FUNDAMENTALS OF SURGERY

KNOWLEDGE COMPONENTS

The general surgery residency program is designed to provide the resident with a clear progression of responsibility. **Technical knowledge** in the art and science of surgery is acquired in a progressive fashion through clinical rounds, conferences, and research.

> Daily rounds with the attending staff provide an opportunity for residents to enhance their clinical knowledge as they advance through the program. Clinical problems and pertinent teaching points are brought to the attention of the medical students and junior-level residents. Relevant questions are asked, and the resultant discussions generate specific teaching points about the patients' pathologic problems.

The discussion is brought to a conclusion by the chief resident who as both student and teacher, shares his/her fund of knowledge with the junior residents and medical students. During morning rounds, residents and medical students may identify new clinical problems in the patients under their care. Their decisions are reviewed by the chief resident prior to entering the operating room. When morning rounds are attended by a staff surgeon, another level of technical knowledge is provided to the residents on the service.

Technical knowledge is taught at all levels of the program in structured didactic conferences. As leader of the curriculum topic for the week, the chief resident presents information in a formal fashion and directs the attention of junior residents to key clinical facts. The conferences are attended and supervised by a faculty surgeon.

This format is also used in the weekly Matrix conference. At these conferences, senior residents may comment on the surgical aspects of a patient's care and provide information obtained from the literature about outcome and alternate methods of management that should have been considered.

Research is another method by which the residents obtain progressive technical knowledge. During the first year of training, junior residents are encouraged to ask clinical questions and to critically review the published medical literature. As the residents progress, they are encouraged to focus their areas of interest by conducting clinical research projects. These activities prepare the residents to meet national standards and to obtain the knowledge and skills required for optimum patient care.

An important benefit of resident participation in research is the generation of scientific information that is presented at regional and national medical meetings. The residents have an opportunity to meet leaders in the field and to assimilate knowledge gained by attending the meeting.

The development of **interpersonal skills** is encouraged throughout the program. Although residents interact with people at many levels in the hospital community, the development of appropriate interpersonal skills in their relationships with patients is of utmost importance. Junior residents observe the communication of attending surgeons and chief residents and are encouraged to develop relationships with patients that are appropriate for their own personalities. The ability to establish a close, personal rapport with patients is one of the most important outcomes of training.

Throughout the program, residents learn to relate to medical students assigned to their clinical services in a patient and understanding way. The residents learn to assess the abilities of the students in order to assign tasks appropriately.

> Monitoring the development of interpersonal skills occurs both formally and informally. Resident interactions with colleagues, hospital staff, and patients are evaluated. The program director counsels residents immediately when he is alerted to interpersonal problems that have occurred with hospital staff. The program director provides constructive recommendations, and when necessary, refers the resident for additional counseling.

Progressive development of **psychomotor skills,** acquired through observation and repetitive actions, is an integral part of the general surgery residency. The skill of each surgery resident in the operating room develops at varying rates. Over the course of the 5-year training program, the resident acquires the psychomotor skills that enable him/her to become a capable, safe clinical surgeon. The surgical skills laboratory is available for clinical teaching and research. Residents, following a PGY-specific curriculum, are supervised through progressive laparoscopic/simulation techniques. This course is useful for developing skills that can be transferred directly to the clinical setting in the operating room.

As the residents progress, they are given increasing responsibility in the operating room, performing surgical procedures that require psychomotor skills consistent with their abilities and level of training. PGY1 residents frequently act as first or second assistants on surgical procedures, at which time they observe the skills of the more senior residents and the attending surgeons. This enables them to acquire information that can be stored, synthesized, and used when they have primary operative responsibilities. PGY1 residents may perform simple, standardized operative procedures such as removal of skin lesions, uncomplicated inguinal herniorrhaphy, appendectomy, minor amputations, and drainage of abscesses.

PGY2 and PGY3 residents develop increasing psychomotor skills through their activities as first assistant on major operations and while opening and closing the operative field on major cases. They may perform operative procedures commensurate with their abilities, such as complex inguinal herniorrhaphy, cholecystectomy, small bowel resection, breast surgery, and right colectomy. PGY4 and PGY5 residents acquire the skills needed to perform more complex operative procedures such as gastric or pancreatic surgery and vascular reconstructions. These operations are performed with supervision by the attending

staff. The residents are counseled throughout the operative procedures so that they may benefit from the experience of the attending surgeon.

The development of **sound surgical judgment** in the operating room is an integral part of the program. Residents are given responsibility in the operating room to a degree compatible with their level of training, technical knowledge, and psychomotor skills. In the course of the five-year program, each resident will have reached the goal of developing sound clinical judgment. The attending surgeon is present at each operation. This is an especially important component of the program since it allows the operating residents to review their clinical decisions and obtain immediate feedback. An increasing degree of independence is granted to the residents as they progress through their training and develop the skills necessary to operate safely.

CURRICULUM OBJECTIVES

Objectives for the surgical curriculum identify what the resident should know and be able to do. At the completion of training, the resident should be able to:

- Manage surgical disorders based on a thorough knowledge of basic and clinical science.
- Demonstrate appropriate skill in the surgical techniques required of a qualified surgeon.
- Demonstrate the use of critical thinking when making decisions affecting the life of a patient and the patient's family.
- Make sound ethical and legal judgments appropriate for a qualified surgeon.
- Collaborate effectively with colleagues and other health professionals.
- Teach and share knowledge with colleagues, residents, students, and other health care providers.
- Teach patients and their families about the patient's health needs.
- Demonstrate acceptance of the value of life-long learning as a necessary prerequisite to maintaining surgical knowledge and skill.
- Demonstrate a commitment to scholarly pursuits through the conduct and evaluation of research.
- Demonstrate leadership in the management of complex programs and organizations.
- Provide cost-effective care to surgical patients and families within the community.
- Respect the religious beliefs of patients and their families and provide surgical care in accordance with those beliefs.

PREOPERATIVE AND POSTOPERATIVE CARE

Resident involvement in **preoperative and postoperative care** of patients is a critical part of the general surgery residency. The 5-year program is designed to provide progressive responsibility.

PGY1 general surgery residents obtain pre-hospital experience with patient care through the surgery clinic (ACC). The residents perform the initial evaluation of

patients as they present to the outpatient clinic. With supervision by the chief resident, they formulate a diagnosis and tentative treatment plan.

The PGY1 resident performs the initial history and physical examination of patients admitted to the hospital and may order routine preoperative studies. Specialized diagnostic studies are ordered as appropriate after discussion with the chief resident and attending surgeon. The resident is closely supervised in these areas during this phase of training.

The PGY1 resident obtains first-hand experience evaluating the postoperative patient's condition during morning rounds. The resident makes pertinent clinical observations, collates available data, and initiates the treatment plan for the day. This work is closely supervised by the senior resident during morning rounds before entering the operating room. Information is given to the attending surgeon, who provides appropriate monitoring and critique at that time. Post-hospital experience in PGY1 is obtained in the surgery clinic or private physicians' offices, where the resident may see patients who were under his/her care on the inpatient service.

As a Level I Trauma Center, all multiple-injury patients are admitted directly to the trauma resuscitation area. General surgery residents on the trauma team treat these patients, led by a staff surgeon. The trauma attendings provide 24-hour coverage in the hospital. The trauma service enables PGY1 residents to participate in the preoperative and postoperative care of the multiple-injury patient. The attending surgeon directs the residents on the trauma team in the initial assessment and resuscitation of patients. The PGY1 resident participates in the initial assessment of the patient's injuries and obtains experience placing monitoring lines and drainage tubes. He/she follows the patient through the operative and postoperative course.

In **PGY2** pre-hospital experience is obtained in the offices of attending surgeons and in the clinic. The resident also has contact with ambulatory patients in the emergency room. The resident is allowed increased responsibility in ordering diagnostic tests, but therapeutic decisions are still monitored by the senior resident and attending surgeon. Preoperative responsibilities include the initial history and physical examination and ordering routine and more complex diagnostic studies. The resident formulates the treatment plan for the patient and recommends diagnostic studies to confirm the diagnosis. The resident helps prepare the patient for surgery by implementing and supervising appropriate nutritional support as well as by placing appropriate monitoring lines prior to surgical intervention.

Postoperatively, the PGY2 resident participates in morning rounds and makes an initial clinical assessment. The resident has more latitude to make therapeutic decisions and initiate treatment following review and approval by the senior resident and the attending surgeon. Post-hospital experience is obtained in the attending surgeon's office and in the clinic.

PGY3 residents obtain pre-hospital experience by participating in office hours with the attending surgeons and in clinic (ACC). The resident gains experience examining new patients, determining diagnoses, and establishing tentative treatment plans for review with the staff surgeon. In the emergency room, the

PGY3 resident evaluates patients who are admitted through this ambulatory unit. This resident is frequently given authority, by either the chief resident or the attending surgeon, to admit patients to the hospital and, with appropriate supervision, initiate therapy.

In PGY3, preoperative experience consists of reviewing the history and physical examination of patients admitted to the surgical service, confirming key findings, and discussing the treatment plan with the junior residents. The resident is allowed increased responsibility in ordering diagnostic studies and, in consultation with the attending surgeon, may institute the treatment program. He/She supervises the preoperative preparation and the placement of appropriate monitoring lines.

During morning rounds, the PGY3 resident monitors the junior resident's activities and evaluates the immediate postoperative patients and patients with difficult clinical problems requiring more skilled supervision and mature judgment. The chief resident or attending surgeon reviews this activity. Post-hospital experience is obtained in the private offices of attending surgeons or in the clinic. The resident sees patients who have undergone surgical procedures and are returning for continued care.

On the trauma service, the PGY3 resident supervises trauma resuscitation, prioritizes treatment, orders appropriate studies, and oversees junior residents performing specific therapeutic interventions. The resident contacts and advises appropriate consultants regarding evaluation of the multiple-injury patient, supervising the overall care of the patient. Postoperatively, the PGY3 resident supervises the junior residents during morning rounds, reviews serious clinical problems, and initiates diagnostic studies and therapeutic alterations with supervision by the attending surgeon. Participation in the ACC Clinic enables the resident to follow patients discharged from the inpatient trauma setting.

In **PGY4** pre-hospital experience is obtained in the surgeons' private offices and in the emergency room. In the surgeon's office, the resident evaluates the clinical problem and formulates a diagnosis and tentative treatment plan, which is reviewed with the attending surgeon. In the emergency room, the resident may assess patient problems, order diagnostic tests, and recommend/institute minor therapeutic procedures. Major problems requiring operative intervention are reviewed with the attending surgeon.

The PGY4 resident reviews new patient admissions and confirms pertinent findings from the history and physical examinations obtained by junior residents. The resident reviews the treatment plan, orders specific diagnostic tests, and confers with the attending surgeon regarding patient management. He/She supervises morning rounds, sharing information with the junior residents about the status of the patients and discussing alterations in patient management. The resident reviews the operative procedure along with the risks and benefits with the patients and supervises the preoperative preparation of patients for surgery by the junior resident.

In **PGY5** the resident sees pre-hospital patients in the private surgeons' offices, the surgery clinic, and the emergency room. In these settings, the resident has first-

hand experience evaluating new patients as they present with their clinical problems. In the clinic, the chief resident supervises the junior residents' initial assessments and makes recommendations regarding clinical management. In the emergency room, the PGY5 resident assesses the junior residents' evaluations and recommends diagnostic studies and therapeutic intervention. The attending surgeon reviews the resident's assessment and recommendation for treatment.

The chief resident's role in preoperative care is as supervisor and primary surgeon. He/She evaluates the physicals performed by the junior residents and reviews the pertinent findings, assesses their tentative treatment plans, and institutes appropriate diagnostic studies. Recommendations for therapy and operative intervention are reviewed with the attending surgeon. The chief resident oversees the preparation of the patient for surgery through the junior residents.

During morning rounds, the chief resident evaluates clinical problems and tentative treatment plans, affirming or modifying the junior residents' recommendations, as appropriate. Patients with major clinical problems are evaluated, and therapeutic interventions are implemented after review with the attending surgeon. The PGY5 resident assists in planning for patient discharge by interacting with discharge planning and outpatient services. Post-hospital experience is obtained in the private physicians' offices and in the surgery clinic. In the clinic, the PGY5 resident follows patients who have undergone surgery while under his/her care, enabling the resident to evaluate the long-term effects of his/her surgical intervention.

OUTPATIENT EXPERIENCE

All general surgery residents are required to spend one-half day per week in the clinic or private office during general surgery and subspecialty rotations (except ICU). Each session should include exposure to **at least** 5 patients who will be entering the hospital or are being seen following a surgical procedure. This requires cooperation by the attending surgeons to integrate residency teaching into their office practices.

Supervision in surgery clinic is provided by the chief residents and the attending surgeon. In the emergency room, the chief resident and the appropriate attending surgeon supervise the junior residents. On the clinic service, patients treated in the hospital are followed as outpatients by a resident, usually the one who has been involved in the patient's operative treatment. In clinic, the resident develops independent responsibility for evaluating new patients and establishing a diagnosis and treatment plan. Decisions are reviewed with the supervising surgeon in the clinic. The resident obtains longitudinal perspective about the patient's care either at the time of admission to the hospital or through repeat visits to the clinic. Long-term patients in the clinic enable the resident to participate in treatment through the course of a particular disease. The resident may make clinical decisions regarding changes observed in the patient's problems that require alterations in the treatment program. Supervised, but independent, responsibility is encouraged and monitored.

Residents are required to attend office hours of the surgeons on their services. In the private offices, residents may participate in the evaluation of new patients prior to or in conjunction with, the attending surgeon. The format of new patient

encounters is at the discretion of the attending surgeon. These experiences allow the resident to formulate an initial clinical impression and make a decision regarding subsequent care of the new surgical patient seen in the office. The plan is discussed with the attending surgeon and modified, as needed. The resident may see the same patients when they are admitted to the corresponding inpatient service and/or when they are discharged from the hospital. The resident develops progressive interpersonal skills and learns psychomotor skills of minor office procedures through these encounters. Responsible patient management is learned, not only by example, but also by direct participation in evaluating postoperative patients. Likewise, skills for managing outpatient surgical problems are developed.

Each resident is required to submit a record of outpatient encounters weekly, consisting of a list of patients seen, the date of the session, and the supervising surgeon. This data is reported to the program director and reviewed at the time of the semi-annual interview. Adequate outpatient experience is required for resident promotion.

EMERGENCY ROOM

General surgery residents participate in the care of the patients seen in the **emergency room**. Patients seen in the emergency room may be self-referred or sent by their primary-care physicians with instructions to be seen by the resident staff or an attending surgeon. The full-time emergency room physician usually sees self-referred patients first. When surgical consultation is needed, the resident may be the first member of the surgical staff to see the patient. Frequently, these patients are followed by the residents who evaluate them initially, providing continuity of care for the patient and educational experience for the resident.

The junior resident (946 Resident) sees a patient in the emergency room and establishes a preliminary diagnosis and differential. The resident may order simple diagnostic studies and subsequently reviews the findings with the senior resident or attending surgeon. The supervising surgeon sees the patient and discusses the preliminary treatment plan with the resident. More complex studies and diagnostic procedures may be ordered, and recommendations for surgical intervention are affirmed or modified.

The surgery resident’s activity in the emergency room is supervised entirely by the Department of Surgery staff. At no time are these residents under the direction of the emergency room physicians.

AMBULATORY SURGERY

Residents obtain experience in **ambulatory surgery** as a component of the inpatient surgery rotations. Each resident should spend time at the 310 Ambulatory Surgery Center and participate in operative procedures. If this program is followed, the resident will have exposure to a variety of ambulatory surgical procedures by the end of training.

In the ambulatory surgery facilities, the resident evaluates the patient’s specific problem for which the procedure is planned. Diagnostic procedures are ordered in the physician’s office or through the clinic. The preliminary treatment plan is made by the resident, who performs the operation under the direction of the chief resident

or the responsible attending surgeon. For private patients, the attending surgeon is the supervisor. For clinic patients, it may be the chief resident or the attending surgeon. If the chief resident is the supervising surgeon, the attending surgeon must be available in the operating suite or scrubbed in the operating room.

Ambulatory surgery patients are seen postoperatively in the clinic by the junior residents under the supervision of the chief resident who was responsible for the operative procedure. The patients may be seen in the private surgeons' offices where the resident obtains experience in evaluating the postoperative convalescence of the patient.

BASIC SCIENCE

Education in **basic science and human biological phenomena** occurs throughout the general surgery residency. The organization of the clinical services into resident teams provides ongoing daily interaction with attending surgeons. Discussions regarding the pathophysiology of the patients' disorders and the human biological phenomena relevant to the disease processes are held. Examples include:

- the scientific basis for selection of operative procedures on the alimentary tract, such as acid production mechanisms of the stomach or secretion of hormones by the upper gastrointestinal tract related to the feedback mechanisms of the neuroendocrine system

- pathophysiologic events related to the biological phenomena of hemodynamic disorders in patients with vascular occlusive disease or aneurysm formation and the selection of appropriate operative procedures

- human biological phenomena observed by the residents in the operating room

- the hemodynamic effects of general anesthesia that are observed and monitored using appropriate invasive techniques and drug manipulation of the autonomic nervous system

- observation of the biological phenomena of wound healing, the inflammatory process, and vascular hemodynamics

During the postoperative period, residents apply basic science to the care of surgical patients. Evaluation of the patient's volume status involves both clinical observation and correlation of data available through monitoring catheters, along with laboratory data. Support of cardiac function through drug therapy in order to optimize a patient's cardiac status on the Starling Curve is common in the critically ill patient.

Didactic teaching occurs at the weekly Basic Science Course. The goal of this conference is to teach the fundamentals of basic science as applied to clinical surgery.

RADIOLOGY

Acquisition of knowledge in the field of **radiology** occurs through the daily clinical care of patients. The radiologists are readily available to the residents and attending surgeons for consultation. The reading room facility is conducive to teaching residents and students when x-rays of patients under their care are being reviewed. These informal teaching sessions allow the resident to correlate clinical, pathologic, and radiologic findings to develop understanding and knowledge of the patient's disease process. Electronic storage of x-ray images enables the residents to review studies at any computer terminal in the network.

The Department of Radiology has state-of-the-art facilities, including computerized tomographic scanners, magnetic resonance imaging, and a PET scanner. The radiologists attend Matrix conference to discuss pertinent x-ray findings on cases presented at the conference.

PATHOLOGY

The goal for residents is to understand the pathophysiology of surgical disease processes. Objectives include:

- Understanding the pathogenesis of benign and malignant surgical disease
- Understanding the principles of surgical pathology
- Gaining knowledge in the diagnosis and management of human organ pathology

Residents should work with the surgical pathologist evaluating frozen sections, pathologic specimens, and preparation of permanent sections for subsequent reporting in the course of their daily activities. The residents may participate in the performance of autopsies at any time. The resident should read in depth on the pathophysiology of the disease processes that he is reviewing with the clinical pathologist. For all residents, it is important to correlate the pathologic findings on patients for whom they are principally responsible during their day-to-day clinical activities.

Residents are encouraged to attend the various multidisciplinary tumor board conferences held during the week. An in-depth pathology review of the cases being discussed is conducted.