

Musculoskeletal Tumor Society Curriculum Guidelines for Clinical Fellowship Programs In Musculoskeletal Oncology

Preamble: The Musculoskeletal Tumor Society (MSTS) is committed to excellence in the fellowship educational process. The Society believes that fellowship education should be focused and uniform, and should occur in an environment capable of supporting the full breadth and depth of the field and dedicated to fostering the development of competency and lifelong learning. Fellowships will be granted MSTS recognition if they agree to adhere to these guidelines, participate in the Match process, and agree to align future goals of the respective fellowships with that of the Society. The Society envisions that all fellowships will be ACGME accredited (or the equivalent in fellowships located in countries outside the United States) in the near term, and future MSTS membership will be contingent upon completion of an MSTS recognized fellowship.

I. Introduction

A. Definition and Scope of Subspecialty

Musculoskeletal oncology is that component of orthopaedic surgery focused on the diagnosis and treatment of children and adults with benign and malignant tumors of bone and connective soft tissues. The field also includes the diagnosis, treatment, and palliative care of patients with metastatic carcinoma to the skeleton. Musculoskeletal oncologists work in concert with experts from musculoskeletal radiology, pathology, medical and pediatric oncology, radiotherapy, and surgery to care for patients with sarcomas of bone and soft tissue.

B. Duration and Scope of Education

Postgraduate fellowship education in orthopaedic surgery is a component in the continuum of the educational process, and such education should take place after completion of an accredited residency. Fellowship programs are expected to last a minimum of twelve months. Fellowship programs are expected to be clinical in nature.

II. Institutions

A. Sponsoring Institution

- i. One sponsoring institution should assume ultimate responsibility for the program and this responsibility should extend to fellow assignments at all participating institutions.
- ii. When orthopaedic residents and fellows are being educated in the same institution, the residency director and the director of the fellowship should

jointly prepare and approve a written agreement specifying the educational relationship between the residency and fellowship programs, the roles of the residency and fellowship directors in determining the educational program of residents and fellows, and the roles of the residents and fellows in patient care.

- iii. There should be close monitoring of the relationship between residency and fellowship education. It is imperative that orthopaedic fellowship education not interfere with the education of residents. Lines of responsibility for the orthopaedic resident and the fellow should be clearly defined. In addition, the fellow should maintain a close working relationship with orthopaedic residents and other fellows in orthopaedic surgery and in other disciplines.
- iv. Programs must provide an intellectual environment for acquiring the knowledge, skills, clinical judgment, and attitudes essential to the practice of the subspecialty. This objective can be achieved only when the program director, the supporting faculty and staff, and the administration are fully committed to the educational program and when appropriate resources and facilities are present. Effective graduate education is not achieved when the educational program functions primarily to meet service commitments.

III. Program Personnel and Resources

A. Program Director

- i. There should be a single program director responsible for the program. The person designated with this authority should be accountable for the operation of the program.
 - a. The program director must be a member of the Musculoskeletal Tumor Society in good standing.
 - b. The program director should maintain a clinical practice which at a minimum is comprised of fifty per cent musculoskeletal oncology.
- ii. The Program Director, together with the faculty, should be responsible for the general administration of the program, and for the establishment and maintenance of a stable educational environment.

B. Faculty

- i. At each participating institution, there should be a sufficient number of faculty with documented qualifications to instruct and supervise adequately all fellows in the program. At a minimum, the fellowship must contain designated faculty members in each of the following disciplines,

who must demonstrate a working knowledge of, and sufficient clinical practice volume comprised of, musculoskeletal oncology patients:

- a. Adult and pediatric medical oncology
 - b. Pathology
 - c. Radiology
 - d. Radiation Therapy
- ii. The faculty should devote sufficient time to the educational program to fulfill their supervisory and teaching responsibilities. They should demonstrate a strong interest in the education of fellows, and should support the goals and objectives of the educational program of which they are a member.
 - iii. The responsibility for establishing and maintaining an environment of inquiry and scholarship rests with the faculty, and an active research component must be included in each program. *Scholarship* is defined as the following:
 - a. the scholarship of *discovery*, as evidenced by peer-reviewed funding or by publication of original research in a peer-reviewed journal;
 - b. the scholarship of *dissemination*, as evidenced by review articles or chapters in textbooks;
 - c. the scholarship of *application*, as evidenced by the publication or presentation of, for example, case reports or clinical series at local, regional, or national professional and scientific society meetings.
 - d. Complementary to the above scholarship is the regular participation of the teaching staff in clinical discussions, rounds, journal clubs, and research conferences in a manner that promotes a spirit of inquiry and scholarship (e.g., the offering of guidance and technical support for fellows involved in research such as research design and statistical analysis); and the provision of support for fellows' participation, as appropriate, in scholarly activities.

C. Other Program Personnel

- i. Additional necessary professional, technical, and clerical personnel should be provided to support the program.

D. Resources

- i. The program should ensure that adequate resources (e.g., sufficient laboratory space and equipment, computer and statistical consultation services) are available.
- ii. A sufficient number of new and follow-up patients must be available to ensure adequate inpatient and outpatient experience for each fellow without adversely diluting the educational experience of the orthopaedic surgery residents or the educational experience of residents in other specialties.
- iii. There should be broad support from other clinical specialties, including diagnostic and therapeutic radiology, pediatrics, nuclear medicine, pathology, psychiatry, surgery and its subspecialties, and medical oncology. Support of oncologic nursing, rehabilitation, nutrition, dietetic counseling, and social services, as well as physical and occupational rehabilitation is desirable.
- iv. Modern facilities to accomplish the overall educational program must be available and functioning. These include inpatient ambulatory care and laboratory resources. Specifically, there should be advanced pathology services, including electron microscopy and immunopathology; resources for nuclear medical imaging, magnetic resonance imaging, musculoskeletal angiography, computed tomography, and sufficient facilities for qualitative correlative studies.
- v. The fellow must have day-to-day access to pathologists and to radiologists with recognized expertise in musculoskeletal pathology and radiology.
- vi. On-site radiation and medical oncology facilities and a modern diagnostic radiologic service are necessary.
- vii. It is desirable that there be other clinical subspecialties of orthopaedic surgery and general surgery to which the orthopaedic oncology fellow may relate formally, as well as special facilities for musculoskeletal pathology.
- viii. There must be a minimum of 300 new patients per fellow of benign and malignant bone and soft-tissue tumors, in both children and adults, with an appropriate mix of primary and metastatic lesions to afford the fellow adequate educational experience in musculoskeletal oncology. This experience must include the care of both inpatients and outpatients.

- ix. Fellows must have ready access to a major medical library, either at the institution where the fellows are located or through arrangement with convenient nearby institutions.
- x. Library resources must include current and past orthopaedic periodicals and reference books which are readily accessible to all orthopaedic fellows in the program.
- xi. Library services should include the electronic retrieval of information from medical databases.
- xii. There should be access at each institution participating in the program to an onsite library or to a collection of appropriate texts and journals. On-site libraries and/or collections of texts and journals must be readily available during nights and weekends.

IV. Program Curriculum

The curriculum should contain the following components:

- A. Skills and competencies the fellow will be able to demonstrate at the conclusion of the program. The program should distribute these skills and competencies to fellows and faculty annually, in either written or electronic form.
- B. ACGME Competencies
 - i. Patient Care
 - a. Fellows should be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health;
 - b. Fellows should demonstrate competence in evaluating patients pre-operatively, making appropriate provisional diagnoses, initiating diagnostic procedures, and forming preliminary treatment plans;
 - c. Fellows should demonstrate competence in oncologic surgical peri-operative management, including:
 - 1. Identifying and managing co-morbidities, including those specific to cancer patients
 - 2. staging methodologies and procedures for all common bone and soft tissue tumors.

- d. must demonstrate competence in the care of critically-ill surgical patients, including:
 - 1. applying sound principles of pharmacology for each form of therapy;
 - 2. evaluating and managing patients receiving chemotherapy, hormonal therapy, and immunotherapy; and,
 - 3. providing supportive care to cancer patients, including pain management.

- e. must demonstrate competence in performing operative procedures related to benign and malignant bone and soft tissue tumors, metabolic musculoskeletal disease, and complex reconstruction including:
 - 1. a minimum of 150 relevant operative procedures
 - 2. complex spine and sacral surgery
 - 3. pelvic surgery
 - 4. soft tissue reconstruction (at a minimum it is expected that the fellow will demonstrate competence in performing local advancement flaps and skin grafts, and demonstrate familiarity with the application of free tissue transfers and microsurgery)
 - 5. surgery in the presence of compromised tissue or host, or tissues that are expected to become compromised (ie. exposed to post-operative adjuvant therapy)
 - 6. surgical management of complications of limb salvage surgery

- f. must demonstrate competence in the surgical management of patients undergoing predominantly medical therapy, including:
 - 1. management of distant metastatic disease, including resection; and,
 - 2. palliative surgery

g. must demonstrate competence in providing state-of-the-art surgical care to patients with complex or recurrent neoplasms and related disorders, including:

1. diagnosis and management of rare or unusual tumors based on knowledge of the natural history of such tumors; and,
 - i. This must include determining the disease stage and treatment options for individual cancer patients at the time of diagnosis and throughout the disease course.
2. selecting patients for surgical therapy in combination with other forms of treatment.
 - i. This must include performing palliative surgical procedures appropriate for each patient.
3. management of complications

ii. Medical Knowledge

a. Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care. Fellows:

1. must demonstrate competence in their knowledge of:
 - i. the benefits and risks associated with a multidisciplinary approach;
 - ii. the fundamental biology of cancer, clinical pharmacology, tumor immunology, and endocrinology, as well as potential complications of multimodality therapy;
 1. This must include a working knowledge of the biologic, pharmacologic, and physiologic rationale for each form of medical therapy, as well as the indications, risks, and benefits of regional and systemic therapy in the adjuvant and advanced disease settings.

2. This must include a working knowledge of radiation therapy including radiobiology, radiation physics, fractionation, brachytherapy, radiosurgery, treatment planning, IMRT, and proton beam

- iii. nonsurgical cancer treatment modalities, including radiotherapy, chemotherapy, immunotherapy, and endocrine therapy;

- iv. nonsurgical palliative treatments;

- v. rehabilitative services in various settings, including reconstructive surgery and physical rehabilitation; and,

- vi. tumor biology, carcinogenesis, epidemiology, tumor markers, and tumor pathology.

iii. Practice-based Learning and Improvement

- a. Fellows are expected to develop skills and habits to be able to meet the following goals:

1. systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement;

2. locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems;

3. demonstrate competence in:

- i. educating students and physicians in the multimodality management of cancer patients;

- ii. educating non-physicians (physician assistants, oncology nurses, physical and occupational therapists, etc.) in specialized cancer care; and,

- iii. organizing and conducting cancer-related public education programs.

iv. Interpersonal and Communication Skills

- a. Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals.
 - 1. Fellows must demonstrate competence as tertiary care consultants for the orthopaedic and non-orthopaedic community, typically over a wide geographic area

v. Professionalism

- a. Fellows must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.

vi. Systems-based Practice

- a. Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.
 - 1. Fellows must demonstrate leadership skills to develop and support:
 - i. institutional policies regarding musculoskeletal health and disease programs and problems;
 - ii. institutional programs relating to cancer, including a tumor registry and psychosocial and rehabilitative programs for cancer patients and their families; and,
 - iii. interdisciplinary meetings and discussions to include cancer topics, patient care, and the oncology research program.

C. Curriculum Organization and Fellow Experiences

- i. The curriculum should include adequate exposure to medical oncology, radiation oncology, musculoskeletal radiology, and pathology.
- ii. The didactic curriculum must include:
 - a. a structured series of conferences in the basic and clinical sciences fundamental to musculoskeletal oncology including grand rounds, and morbidity and mortality conferences;

1. Fellows should organize the formal conferences, grand rounds, and morbidity and mortality conferences, and present a significant share of these conferences.
2. The didactic component must include:
 - i. a combination of both formal and informal instruction in the biologic, pharmacologic, and physiologic rationale for each form of medical therapy, as well as the indications, risks, and benefits of regional and systemic therapy in the adjuvant and advanced disease settings, taught by an expert in the field.
 - ii. a combination of both formal and informal instruction in radiation therapy including radiobiology, radiation physics, fractionation, brachytherapy, radiosurgery, treatment planning, IMRT, and proton beam, taught by an expert in the field.
 - iii. formal instruction in pain management, taught by an expert in the field.
 - iv. formal instruction in palliative care, taught by an expert in the field.
- b. Fellows and faculty must participate in a journal club which reviews current literature in medical, pediatric, and radiation oncology on at least a monthly basis.
- c. at least weekly teaching rounds by oncologic surgical faculty members;
- d. education in the basic methodology for conducting clinical trials, including biostatistics, clinical research design, ethics, and implementation of computerized databases; and,
- e. frequent relevant multidisciplinary conferences.
- iii. Each organized clinical discussion, round, journal club, and conference must include participation by at least one member of the faculty.
- iv. Fellow Experiences

- a. Fellows must provide outpatient follow-up care for surgical patients.
 - 1. Follow-up care should include short- and long term evaluation and progress, particularly with complex, multi-disciplinary cancer management.
- b. Each fellow should have experiences acting as a teaching assistant in the operating room when documented operative experience justifies a teaching role.
- c. Fellows should have significant teaching responsibilities for surgery residents, medical students, or other learners.

V. Fellows' Scholarly Activities

- A. Each program should provide an opportunity for fellows to participate in research or other scholarly activities, and fellows should participate actively in such scholarly activities.
- B. Each fellow should complete a course on clinical research on human subjects, such as the courses approved by the National Institutes of Health Office for Human Research Protections, or an institution-based equivalent.
- C. Fellows must demonstrate the ability to: design and implement a prospective data base; conduct clinical cancer research, especially prospective clinical trials; use statistical methods to properly evaluate results of published research studies; guide other learners or other personnel in laboratory or clinical oncology research; and navigate the interface of basic science
- D. Fellows should participate in basic and/or clinical hypothesis-based research.
- E. The program should provide time and facilities for research activities by fellows.

VI. Fellow Duty Hours and the Working Environment

- A. Providing fellows with a sound didactic and clinical education must be carefully planned and balanced with concerns for patient safety and fellow well-being. Each program must ensure that the learning objectives of the program are not compromised by excessive reliance on fellows to fulfill service obligations. Didactic and clinical education must have priority in the allotment of fellows' time and energy. Duty hour assignments must recognize that faculty and fellows collectively have responsibility for the safety and welfare of patients.
- B. Supervision of Fellows

- i. All patient care must be supervised by qualified faculty. The program director must ensure, direct, and document adequate supervision of fellows at all times. Fellows must be
- ii. Faculty schedules must be structured to provide fellows with continuous supervision and consultation.
- iii. Faculty and fellows should be educated to recognize the signs of fatigue, and adopt and apply policies to prevent and counteract its potential negative effects.

VII. Evaluation

A. Fellow

i. Formative Evaluation

- a. The faculty should evaluate in a timely manner the fellows whom they supervise. In addition, the program should demonstrate that it has an effective mechanism for assessing fellow performance throughout the program, and for utilizing the results to improve fellow performance.
 1. Assessment should include the use of methods that produce an accurate assessment of fellows' competence in patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems -based practice.
 2. Assessment should include the regular and timely performance feedback to fellows that includes at least semiannual written evaluations. Such evaluations are to be communicated to each fellow in a timely manner, and maintained in a record that is accessible to each fellow.
 3. Assessment should include the use of assessment results, including evaluation by faculty, patients, peers, self, and other professional staff, to achieve progressive improvements in fellows' competence and performance.

ii. Final Evaluation

- a. The program director should provide a final evaluation for each fellow who completes the program. This evaluation should include a review of the fellow's performance during the final period of education, and should verify that the fellow has demonstrated

sufficient professional ability to practice competently and independently. The final evaluation should be part of the fellow's permanent record maintained by the institution.

B. Faculty

- i. The performance of the faculty should be evaluated by the program no less frequently than at the midpoint of the accreditation cycle, and again prior to the next site visit. The evaluations should include a review of their teaching abilities, commitment to the educational program, clinical knowledge, and scholarly activities. This evaluation should include annual written confidential evaluations by fellows.

C. Program

- i. The educational effectiveness of a program should be evaluated at least annually in a systematic manner.
- ii. Representative program personnel (i.e., at least the program director, representative faculty, and one fellow) should be organized to review program goals and objectives, and the effectiveness with which they are achieved. This group should conduct a formal documented meeting at least annually for this purpose. In the evaluation process, the group should take into consideration written comments from the faculty and the fellows' confidential written evaluations. If deficiencies are found, the group should prepare an explicit plan of action, which should be approved by the faculty and documented in the minutes of the meeting.
- iii. The program should use fellow performance and outcome assessment in its evaluation of the educational effectiveness of the program.
- iv. The program should maintain a process for using assessment results together with other program evaluation results to improve the program.

VIII. Fellow Recruitment and Selection

- A. It is expected that all MSTS recognized fellowships will participate annually in the combined arthroplasty/tumor match and abide by the rules and expectations of that process.