



2002

**SURGICAL
RESIDENT
CURRICULUM**

FOURTH EDITION

Edited By

**Sherralyn S. Cox, Ph.D., Walter E. Pofahl, M.D., and
Walter J. Pories, M.D.**

The Association of Program Directors in Surgery

SURGICAL RESIDENT CURRICULUM

FOURTH EDITION

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PREFACE TO THE FOURTH EDITION

The fourth edition of the *Surgical Resident Curriculum* emphasizes the principle that positive educational outcomes are best attained if the goals, objectives, and expected outcomes are clearly defined for resident learners. The current curriculum revision includes: (1) competencies for surgical advances since publication of the third edition in 1999 and (2) refined and expanded objectives emphasizing the knowledge and skills needed for residents to gain expertise to meet the health care needs of their elderly patients.

Advances in science and technology continue in the dynamic field of surgery, including those advances in minimally invasive and robotic surgery, and in our understanding of molecular biology. Our aging population presents an ever-growing challenge. It is not uncommon to see 85-year-old patients undergo surgical procedures. Nor is it unusual for residents to communicate with the families of patients and patients in their ninth decade. We are grateful to the American Geriatrics Society and the John A. Hartford Foundation of New York City for providing the Association of Program Directors in Surgery (APDS) with funding for education to further the study and teaching of surgical geriatrics and for support of resident research and special interest group activities at surgical meetings.

We regard a curriculum as a road map for an educational journey. Just as in a trip across the United States, there may be many ways to get to the destination and there are a number of places to linger. Similarly, this curriculum document for the residency in surgery delineates competencies to be achieved while it facilitates choices. Surgical educators will tailor-make a curriculum for their own residents. This document can serve as a point of reference to faculty and education committees as they determine program priorities, to residents as they plan a course of action in their study and board preparation, and to program directors as they organize their documentation of education for the Accreditation Council for Graduate Medical Education (ACGME). As in previous years, to assist program directors, the *Surgical Resident Curriculum* is being made available electronically from APDS through these editors.

How could one use this curriculum? Here are several examples:

- Select competencies from the curriculum as the basis for revising one's existing residency content to meet the ACGME Outcome Project requirements
- Direct the planning of rotations for residents by level
- Guide a resident's study program as he or she progresses through the various rotations
- Provide a scaffold for the scheduling of formal lectures in basic science and the general surgical specialties
- Help plan individual lectures and presentations (e.g., What should I cover in my presentation of hyperparathyroidism?)
- Provide an outline of goals and objectives for the rotations through the surgical subspecialties
- Organize reviews for ABSITE and the Qualifying and Certifying Examinations of the American Board of Surgery
- Offer a "check-list" for general surgeons in practice to measure their competency

We are sure that you can think of other approaches as well. We offer you this guide with our best wishes for a challenging and rewarding residency. Good luck to you.

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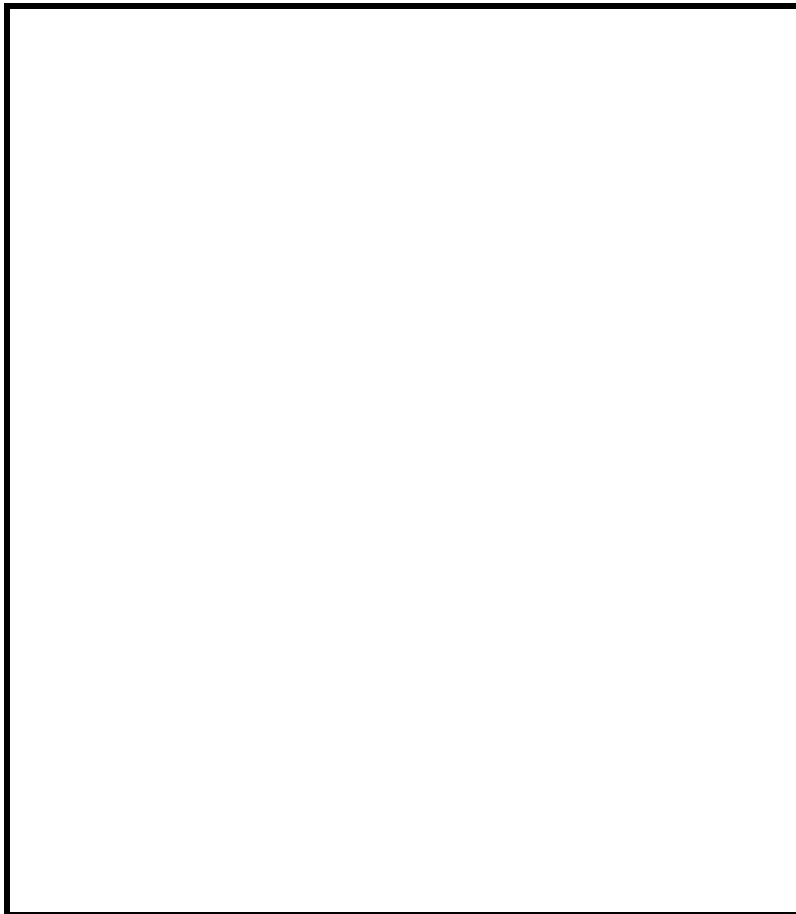
ACKNOWLEDGEMENTS

It has now been more than fifteen years since the Association of Program Directors in Surgery (APDS) first supported the concept of a project to develop and disseminate a residency curriculum document representing surgical educators' efforts to structure the extensive and complex knowledge, psychomotor skills, and attitudes that are Surgery. Department chairs, program directors, other surgical educators, and residents from a variety of institutions through the APDS provided conceptual guidance for the curriculum. Implementation has been facilitated by Mr. Tom Fise and Ms Liz Starnes at the Association.

The task of preparing the first edition of the *Surgical Resident Curriculum* fell to Jay C. Smout, Ph.D. His efforts in large part provided Surgery with its first national curriculum in 1992, following years of work on conceptual organization by Hazel M. Aslakson, Ed.D. and Walter J. Pories, M.D. The second edition, published in 1995 and headed by Sherralyn S. Cox, Ph.D. and Dr. Pories, saw content and organizational changes. M. Beth Foil, M.D. and Timothy N. Patselas, M.D rounded out the editorial team. The third edition, edited by Dr. Cox and Dr. Pories, continued refinement in 1999. Now, for the fourth edition in 2002, Walter E. Pofahl, II, M.D., and a group of surgeons as section editors have joined the team of Cox and Pories to provide new perspective to the project.

The American Geriatrics Society and John A. Hartford Foundation chose to fund the development of surgical geriatric materials through the existing team at East Carolina University because of the existence of the *Surgical Resident Curriculum* as a national curriculum vehicle. To date, nearly every surgical training program and many other entities such as libraries, book-stores, and practicing surgeons have placed orders with APDS to receive the document. More than 295 programs and individuals have requested and been provided electronic versions in addition to the Web version at the APDS site: <http://www.apds.org/>

Dissemination of the *Surgical Resident Curriculum* will undoubtedly serve as impetus for continuing discussions about what surgeons do and how they are educated to do it. We hereby acknowledge those of you who daily work to explicate the science and art that is Surgery.



SECTION 1.1

SURGICAL RESIDENT CURRICULUM GOALS

Summary Curriculum Goals:

The goal of the surgical curriculum is to assist program directors, faculty, and residents in their educational pursuits. Each program is required to have a clear set of goals that can be viewed as milestones or expectations, by level, for resident learners.

Specific Curriculum Goals:

- Create an organizational structure of academic, clinical, and technical criteria to facilitate the education of residents in general surgery.
- Provide an educational plan as an available guide for a diverse body of surgical programs, including: new programs, established programs, university- and community- based programs, public and private programs, urban and rural programs, five-year and six-year programs, and military-based programs.
- Maintain educational criteria that are congruent with the aims of the American Board of Surgery and the Residency Review Committee for General Surgery.
- Suggest teaching methodologies for expanding the number of ways to transmit knowledge, skills, and attitudes from faculty to residents.
- Establish the basis for evaluation activities tied to expectations of resident learning.
- Facilitate the self-directed study of residents via recommended readings and learning activities.
- Suggest learning experiences based on measurable objectives for the education of surgeons.
- Integrate principles of basic sciences with clinical experiences.
- Promote a broader understanding of the role of surgery and its interaction with other medical disciplines such as Internal Medicine, Psychiatry, and Pediatrics.
- Guide the mechanism for residents' progressive responsibility from initial patient care to complete patient management for all patient age groupings, from neonatal to the oldest-old.
- Provide surgical residents with a reference for functioning as teachers and consultants.
- Guide surgical residents to use research technology and skill in conducting studies that assist in solving surgical problems.
- Assist residents in achieving professional leadership and management skills.
- Promote the understanding of the economic, legal, and social challenges of contemporary and future surgery.
- Foster continuing education to promote lifelong individual initiative and creative scholarship.

GUIDELINES FOR RESIDENT EDUCATION IN SURGICAL GERIATRICS

Members of the Association of Program Directors in Surgery (APDS) Curriculum Committee and the Task Force prepared these curriculum guidelines for Surgical Geriatric Curriculum Development. The guidelines can be considered the starting point for a multifaceted program to assist surgical training programs organize and prioritize geriatric competencies for their general surgery residents. Since 1995, APDS has provided supporting structure for increasing geriatric knowledge and skills for general surgery residents, offering symposia, panel and workshop education sessions, and supporting reviews in the surgical geriatric literature for educators and practitioners. This work has been supported by generous funding from the John A. Hartford Foundation of New York City and the American Geriatrics Society (AGS), primarily through the project *Increasing Geriatrics Expertise in Non-Primary Care Specialties*. In the past year the AGS/Hartford Foundation has extended funding competitively to general surgery through the *Geriatrics Education for Specialty Residents Program* (GESR), a component of the broader project, *Increasing Geriatrics Expertise in Surgical and Related Medical Specialties*. In general surgery the following programs were selected to participate in the GESR initiative: University of California-Los Angeles, Yale University, University of Rochester, and East Carolina University.

The *Surgical Resident Curriculum* has integrated units, so that resident objectives related to care of the elderly patient are presented with, or immediately adjacent to, related surgical content. When one consults the table of contents, one can quickly determine if geriatric objectives are within a revised unit (e.g., Unit 2.2/2.2G, where “G” indicates “Geriatrics”) or if the geriatric objectives are provided as a separate unit. This format allows for recognition of each contributor’s role.

The following guidelines provide the structural basis for increasing resident expertise in caring for the special needs of elderly patients.

CURRICULUM GOAL: Following study and implementation of a Surgical Geriatric Curriculum, the surgical resident will be prepared to manage or co-manage the health care needs of prospective surgical geriatric patients.

RESIDENT COMPETENCIES

I. PRINCIPLES OF NORMAL AGING

The resident will acquire a working knowledge of general principles of aging while recognizing the considerable heterogeneity of patients age 65 and older.

The general principles will include the study of:

1. Demography of aging
2. Biology of aging relative to age-related physiologic changes
3. Preventive geriatrics: health maintenance

The resident will be prepared to recognize, interpret, and manage the principal elements in the Psychology of aging that present as the patient’s psychologic status, cultural value system, and personally-preferred lifestyle.

Elements of the Psychology of aging will include applying principles of:

1. Neuropsychiatric aging: brain-behavior relationships (dementia, acute delirium/changes in mental states)
2. Hypothalamic function and regulation of body temperature

The resident will be prepared to identify age-related physiologic changes and apply that knowledge during surgical counseling and decision-making.

Age-related physiologic changes will encompass:

1. Aging relative to tissues, organ systems, immune functions, and nutritional needs
2. Endocrine and metabolic alterations (e.g., carbohydrate and insulin metabolism)
3. Changes in laboratory values (e.g., expected changes in normal blood chemistries)

II. PATHOPHYSIOLOGY IN THE ELDERLY PATIENT

The resident will develop clinical management strategies, considering the unique aspects of geriatric pathophysiology.

Knowledge of disease processes will include the study of:

1. Mortality: leading causes of death for those 65 and older
2. Morbidity: leading causes of disability
3. Factors affecting altered disease presentation
4. Comorbidity: chronic diseases superimposed on acute disease
5. Geriatric syndromes (dementia, failure to thrive, fractures, malnutrition, sleep problems)

The resident will be prepared to analyze and apply information about medication to principles of age-related pharmacokinetics, pharmacodynamics, and adverse drug reactions.

Physiologic and Psychosocial implications will build upon a working knowledge of:

1. Changes in drug metabolism and excretion
2. Adjustment of doses and age-specific side effects
3. Use of psychotropic agents and pain medications
4. Identification of possible adverse drug-drug interactions
5. Significance of financial problems imposed by polypharmacy

III. PREOPERATIVE ASSESSMENT OF THE ELDERLY PATIENT

The resident will modify his/her approach to evaluation and diagnosis in a manner that is effective, efficient, and in accord with the special needs and limitations of the geriatric individual.

Factors to consider will include:

1. Developing attitudes toward and communicating with the elderly; age bias
2. Establishing lines of communication with health care team: personal physician/geriatrician, social worker

The resident will be prepared to obtain and utilize patient data for decision making prior to surgery.

Full geriatric assessment of patient baseline data will include consideration of:

1. Functional capabilities: activities of daily living, mental and physiologic health
2. Psychosocial variables: ethnic factors, cultural mores, social supports, and community relations
3. Differences in health care preferences according to perspectives of patient, referring physician, and surgeon
4. Considering risks to desired surgical outcomes: comorbidity, frailty, and social supports

The resident will be prepared to implement interventions that minimize legal and ethical risks to the patient's individual rights and liberties.

Interventions will require consideration of the following factors:

1. Weighing aggressive approach with patient's right to autonomy: legal right to self-determination and perceptions of quality of life
2. Rights regarding competence and advance directives: informed consent, surrogate decision making, long-term care, extent of care, living wills, and decisions about death
3. Cost:benefit ratio determination

IV. OPERATIVE MANAGEMENT OF THE ELDERLY PATIENT

The resident will monitor and act upon coexisting requirements of care to maintain patient stability.

Monitoring of patient surgical needs will include:

1. Planning and supporting the selection and management of local, regional, and general anesthetics
2. Managing conscious sedation
3. Maintaining body temperature and metabolic homeostasis during surgery
4. Following Halsted's Principles during surgical intervention

V. PERIOPERATIVE CARE OF THE ELDERLY PATIENT

The resident will determine and act upon the continuing needs of the surgical patient based upon patient communication and interaction, use of patient data, and analysis of surgical outcome.

Perioperative decisions will require:

1. Management of complications such as sepsis, cardiac problems, diabetes, pulmonary and renal failure.
2. Determining need for prophylaxis for common complications like DVT and PE, aspiration pneumonia
3. Sustaining patient with homeostasis, fluid management, ventilator support, wound and antibiotic management
4. Determining management for deconditioning, use of Foley catheters and NG tubes, use of invasive monitoring
5. Management of directive care issues such as life sustaining mechanisms: supportive care, extent of care issues

VI. LONG-TERM RECOVERY/REHABILITATION OF THE ELDERLY PATIENT

The resident will be prepared to utilize information and resources to maximize positive outcomes.

Data and resource utilization will include application of rehabilitation principles:

1. Optimizing patient health and maintaining function
2. Communicating with the patient and family regarding quality of life issues
3. Directing long-term recovery and rehabilitation for home, community, and/or institutional settings
4. Applying non-institutional support systems and institutional services for patient and family

VII. FINANCING, UTILIZATION, AND REIMBURSEMENT ISSUES

The resident will be prepared to analyze the continuum of care available to that patient, considering the complex factors inherent to implementation when matching health services to individual needs and resources.

The consideration of factors related to health services will include an analysis of:

1. Elderly patient rights to benefits: age-based and needs-based services and entitlements
2. Delivery of health services available to the patient and his/her family
3. Cost:benefit ratio determination; economic impact of operative procedure
4. Implications of long-term care: the recovery period, quality of life

VIII. PATIENT OUTCOMES

The resident will analyze and utilize his/her surgical data in systematic fashion.

Analysis and utilization of surgical data will include:

1. Selecting, maintaining, and analyzing a patient outcome database
2. Comparing patient outcomes with local medical community and national standards
3. Initiating improvements in patient care based on patient outcome data

The Surgical Resident Curriculum Goals section was prepared by Sherralyn S. Cox, PhD, and Walter J. Pories, MD.

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SECTION 1.2/1.2G

CURRICULUM UTILIZATION TO GAUGE PROFESSIONAL COMPETENCE

This curriculum, the fourth produced under the auspices of the APDS, is designed with function and utility in mind for surgical residents, surgical faculty including program directors, and any others who would benefit from clear sets of goals, along with knowledge and performance objectives, delineated as expected accomplishments by learners. There is no national consensus about what is the *essential* knowledge or skills or attitudes for surgeons. Not yet. But as surgical educators proceed with the development of clearer ideas and requirements for their learners' curricula, and as we educators move closer to accurately measuring the accomplishments of our learners, we zero in on the "meat and potatoes" of what it takes to produce competent graduates of surgical training programs, effectively and efficiently.

We know that previous editions of this curriculum have been utilized, through the facilitation of John T Boberg, PhD (Jack), by the various Accreditation Council for Graduate Medical Education (ACGME) committees working toward what now has become the Outcome Project. This APDS curriculum attempts to map milestones for resident learners which, when successfully accomplished, are indexes of competence. The *Surgical Resident Curriculum* represents an effort to document enabling objectives representing the educational activities and procedures that combine to clarify the expected outcomes of a general surgery residency.

General Competencies

The *Surgical Resident Curriculum* constructs professional competencies as the bases for objective development and inclusion in each curricular unit. The core competencies were structured first as summary curriculum goals descriptive of the desired outcomes of surgical education. When competencies are viewed in conjunction with the objective criteria in each unit, one has a combination of indicators of what is essential for resident learning, and one can employ these essentials in implementing an instructional program.

The educational areas in this surgical resident curriculum, for which competencies and instructional criteria exist, are these:

- Integration of theory and practice
- Application of surgical skills
- Increasing expertise in care for elderly patients
- Use of critical thinking
- Exercise of ethical judgment
- Use of appropriate communication
- Recognition of teaching responsibilities
- Development of management abilities
- Teaching and learning for a lifetime

The general competency areas for residents, in which residency programs are required by the ACGME, as explained more fully on the Web at (<http://www.acgme.org/Outcome/comp2.asp>) to define specific knowledge, skills, and attitudes are these organizing principles:

- **PATIENT CARE** that is compassionate, appropriate, and effective for the treatment of health problems and promotion of health

- **MEDICAL KNOWLEDGE** about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and application of this knowledge to patient care
- **PRACTICE-BASED LEARNING AND IMPROVEMENT** that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care
- **INTERPERSONAL AND COMMUNICATION SKILLS** that result in effective information exchange and teaming with patients, their patients' families, and other health professionals
- **PROFESSIONALISM** as manifested through commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population
- **SYSTEMS-BASED PRACTICE** as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value

It seems prudent to consider that the educational areas and organizing principles listed above identify the content divisions that are critical for the comprehensive educational and professional preparation of a surgeon. We regard these listings as the competency-based structure of our curriculum. A competency-based education program, anchored by this structure, creates an educational back-up system of knowledge, skills, and attitudes that are helpful in assuring the public that a program graduate is competent to practice.

Expected Outcomes Expressed as Core Competencies

The objectives in each unit of the *Surgical Resident Curriculum* describe the learning activities that are to occur during the course of curriculum implementation. When these objectives have been met, the expected outcome is that core competencies, describing the abilities made possible by a professional education, can be performed acceptably. The competencies specify what the resident should know, be able to do, or have an attitude about at the completion of a defined point during or immediately upon completion of the surgical training. The following statement should preface each of the core competencies listed below:

At the completion of training, the resident can:

- Make sound ethical and legal judgments appropriate for a qualified surgeon.
- Respect the cultural and religious needs of patients and their families, and provide surgical care in accordance with those needs.
- Manage surgical disorders based on a thorough knowledge of basic and clinical science.
- Utilize appropriate skill in those surgical techniques required of a qualified surgeon.
- Use critical thinking when making decisions affecting the life of a patient and the patient's family.
- 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.
- Be committed to scholarly pursuits through the conduct and evaluation of research.
- Be prepared to manage complex programs and organizations.
- Provide cost-effective care to surgical patients and families within the community.
- Value lifelong learning as a necessary prerequisite to maintaining surgical knowledge and skill.

The purpose of the curriculum is to define educational activities in a structure to serve as a program resource. With this structure in hand, especially in electronic editable form, programs will determine their own best use of the curriculum document for integrating resident educational experiences.

Selected strategies for utilizing the *Surgical Resident Curriculum* follow.

Select appropriate educational activities from the curriculum and rework them as needed in order to define specific competencies of knowledge, skills, and attitudes in the six areas required by the ACGME.

- The six areas are patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.
- Combine objectives from several curriculum units that lead to experiences that define one or more of the required principles (e.g., curricular units on ethics and communication can assist one in defining behaviors displaying interpersonal and communication skills and/or professionalism).

Provide copies of the *Surgical Resident Curriculum* for faculty and residents.

- This can be accomplished by highlighting the curriculum at a faculty meeting and then routing it to those who express interest.
- One or more copies can be given to chief residents for dispensing to other residents in their library or lounge, during study periods, or through a checkout system.
- All education stakeholders can be notified of document availability through the departmental office of surgical education.
- Personal copies can be provided for each resident.

Establish an educational dialogue between program director, faculty, and residents.

- Dialogue can occur in curriculum conferences, education and/or curriculum committee agendas, faculty meetings, or resident seminars. There are many significant forums for exchange, not the least of which is the one-on-one discussion that occurs during teaching rounds.
- Focus the dialogue with questions important to all stakeholders, such as: What does our program consider to be essential? What are our residents expected to do and when? How will we determine if our residents have performed acceptably?

Utilize the *Surgical Resident Curriculum* as a faculty checklist when preparing for rounds, seminars, and study sessions.

- Each faculty member should have access to the objectives appropriate to his/her clinic and hospital practice and teaching situations.
- Faculty analysis can determine which aspects of the curriculum can be self-learned and which need faculty explanation, structured development, and testing for competence or mastery.
- Emphasize that the criteria clarifying most objectives are included as examples of cognitive activities to consider or procedures to perform. These criterial listings are not exhaustive; they are not intended to be complete inventories, but they are indicative of what is essential. Specific faculty guidance must indicate program expectations.

Make a copy of the curriculum objectives to be available to conference planners/presenters.

- Maintain a running account of when and what coverage occurs. Selected faculty can be responsible for overseeing topical presentations on a cyclical basis (e.g., it may be prudent to

hold grand rounds on surgical core topics at least every two years so that all residents have a recurring review of the topic's importance as it relates to their progress).

Reinforce the applicability of competency expectations for residents, establishing the link between knowledge and performance with regular assessment and evaluation.

- Selected faculty can serve as facilitators for the optimal use of the curriculum by residents.
- Although many of the learning objectives will be accomplished prior to completion of the indicated residency period, *all* of the competencies should be met prior to completion of the surgical training program. The training program itself will establish the time frame within which residents are expected to be competent in each area presented in the curriculum.
- The curriculum is designed to require progressively increasing levels of resident responsibility. In most instances, the surgical specialty units do not show separate junior and senior objectives because rotations occur at different chronological periods according to the residency program. However, all competency-based objectives have been developed with the intention of progressing from the more basic (generally the beginning of each unit) to the more complex (generally the latter portions of each unit).
- Established levels of knowledge, performance, and attitudes can be set as program goals or requirements, with oral quizzes, written tests, performance demonstrations, and/or case presentations providing evaluative data on resident qualifications. Resident reflection and self-assessment is another important aspect of evaluation.

Formally incorporate the curriculum into the department's performance protocols.

- Expected performance at predetermined points during the residency form the basis for formative and summative evaluation of resident performance.
- Performance not meeting minimal standards established in the curriculum requires administrative and resident recognition, documentation, and action.
- Determine a schedule of remediation and supplementary learning for residents not meeting minimum standards.

Tailor-make the *Surgical Resident Curriculum*, or portions thereof, so that it is reflective of your own philosophies, conditions, and goals.

- Create a deliberative body to consider the curriculum coverage and presentation.
- Utilize the optional curriculum on diskette or via e-mail in redesigning your own curriculum from the existing structure.
- Determine which objectives are not essential, not realistic, and/or not otherwise appropriate for your program. Omit them.
- Determine which objectives are to be retained. Evaluate the clarity of each objective. Would your residents know what is expected of them? Examine the verbs used in stating the expected behaviors. Are these verbs appropriate for your own program's educational goals? Change any objectives to reflect your faculty/resident deliberative body's determination of what residents should be competent to do.

Create an implementation process to consider curricular conflict, redundancy, and inadequacy.

- Consider the educational resources, service obligations, and rotation patterns that characterize your program.
- Determine how much of the curriculum can be implemented during the first established time period. This includes earmarking the specific goals and objectives to be incorporated into the program's educational coverage over time.
- Assess whether or not learning resources are adequate.

- Formulate teaching strategies and methods to best accomplish your goals.
- Determine if formal guidance/instruction is necessary to maximize faculty skill and cooperation in stabilizing the program's curricular structure, content, and assessment procedures.
- Consider establishing a program of mentoring, peer review, and/or other kinds of networking to assist faculty in their roles as educators, assessors, and evaluators.

Formulate a curriculum evaluation plan to include formative and summative points of examination.

- Examine curricular coverage of desired and essential topics.
- Oversee the economic and efficient use of resources.
- Solicit faculty opinion and critique.
- Determine faculty development needs.
- Analyze clinical outcomes.
- Consider resident academic performance and change over time.
- Solicit the assessment of peers and experts from outside your department/ institution/ discipline.
- Determine a plan to implement change.

Provide evaluative feedback to *Surgical Resident Curriculum* editors at East Carolina University, Department of Surgery.

- Your experiences, suggestions, and critique will be valued and utilized by the curriculum editors in the ongoing development of improved resident curriculum resources.

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SECTION 1.3

TEACHING AND LEARNING IN SURGERY

Most of us agree that our roles as surgical educators are significant. And, since what is significant most often requires time, effort, and a considerable amount of thinking, our roles as educators cannot be taken lightly. Indeed, Aristotle described teaching as the highest form of understanding. What is it that motivates surgeons, basic scientists, and other professional educators to want to teach future surgeons? What is it that makes surgical teachers effective in imparting the current wisdom and in stimulating the formulation of future wisdom? Are we limited by the belief that we should teach in just the way that we were taught? Are we resistant to change? How can we as educators ensure that learning truly accompanies all the teaching that occurs; for without learning, has there really been any teaching?

These questions are more than rhetorical. They represent the professional queries surgical educators have about their roles as teachers and socializing agents. The questions represent the professional accountability for resident learners that surgical faculty members share when they endeavor to cast the surgeons of the next generation. Accountability describes the surgeon's role for his/her patients, and it summarizes the professional commitment to one's staff, peers, and profession. In the same fashion, surgical educators are accountable for the learning of their residents in multiple learning environments, such as at bedside, in ambulatory care settings, and in the operating room. But just as faculty are accountable to residents and their profession, so also are residents responsible for maximizing their own learning.

Medical and surgical educators have long emphasized the principles of adult learning which so appropriately fit the characteristics and circumstances of surgical residents. Residents learn best when the environment is supportive; when there is mutual trust, respect, and encouragement. They relate to their past experiences in solving current problems, learning best when they actively participate in problem solving. Indeed, their ability to learn independently marks them as suitable candidates to become surgeons. But learning works best when there is a joint effort with the faculty. Residents respond best to immediate feedback regarding their professional performance. An important aspect of gaining skill is the opportunity to practice a new behavior. Positive faculty reinforcement is a powerful tool for resident learning, so is incisive faculty critique of resident performance. Trainees who lack sufficient experience in practice can benefit by more explicit structure from the faculty member as a performance guide toward the resident's achievement of expected outcomes.

When programs adjust the *Surgical Resident Curriculum* to suit their own philosophies and learning environments, they endorse the curriculum theory that emphasizes structure to meet the needs of resident learners in fulfilling program goals and objectives and in meeting national mandates for competency. When residents utilize a specific curriculum, they have guidance in prioritizing their personal program of self-study. What does the curriculum communicate to residents? There is a comprehensive presentation of professional competencies that program faculty agree represents **background knowledge** residents will hold at specified intervals in their training. Faculty must emphasize which aspects of the curriculum should have been introduced during medical school, which are to be learned early in the residency, which are required before graduating to senior level responsibilities, and which may not be accomplished until the final months of training. Currently, a resident's competency is determined in the context of his or her own training program.

The *Surgical Resident Curriculum* presents a comprehensive package of **clinical skills** which faculty expect residents to perform competently at specified intervals. The value of this written commitment to specific behaviors is that residents can monitor their own learning under the tutelage of faculty or more senior residents. With structure (e.g., documented faculty expectations) the learning program is transformed from an often frustratingly global directive of "just know everything" to a more educationally sound message of "let's work together to assure your competence in these areas."

There are times when the surgical resident is more than a learner. He or she also serves as a teacher. In the teaching role, the resident practices by understanding, by interpreting, and by mimicking. Good faculty role models lead residents to transmit successful learning formulas to medical students, more junior residents, and to patients and their families. The curriculum, presented in the order of progressively higher levels of knowledge, skill, and responsibility can assist the resident to organize, prioritize, and impart information.

An additional curricular consideration is that while residents are often teachers, faculty are often students. The professional education literature documents several significant aspects of faculty teaching and learning that are applicable to surgery:

- The stimulating educational environment of a collegial surgical residency motivates faculty as lifelong learners. But faculty learning also comes from interacting with their residents who provide new insights and new questions.
- One pressing faculty need may be in the area of personal development for curriculum utilization. Anyone who believes that successful teaching comes naturally probably has a limited experience.
- Quality teaching requires considerable scholarship, and that scholarship should be recognized and rewarded just as are other faculty accomplishments. The *Surgeons as Educators* course of the American College of Surgeons is a prime example of scholarship and teaching.
- In the past few years there has been a growing number of national conferences, seminars, and fellowships focusing on improving the abilities of residents and faculty as instructors. More frequently, medical schools, hospitals, and other institutional settings are recognizing the need to design and implement faculty development programs to create curricula, enhance teaching skills, and promote the assessment of educational outcomes.
- Faculty members can improve their own insight into what it is they want to accomplish when their research includes education questions. Participation in a faculty special-interest group formed to discuss teaching and learning can be helpful. Group goals can include broadening insights by sharing ideas and reflection with colleagues, students, and residents; fielding common problems; reviewing the literature; and generally stimulating new thoughts and questions about teaching and learning.
- In a time of accountability, institutions are adopting policies to comply with state legislation mandated for the purpose of documenting teaching effectiveness--"proving" that the education they offer truly is value-added or that it adds value to resident performance. Documentation of teaching efforts is now included in faculty portfolios accompanying promotion and tenure applications as well as in the post-tenure review packet. The documentation of one's own teaching philosophy, techniques, evaluations, and progress is recognized as an important part of teaching accountability.

A final consideration in this section is selection of specific teaching strategies and methodologies. While creative teaching has endless possibilities, several *Surgical Resident Curriculum* authors and evaluators provided their own recommendations for facilitating and improving resident learning. A selection of teaching practices follows:

- Weekly, focused didactic sessions between surgical faculty and residents are critical during the junior years, especially regarding expectations in the basic sciences. At the center of these sessions are specific reading assignments, discussed in classic give-and-take "pimping"-format designed to debrief the resident in selected areas.
- Teaching rounds should occur at least weekly and should include detailed discussions of specific anatomy and physiology. Residents should do more and watch less. Team learning, where residents work together on problem solving and more interactive presentations like those activities required in evidence-based medicine, have proven to be helpful.
- Discussions of clinical scenarios, certainly incorporated into weekly Morbidity and Mortality conferences, are an efficient way to stimulate and encourage resident involvement. Such activity prevents a passive resident role.
- Conferences provide the setting for needed didactic lectures. But the teaching faculty can also emphasize resident participation through Socratic questioning techniques or actual resident presentation of the conference. A structured reading program, including Selected Readings, Yearbook of Surgery, and SESAP Reviews, in addition to the periodicals focused upon in journal clubs and case review sessions, is essential.
- Anatomic and physiologic considerations are taught with patients, models, text reviews, and discussion.
- Skills laboratories, including use of cadaver study and animal models, training devices, simulators, computers, and robots are highly recommended by those sophisticated enough to have incorporated the technologies into their programs. Autopsy or cadaveric dissection and mock operations provide needed practice.
- Structured clinical instructional module (SCIM) and Objective structured clinical examination (OSCE) use allows practice and direct feedback in addition to more accurate performance evaluation on skills achievement.
- Residents should do more and watch less. Participating in team learning can be valuable.
- The integration of technology into clinical teaching assists residents in understanding the "big picture." But excessive emphasis on technique, skills, and cognitive factors tends to create residents who are like encyclopedias rather than professionals who can apply and transfer what they learn to other settings and contingencies.
- Tutorials, especially computer-aided instruction using CD-ROM technology, show promise as educational adjuncts.

The Teaching and Learning in Surgery section was prepared by Sherralyn S. Cox, PhD.

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SECTION 1.4

EDUCATIONAL OUTCOMES ASSESSMENT AND PROGRAM EVALUATIONS

This section will highlight several aspects of assessment and evaluation that can be utilized in conjunction with the goals, competencies, and objectives included in the *Surgical Resident Curriculum*. Topics included are: assessment, evaluation, and instrumentation. A helpful introduction and reference for the discussion in this section can be found at the following Accreditation Council for Graduate Medical Education (ACGME) website location: (<http://www.acgme.org/outcome/project/glossary2.asp>).

Over the past several years, surgical educators have spoken more frequently about the importance of outcomes assessment in their residency programs. These discussions and the resulting actions are, at least in part, a result of the accountability movement that finds most health care professionals being asked by governing and accrediting bodies to provide measurable evidence of acceptable patient outcomes to the public, consumers, legislators, and their peers. At the same time, the assessment of quality in education and acceptability of educational outcomes has become a standard part of surgical education. Competency-based education creates an educational back-up system of knowledge, skills, and attitudes that are helpful in assuring the public that a program graduate is competent to practice, that is that he or she is fit to engage in the professional activities that define being a surgeon.

The ACGME Outcome Project to enhance residency education through outcomes assessment has motivated surgical educators to consider resident outcomes at the top of their lists of program planning and assessment activities. This is a good thing to do, and it is a necessary thing to do because the ACGME will incorporate selected general elements, also known as *general competencies*, into the requirements of all residencies, beginning in July, 2002. Specific knowledge, skills, and attitudes in six prescribed areas are to be developed and taught and then experienced and practiced by resident learners. The six organizational areas delineated by ACGME are patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

Program faculty must observe and assess, or *measure*, resident-demonstrated achievements in order to determine the educational outcomes of their respective residency program. Residents' achievement of competency-based learning objectives is evidence of their meeting the requirements for program completion.

Outcomes Assessment

Historically, the field of assessment has used multiple measures and observers to report cognitive, performance, and personal growth in learners, longitudinally. Assessment refers to the instruments and procedures used to gauge such things as an individual's competence for professional practice. There are at least three considerations to make when employing an assessment process.

1. The first requires **obtaining information** about the attainment of the academic endeavor under consideration. Documentation of learner experience is an important part of learner assessment. Data sources can include in-training examinations, content analysis of resident conference presentations, direct observation of manipulation of laboratory models, performance evaluations such as OSCE's, summaries of responses to exit surveys on beliefs, and composite scores on computerized professional practice simulations.

2. The next consideration in the assessment process requires **analyzing the data**, often through comparison with existing data sources.
3. Finally, the process entails **summarizing findings and interpretations** in order to prepare a report of data for use in the appropriate evaluation. An evaluation can then be used to justify continuation of an academic endeavor, improve an existing endeavor, or call for a plan to institute change.

The utilization of this kind of assessment process can help to determine if the desired competencies have been achieved, thus documenting educational effectiveness or calling for and directing change. Outcomes assessment asks whether the academic endeavor does what it says it does, suggesting a comparison of goals and objectives with observable, measurable outcomes.

A plan for assessment includes specifying criteria known as *outcomes measures*. These measures are determined by competency-based objectives. Objectives specify the kind of content that will be sampled in order to judge resident behavior. The *Surgical Resident Curriculum* is formatted so that users can develop written examinations, structure oral questions, observe work progression, and analyze presentation coverage using the knowledge and performance objectives presented in each curricular unit as a basis for determining acceptable outcome variables. When one has adequately sampled resident performance using various assessment measures, one should have the data needed to determine whether expected outcomes have been achieved.

Outcomes assessment should involve multiple judges or raters working in a coordinated effort. The judges can come from faculty, peers, other practitioners, accrediting bodies, allied health professionals, students, patients, and community representatives. Pre- and post- test tools and the improvement observed in knowledge, skills, and/or attitudes can indicate progressive learning and support a program's efforts to show curricular effectiveness by relating resident competence to curricular offerings. Change scores may be a good index of *value added* (i.e., the documentation of positive change longitudinally, thus reinforcing the benefit the educational endeavor has had for the learner).

A major constraint of a broad assessment using multiple raters can be the lack of agreement, or interrater reliability, especially when there is not a single acceptable standard of performance. Outcomes assessment can have increased reliability when rater training and standardized collection instruments and methods are employed. Assessment is also improved through the use of such techniques as lifelike problem scenarios, OSCE's, role-playing exercises, or computer simulations because these techniques can be better controlled and acceptably standardized. And they help to solve the assessment shortcomings of examining *content* rather than process; of examining knowledge and technique *acquisition* rather than ability to perform.

The purpose of examining outcomes is to enable the measurement of institutional goals achievement, to make recommendations for program improvement, and to assure to the public and the profession the quality of graduates according to the program's established standards. The standards are expressed as competencies and are defined by the program's educational objectives.

Educational Evaluation

The ACGME has recently emphasized the necessity for residency programs to demonstrate an effective plan for assessing resident performance using dependable measures, incorporating

timely performance feedback to residents, and utilizing evaluation results to improve resident performance and the quality of the residency program.

Educational evaluation is involved with determining the worth, value, or acceptability of such processes or products as: a technique, a resident's performance, a course, or a curriculum. Evaluation relates to assessment in that evaluation employs standards using selected assessment methods. Consider this example: the method of *assessment* is the certifying examination (as a tool or instrument), while the *evaluation* uses a standard set at 75 as the lowest acceptable score (for passing the exam). Evaluation is a way to provide feedback when evaluative efforts are grounded in competency-based objectives which have been accepted as the standard of performance.

Evaluation of competence should occur at prescribed times during the residency. Formative evaluation of competence allows more immediate feedback and the opportunity for remediation, while summative evaluation occurs at the end of training, or a training period, and allows the resident less opportunity to prove his/her worth. Surgeons have participated for years in the American Board of Surgery qualifying and certifying examinations and re-certification process, indicating that sequential professional competency evaluation is a fact of life. However, there is no gold standard for evaluation of a surgeon's competence. Therefore, disagreements can certainly occur regarding the acceptability of resident performance. This is even more reason for there being a defined set of expectations for residents--a curriculum defining program requirements.

Frequently, evaluation of knowledge occurs through use of objective measures such as multiple choice or true-false examinations. Evaluation of skills often uses direct observation, including an examination of the *process* as well as the final *product*. Evaluation of attitudes can use listening and observation by a peer or preceptor, or it can be accomplished through some mechanism of self-assessment.

Evaluation of a program can and should be a multifaceted process, entailing such procedures as: curriculum review; self-study; rating of the educational environment; summaries of resident performance on examinations, clinical rotations, research volume and quality, and conference presentations; faculty aggregate data regarding publications, receipt of grant monies, visiting professorships, and teaching awards; and examinations of patient/resident/physician outcomes. Multiple perspectives should be incorporated into summary evaluation reports. The accreditation process is a multifaceted evaluation of a residency program.

Evaluation of teaching includes reviews of methods as well as instructor characteristics. Methods and characteristics that facilitate learning and show improvement over time can be isolated and used as the focus of faculty development and dossier documentation. Medical students, residents, trained educators, peers, and one's self contribute the multiple sources of evaluative data necessary to complete the portrayal of an individual's success as a teacher. No single approach is adequate for evaluating teaching. The selected approaches to evaluation should be flexible and multifaceted. Teaching skills are usually enhanced by instruction, including feedback and self-evaluation. The evaluation of teaching can also consider the outcomes of formal education such as test and board scores.

A critical yet often overlooked aspect of educational evaluation is *meta evaluation*. The meta evaluation process entails consideration of a program's multiple evaluations and evaluation reports—an evaluation of one's evaluations. The process analyzes such questions as: How useful is our evaluation system? Is our system feasible? Are our evaluation methodologies valid

and reliable? Are our evaluation methodologies ethical? How can we rectify our evaluation system shortcomings?

Instrumentation

The reader is referred to the ACGME Website for a compendium of instrument categories and content suggestions that will be useful in preparing tools to facilitate the assessment process.

Just as much attention is needed to develop appropriate data-gathering assessment instruments as is needed to identify data that are valid for evaluating a program or an individual. The utilization of selected instruments most often occurs at the end of an educational process, as a final examination or a final rating of subspecialty rotation achievement, providing summative program or individual information. *Summative evaluation* relates directly to goals and objectives; it is a terminal form of judgment. However, *formative evaluation* is part of the development process. It provides feedback to enhance learning and to improve performance prior to the endpoint of the educational endeavor. Feedback is perhaps the most critical part of an evaluation system because it can give information to residents about their performance rating, help faculty compare learning objectives with what was learned, indicate the need to change rotation goals, and provide constructive criticism and praise for more junior residents and faculty. Educational evaluation, through sensitive instrumentation, provides an ongoing source of feedback for change.

Another piece of what is often an assessment puzzle requires reaching program faculty consensus on the kinds of procedures, measures, and variables to be utilized. Unit authors of the *Surgical Resident Curriculum* were asked to contribute their suggestions for outcomes assessment and program evaluation in surgical education. Selected responses follow:

Author Suggestions for Assessment of Resident Performance

General Recommendations:

- Present assessment mechanisms to residents in advance of their course of study.
- Utilize attendings and more senior residents familiar with the resident's work when assessing residents.
- Record assessment of resident performance in individual faculty reports on the progress of each resident; then conveniently place the assessment on a performance form completed at the end of each service rotation. Two or more faculty should submit this same form to the program director.
- Monitor specific resident performance with grade sheets.
- Provide face-to-face meetings between the program director and resident at least two times each year for performance summary, troubleshooting, and encouragement.
- Assessment is the responsibility of each faculty member or attending. The level of capability of each surgical resident with whom the attending works must be adequately documented.

Assessment Techniques:

- Assess the morning report (e.g., the resident's ability to present patients and treatment plans).
- Utilize a checklist of the procedures accomplished by the resident, providing a running account of the resident's operative experience and allowing for recognition of deficiencies in time for catch-up to occur. Print out operative log summaries for precise assessment of minimal numbers.
- Assess physician orders, progress notes in charts, and laboratory report summaries.
- Assess daily progress notes and consultations to find a recommended course of action compatible with established standards of care.

- Prepare a content review of the resident's oral presentations.
- Utilize interactive lectures with faculty using case studies (and including radiographs and laboratory reports) as educational tools; then administer pre- and post- tests.
- Determine psychomotor competency as it is reflected in laboratory skills exercises, operative technique, successful performance of basic bedside procedures, and quality of assistance during complex operative procedures.
- Prepare mock oral practice examinations similar to the certifying examination for the ABS.
- Create monthly basic science examinations with oral examinations; compare results to previous years scoring on the ABSITE.
- Utilize ABSITE/SESAP performance comparisons each year. These can serve a dual purpose of monitoring and evaluating on an ongoing basis.
- Incorporate suggestions from expert, outside reviewers and from the surgical literature.

Program Evaluation

- Prepare separate pre- and post- tests developed and administered to residents as evaluative and educational tools. These can be compared, in total, to previous residents' performance regarding short-term learning increases and then compared to ABS board examination for noting long-term increases.
- Use a resident-directed survey to identify and correct training weaknesses. Chief residents can prepare these.
- Use alumni surveys to assess the adequacy of training relative to current alumni practice.
- Assess more than resident test scores. Look also at the assessment of methods used for teaching.
- Emphasize self-awareness and improvement, not just punishing the weak and rewarding the effective.
- Prepare a program effectiveness survey, utilizing the competencies listed in Section 1.2.

Summary

The *Surgical Resident Curriculum* can be useful in defining progressive knowledge and performance for resident academic and skills achievement at defined levels. Generally, the more specific the educational objectives, the better it is for program definition and assessment. Objectives are constructed so that they can describe measurable behaviors. The curriculum provides goals, unit objectives, and professional competencies for knowledge, performance, and attitudes. With these activities defined, program and self-evaluation and targeted feedback can occur more systematically.

Utilizing the curriculum resources, those who would construct an assessment of educational outcomes and a program evaluation could well ask these basic questions:

- **What is expected of all residents?** Do the goals and objectives reflect what our program plans for residents to achieve?
- **Are there specific knowledge and skill achievements expected of all graduates?** This could include passing boards, establishing practice, or serving mankind.
- **Are there available measures that will indicate growth when assessing attitudes and values?** Assessment tools can include documentation of observations, self-report inventories and questionnaires, and locally prepared interview protocols.
- **Does our program have alumni profiles to demonstrate previous resident/graduate achievements?** These can provide comparative data and establish the basis for longitudinal program research.

- **Does our faculty require a series of structured development opportunities in order to maximize their effectiveness in implementing our curricular assessment and evaluation plans?** Development experts may become a necessary addition to faculty preparation procedures, including determination of inter- and intra- rater reliability.

The Educational Outcomes and Program Evaluation section was prepared by Sherralyn S. Cox, PhD.

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EXHIBIT 1.4A

[Sample form from East Carolina University, School of Medicine]
Peer Evaluation Form for Large Group Presentations
 (Generally more than Twelve People)

Faculty Member Observed:
 Title or Subject of Presentation:
 Date Observed - ____ Length of Observation ____
 Observer ____
 Date Reviewed with Faculty Member:

Response Scale: OUTSTANDING = met all or virtually all of the criteria
 SATISFACTORY = met most of the criteria
 MARGINAL = met some of the criteria
 UNSATISFACTORY = met few or none of the criteria

Clarity and Organization (circle one)				O	S	M	U
Criteria: Begins on time States purpose of presentation Outlines clear objectives for presentation Explains clearly how presentation relates to previous content Presents material in organized manner Uses effective transitions between key points Uses instructional media appropriately Summarizes key points of the presentation							
Strengths				Recommendations			
Presentation Style (circle one)				O	S	M	U
Criteria: Is enthusiastic Stimulates interest in the topic Speaks clearly Paces the presentation to allow note-taking Presents without distracting mannerisms Maintains appropriate eye contact							
Strengths				Recommendations			

Group Interaction (circle one)	O	S	M	U
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Criteria:
 Encourages participation
 Uses questions appropriately to stimulate discussion
 Answers questions clearly
 Answers questions in non-demanding way

Strengths	Recommendations

Content (circle one)	O	S	M	U
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Criteria:
 Presentation follows the outline and/or syllabus
 Defines terminology
 Presents appropriate amount of information
 Presents material at appropriate level of complexity
 Material presented is up-to-date
 Handouts or other materials reinforce the key points

Strengths	Recommendations

Overall Comments: _

EXHIBIT 1.4B

[Sample from East Carolina University, Department of Surgery]

Resident Feedback for Attending Faculty Instruction

Administration Date: July, 1999

Check: ___ Junior-level Resident ___ Senior-level Resident

For resident feedback to attendings for instruction occurring only between JANUARY 1, 1999 and JUNE 30, 1999.

Assessment for this feedback indicates the resident believes he or she had significant contact with the faculty member. Please utilize both sides of the form. Your data from this assessment will be combined with other resident responses from 1999 for a single report to faculty attendings in Spring, 2000. Dr. Cox and Ms Da Re will prepare summary reports MAINTAINING RESIDENT ANONYMITY.

FACULTY MEMBER'S NAME:

<p align="center">RESPONSE SCALE</p> <p>Indicate how frequently the named attending demonstrates the listed behavior:</p> <p>4 = to a very high degree 3 = to a considerable degree 2 = to a moderate degree 1 = to a small degree 0 = does not demonstrate the behavior IO = Insufficient observation to judge</p>	<p align="center">FREQUENCY</p>
OPERATING ROOM TEACHING	
1. Describes upcoming surgical procedure, including operative approach, rationale, and alternatives.	
2. Discusses expected patient outcomes and possible complications.	
3. Clarifies resident roles and responsibilities.	
4. Demonstrates technical skills with confidence and expertise.	
5. Permits resident participation in procedures according to ability.	
6. Demonstrates awareness and sensitivity to resident learning needs.	
7. Answers questions clearly and precisely.	
8. Stimulates residents to think critically and problem solve.	
9. Provides direct and ongoing feedback regarding resident progress.	
10. Maintains climate of mutual respect for all members of health care team.	

List two OR teaching strengths of this faculty member:

Suggest two areas for OR teaching improvement for this faculty member:

RESPONSE SCALE	
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Indicate how frequently the named attending demonstrates the listed behavior: 4 = to a very high degree 3 = to a considerable degree 2 = to a moderate degree 1 = to a small degree 0 = does not demonstrate the behavior IO = Insufficient observation to judge	FREQUENCY
CLINICAL/HOSPITAL TEACHING	
1. Orients residents to practice setting and role expectations.	
2. Outlines objectives and expected outcomes for procedures.	
3. Develops and sustains a positive learning atmosphere.	
4. Permits resident participation in procedures according to ability.	
5. Shares up-to-date knowledge of developments in the field.	
6. Provides ample opportunity for residents to teach.	
7. Encourages resident questions and active participation.	
8. Gives residents positive reinforcement.	
9. Provides direct and ongoing feedback regarding resident progress.	
10. Maintains climate of mutual respect for all members of health care team.	

List two clinical teaching strengths of this faculty member:

Suggest two areas for clinical teaching improvement for this faculty member:

SUMMARY EVALUATION:

OVERALL, THIS ATTENDING HAS MADE A POSITIVE CONTRIBUTION
TOWARD MY DEVELOPMENT AS A SURGEON.

YES

NO

UNSURE AT THIS TIME