper for high-risk patients before major operations. Each institution likely has its own algorithms for testing. Table 3–1 provides an example of a preoperative lab grid matrix from our academic medical center. Each system should establish a practice for managing abnormal results, whether germane to the patient's active condition or a serendipitous finding, and the need for subsequent tests or interventions.

A complete blood cell count and basic chemistries are reasonable for some operations, but their likelihood of producing abnormal or meaningful results should be considered. Coagulation factors such as prothrombin time (PT), international normalized ratio (INR), and partial thromboplastin time (PTT) are not ordinarily indicated but should be obtained when a patient describes a bleeding history, an established bleeding disorder, or the usage of anticoagulants. These tests may also be indicated in instances of potentially impaired coagulation factor synthesis such as liver failure, bile duct obstruction, malnutrition, or the absence of a terminal ileum (where vitamin K is absorbed). Furthermore, coagulation tests may be valuable for operations associated with little threshold for intraoperative or postoperative bleeding, such as those on the brain or spine. A pregnancy test (eg, urine β-human chorionic gonadotropin) should be performed shortly before operations on women with childbearing potential. Other laboratory tests depend on specific conditions, including liver chemistries, tumor markers, and hormone levels. A blood bank specimen should be selectively submitted in advance of operations that confer a significant chance of major hemorrhage or in the setting of anemia with prospects of additional blood loss. Actual cross-matching of blood for transfusion is costly, so blood typing alone may suffice.

Electrocardiograms are justified for patients older than 50 years, those undergoing cardiovascular operations, and those with a history of hypertension, cardiac disease, significant respiratory disease, renal dysfunction, and diabetes mellitus. Chest radiographs are no longer performed on a regular basis but are primarily reserved for patients with malignancies or significant pulmonary disease and when cross-sectional chest imaging is not already available. Other special tests are selectively requested, often with guidance from consultants, including echocardiography, cardiac stress testing, baseline arterial blood gases, and pulmonary function tests.

COVID-19 Testing & Perioperative Guidelines

The COVID-19 pandemic has had a tremendous impact on preoperative preparation, perioperative care, and outcomes. At our institution, staff in the surgeon's clinic, the

Table 3–1. Sample preoperative testing grid.

	CBC	BMP	Coag	LFTs	Thyroid	UA/Cx	ECG	Vit D	Alb	Pre Alb	A1C	T&S
Comorbidity												
Cardiovascular disease	X						X					
Pulmonary disease	X						X					
End-stage renal disease	X	X					X					
Renal insufficiency	X	X										
Hepatic/liver disease	X	X	X	X								
Hypertension							X					
Diabetes		X					X				X	
Vascular disease	X						X					
Urinary tract infection symptoms						X						
Bleeding disorders/anticoagulants	X		X									
Chemotherapy	X	X										
Diuretics		X										
Hypothyroidism (<3 months)					X							
Operation Type												
Neurologic	X	X	X			X	X					X
Gynecology	X	X										X
Major vascular	X	X					X					
Total thyroidectomy					X			X				
Knee/hip joint replacement	X	X	X				X	X		X	X	X
Shoulder replacement	X	X					X	X		X	X	X
Spinal with hardware						X			X	X	X	
Anterior spinal fusions	X	X				X		X		X	X	X
Bariatric surgery	X	X					X		X			X
Urologic surgery						X						
Gastrointestinal	X	X										
Hepatobiliary	X	X										X
Colorectal												X

A1C, hemoglobin A1C; alb, albumin; BMP, basic metabolic panel; CBC, complete blood count; coag, coagulation labs (eg, international normalized ratio and partial thromboplastin time); Cx, culture; LFT, liver function tests; Pre Alb, prealbumin; T&S, type and screen; UA, urinalysis; Vit, vitamin.

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