

Career Resources

Orthopedic surgery

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Abstract. Orthopedic surgery is a specialty of surgery dedicated to the prevention, diagnosis, and treatment of diseases and injuries of the musculoskeletal system in all age groups. Careers in orthopedic surgery span the spectrum from general orthopedics to those of subspecialty expertise in orthopedic trauma, hand, pediatrics, total joint, foot and ankle, sports medicine, and oncology to name a few.
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Orthopedic surgery as a specialty has its roots in 2 Greek words: *orthos*, which means straight and free of deformity and *paedios* meaning a child. The 1st textbook of musculoskeletal medicine was written by Nicolas Andry in 1740. He wrote a book titled *Orthopaedia* in the last year of his life at the age of 83. He wrote this book as a way to teach others how to correct the deformities of children. From this small book grew a specialty out of the world of science and medicine that has its goal of understanding how physical factors affect living systems.¹

Over time, this thirst for knowledge has specialized into a surgical specialty, orthopedics, which focuses on the processes involving the bone, muscles, tendon, and ligaments of the skeleton. Protecting and shaping the growth of this skeleton allows human locomotion and function. Without this specialty, broken bones may not heal or heal with deformity, muscles may not fire, and ligaments and tendons may not work properly. All information gained regarding bone and skeletal homeostasis is involved in orthopedics with the following goal: to preserve the form and function of human locomotion and movement in the best way possible. To this end, Orthopedics is dedicated to the prevention, diagnosis, and treatment of diseases and injuries of the musculoskeletal system in all age groups.

Not only does this specialty protect human locomotion by protecting the skeleton and its form and function, but it also makes it better by ways and means of applying cutting-edge research and clinical knowledge to those who sustain musculoskeletal injuries and present with other conditions. The newest advances in total joint replacement and limb salvage whether caused by cancer or trauma are some examples.

Orthopedics is a very versatile specialty of surgery and includes the following areas²: (1) pediatric orthopedics: care of injuries, deformities, and diseases of the bone, joints, muscles, and tendons in children; (2) sports medicine: care of injuries related to athletic activities; (3) joint replacement and surgery in arthritis: care of patients with advanced arthritis including medical treatment, joint replacement, and a newer procedure that aid with longevity of joint form and function; (4) foot and ankle: care of injury and diseases of the foot and ankle; (5) hand surgery: surgical and nonsurgical treatment of the hand and wrist; (6) shoulder and elbows: care of musculoskeletal conditions and injuries of the shoulder and elbow; (7) spine: surgical and nonsurgical treatment of deformities, injuries, and disorders of the back and neck; (8) trauma and fractures: treatment of traumatic injuries to the arms, legs, pelvis, and spine; (9) musculoskeletal oncology: treatment of benign and malignant tumors of bones, joints, and muscles; (10) rehabilitation: programs, whether short- or long-term that help improve strength and mobility and optimize recovery of injuries, diseases, or

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musculoskeletal conditions; and (11) arthroscopy and arthroscopic surgery: diagnosis and treatment of joint diseases and injuries using arthroscopic methods.²

The following are the training requirements:

1. Residency requirements: residency requirements consist of 5 years after successful completion of an accredited 4-year medical school.
2. Residency: have a minimum of 5 years (60 months) of an accredited orthopedic residency training program in the United States or Canada. Generally, 1 year of internship is required. The internship year may include a concentration of surgical and orthopedic rotations. After completion of successful internship, 4 years completion of residency is required with required exposure to all sub-specialties. Depending on the program, various amounts of time and training may differ in each of these orthopedic areas.
3. Board certification in orthopedic surgery is done by the American Board of Orthopaedic Surgery (ABOS) founded in 1934. Being certified means the orthopedic surgeon has met the specified educational, evaluation, and examination requirements of the Board. This includes a written test (part I) after the completion of orthopedic residency and an oral assessment (part II). A surgeon who has passed part I has 5 years during which to pass part II. If part II is not completed within 5 years, the candidate must retake part I.^{3,4}

Furthermore, board certification is a voluntary process on the part of any physician in orthopedic surgery.

Maintenance of Certification

Since 1986, the ABOS has issued time-limited certificates. Those orthopedic surgeons who were certified in 1986 and thereafter must maintain their certification by completing 120 hours of pertinent continuing medical education, undergoing a stringent peer-review process to make certain they are respected by their peers and practicing ethical orthopedic surgery, and taking and passing a written or oral examination. This maintenance of certification (MOC) process must be performed every 7 to 10 years.

Beginning with certificates that expire in 2010, all ABOS diplomates with time-limited certificates who wish to remain board certified will be allowed to do so by complying with requirements of the MOC program established by the ABOS. The MOC program has 4 components. These components consist of the following:

1. Evidence of professional standing, which is currently evaluated with periodic peer review, and confirmation of full and unrestricted licensure in all jurisdictions where a license is held and hospital credentials.
2. Evidence of life-long learning and self-assessment, addressed through two 3-year cycles of 120 credits of category 1 continuing medical education (CME) that

include a minimum of 20 CME credits of Self-Assessment Examinations.

3. Evidence of cognitive expertise, which occurs through one of the same secure recertification examination pathways currently required at 10-year intervals.
4. Evidence of performance in practice, focuses on a quality improvement model and includes a stringent peer-review process. The process involves the submission of case lists and patient survey information. The Board also obtains peer review of the candidate from certified orthopedic surgeons who are familiar with their work. Evaluations from the hospital chief of staff, chief of orthopedics, surgery, anesthesia, and nursing staff in the operating room and orthopedic wards are also obtained. This information is reviewed by the Credentials Committee of the ABOS, who will decide which applicants are admitted to sit for the recertification examination.⁴

The ABOS website is invaluable at helping to plan and start the process for recertification as this becomes due. The American Academy of Orthopaedic Surgeons can also help. Planning, managing and achieving required continuing education for those already certified is made easy with educational programs and services. Earning CMEs and keeping track of personal CME hours is made available through the AAOS. Included is the availability of scored and recorded self-assessment resources (self-assessment examinations) to help evaluate knowledge, satisfy the MOC requirement and keep orthopedic knowledge up-to-date.

To help maintain certification with lifelong learning and continuing education, a vast array of educational choices are made available through the AAOS. Some items are free, and others are sold as educational CME units. Found on the AAOS website are various certification, recertification and board exam preparation resources, which include, but not limited to, the following: online CMEs, self examinations in numerous sub-specialties and general orthopedics, and various courses held in numerous places and attended by those wishing to earn CMEs. Various courses can also be used to keep abreast of new techniques, learn practical skills, learn to communicate better with patients, and to better manage one's practice. The AAOS Annual Meeting attracts thousands of orthopedic surgeons and also offers opportunities for earning CMEs. Specific Board Review Courses are held yearly for preparation for certification and recertification.

Grant Funding, Research Fellowships, and Travel Fellowships

1. Medical students: Ruth Jackson Orthopaedic Society (RJOS) Medical Student Scholarship. To encourage students to enter the field of orthopedic surgery, RJOS provides up to \$1,500 each to 2 medical students to attend the American Academy Orthopedic Surgeons (AAOS) Annual Meeting, including the RJOS Annual Luncheon. Applicants should be current medical stu-

- dents. Application deadline date is October 1. Applications completed after this date will not be reviewed until the following year.
2. Residents: Jacquelin Perry, M.D., resident research award. RJOS encourages orthopedic residents to submit abstracts of research projects for this annual award. Applicants must be current residents in accredited orthopedic surgical residency programs. The resident must be the primary investigator of the submitted research project. The winner presents his/her paper at the RJOS Annual Luncheon at the AAOS Annual Meeting, and receives an award of \$2,000.
 3. Faculty: RJOS traveling fellowships.⁵⁻⁷ Two RJOS traveling fellowships are awarded to RJOS members each year: an academic fellowship and a practice enrichment fellowship. The academic fellowship, recently named in memory of Alexandra Kirkley, M.D., provides funds to allow the winning applicant to travel to enrich his/her academic career. The practice enrichment fellowship allows the winner to travel to learn new techniques or expand his/her subspecialty interests. Applicants must be RJOS members in good standing who are board-certified or board-eligible orthopedic surgeons and citizens of the United States or Canada. The awards are up to \$6,000 travel expense reimbursement for each fellowship. This award is supported by funds from Zimmer, Inc. These awards are supported by funds from Zimmer, Inc. In addition, Zimmer, Inc., has generously provided funding for 2 separate \$30,000 grant awards targeted to RJOS members. There is no age restriction, but the applicants should be board eligible or board certified. The grant application can be on any topic, but preference will be given to topics related to women's musculoskeletal health issues.⁶ The Orthopaedic Research and Education Foundation (OREF) is the 1 foundation serving the entire orthopedic community supporting research and education toward building the scientific base of clinical practice. Since 1955, the foundation has raised more than \$100 million and holds a unique place in American medicine.⁵

The following OREF grants^{6,7} are available:

1. RJOS/OREF/DePuy Career Development Grant in Women's Musculoskeletal Health: with support from DePuy Orthopedics, this grant will help train and develop female orthopedic surgeons to improve knowledge in the area of women's musculoskeletal health and enhance the understanding of gender and diversity differences in the outcomes of orthopedic procedures. The candidate must be a female orthopedic surgeon who is a member of the RJOS. The amount of the grant is \$45,000 for up to 1 year.
2. Career Development Grant in Total Joint and Trauma Surgery: this 1-year grant provides up to \$45,000 to advance the training of the next generation of orthopedists who have a clinical or scientific interest in total

joint surgery and/or trauma treatment. Physicians currently completing formal orthopedic surgical training, currently enrolled in advanced surgical training, or having completed formal training within the last 4 years may apply by submitting a proposal for an individual plan for further research investigation or surgical training. (This requirement is flexible if a sabbatical or leave of absence was taken during the candidate's early career and will be evaluated on a case-by-case basis.) Minority and female orthopedic surgeons are encouraged to apply for grants reviewed and selected by members of the J. Robert Gladden Society and RJOS.^{6,7}

Residents and Faculty

The Clinician Scientist Development Program seeks applicants in their postgraduate year 2 to 5 residency years, in fellowships, and junior faculty through year 3 who have the potential/desire to become orthopedic clinician scientists. Up to 15 participants are selected to participate in the 1.5-day CSDP training workshop. For inquiries, contact Erin Ransford, Manager of Research Development, Office of Government Relations, 6,300 North River Road, Rosemont, IL 60018-4262 (e-mail ransford@aaos.org).

Additional resources are the following: (1) Clinician Scientist Career Development Timeline (Orthopaedic Research and Education Foundation online), (2) National Institutes of Health Career Development Awards, and (3) information on Orthopaedic Specialty Society grant opportunities. Numerous other grants and awards are found on the OREF web site (<http://www.oref.org>).⁸

Membership in the following societies is available:

1. The American Orthopaedic Association (AOA) (<http://www.aoassn.org>) was founded in 1887 and is the oldest orthopedic association in the world. Its mission is to identify, develop, engage, and recognize leadership to further the art and science of orthopedics. You must be nominated for and voted on for membership.⁹
2. AAOS (<http://www.aaos.org>): founded in 1933, the AAOS is the pre-eminent provider of musculoskeletal education to orthopedic surgeons and others in the world. CME venues include a world-renowned annual meeting, multiple CME courses held around the country and at the Orthopedic Learning Center, and various medical and scientific publications and electronic media materials.¹⁰
3. RJOS (<http://www.rjos.org>): RJOS is the oldest surgical women's organization incorporated in the United States. It welcomes both men and women as members. Founded in 1983 as a support and networking group for the growing number of women orthopedic surgeons, it has grown to a membership of more than 450. The majority is from North America, with international female orthopedists included. The membership is comprised of practicing orthopedic surgeons, residents, fellows, and medical students. With these varied perspectives, RJOS offers a

woman's viewpoint on the rewards and shortcomings of a career in orthopedics. For the medical student, resident, and fellow, there is a mentoring program to offer guidance as well as practical suggestions for choosing and completing an orthopedic residency. Working along with the AAOS, educational projects involving osteoporosis and family violence have been completed. Future RJOS efforts will involve women's musculoskeletal health and physician leadership training.

The RJOS has an endowment with the OREF. Through partnering with industry, the Society has developed the RJOS Traveling Fellowship Program, which awards 2 fellowships annually, and a Resident Research Award. As of 2002, RJOS also offers 2 Medical Student Scholarships for those students interested in attending the AAOS Annual Meeting and the RJOS luncheon.

The Society holds a luncheon meeting each year during the AAOS Annual Meeting. This is a time for conducting the business of the society and also for networking and socializing. Committee work powers the organization. Opportunities for membership are available on the Membership, Mentoring, Program, Nominating, Scientific, and Communications Committees.¹¹ Further information can be found at <http://www.rjos.org/web/about/index.htm>.

The mission of the J. Robert Gladden Orthopaedic Society of the American Academy of Orthopedic Surgery (www.gladdensociety.org) is to increase diversity in the orthopedic profession, improve musculoskeletal patient care by improving culturally competent care, and eliminate musculoskeletal health care disparities in underserved groups.¹²

Subspecialty societies within orthopedics with subspecialty interest include but are not limited to the following societies:

1. The American Orthopaedic Foot and Ankle Society (AOFAS) (<http://www.aofas.org>): the AOFAS is an orthopedic specialty society whose members are orthopedic surgeons specializing in surgical and medical treatment of injuries, diseases, and other conditions of the foot and ankle. This society has interests in diabetes/nerve disorders, ankle, bunions, forefoot, tibiotalar-calcaneal fusion, flatfoot, hindfoot, and ankle/hindfoot and congenital clubfoot to name a few.
2. American Orthopedic Society For Sports Medicine (AOSSM) (<http://www.sportsmed.org>): the AOSSM focuses on sports-related orthopedic conditions and injuries. Topics such as meniscal/articular cartilage, the foot and ankle in sports medicine, the elbow, the shoulder (rotator cuff and instability) and stress fractures, and rotator cuff tendinosis in athletes are included in research and discussion.
3. The American Shoulder and Elbow Surgeons (ASES) (<http://www.ases-assn.org>): the ASES organization seeks to foster and advance the science and practice of shoulder and elbow care. This society is made up of leading national and international orthopedic surgeons who specialize in surgery of the shoulder and elbow. Focus topics of this society include elbow instability, glenohumeral instability, basic science, rotator cuff, arthroscopy, elbow/osseous reconstruction, arthroplasty (primary, long-term results, complications, and revisions), and general issues of the shoulder and elbow. Arthritis and its effect on both young and older patients is an emerging topic.
4. The American Society for Surgery of the Hand (ASSH) (<http://www.assh.org>): the ASSH was founded in 1946. This society boasts of being the oldest medical specialty society in the United States devoted entirely to CME related to hand surgery. Musculoskeletal and congenital conditions and injuries to bones of the hand and wrist complex are studied. Wrist ligament, wrist arthritis/phalanx fractures, and distal radius are important topics of interest as well. Numerous other areas of interest are found on their web site.
5. The Arthroscopy Association of North America (AANA) (<http://www.aana.org>): the AANA exists to "promote, encourage, support and foster . . . the development and dissemination of knowledge . . . of arthroscopic surgery to improve upon the diagnosis and treatment of diseases and injuries of the musculoskeletal system."¹³ Rotator cuff and subacromial space pathology; miscellaneous shoulder conditions, complications and controversies in shoulder arthroscopy, articular cartilage knee surgery, meniscus surgery, anterior cruciate ligament update, and posterior cruciate ligament and patellofemoral joint are just a few orthopedic areas of interest this subspecialty studies. Safety and efficacy of thermal surgery of the shoulder, radiofrequency chondroplasty, meniscal repair using the inside-out suture technique, and using patellar tendon or hamstring grafts for anterior cruciate ligament reconstruction are newer topics and recent advances in orthopedic arthroscopy techniques.
6. The Federation of Spine Associations (FSA) consists of the following 4 societies with recommended links: American Spinal Injury Association (ASIA) (<http://www.asia-spinalinjury.org/>), Cervical Spine Research Society (CSRS) (<http://www.csrs.org/>), North American Spine Society (NASS) (<http://www.spine.org/>), and Scoliosis Research Society (SRS) (<http://srs.org/>). This federation focuses on spine-related disorders including scoliosis, pediatric congenital disorders, adult spine degeneration, and other spine disorders including fractures and spinal cord injuries among numerous other spine-related disorders.
7. The American Association of Hip and Knee Surgeons (AAHKS) (<http://www.aahks.org>) was established in 1991. The mission of the AAHKS is to provide leadership in advocacy, education, and research to achieve excellence in hip and knee patient care. Topics such as implant design, results, surgical techniques, and complications of primary and revision total joint arthroplasty

- (TJA) are a few areas of interest. With the population living longer, and arthritis a very common musculoskeletal condition, TJA (replacement) will continue to be a common orthopedic procedure.
8. The Hip Society (<http://www.hipsoc.org>) and Knee Society (<http://www.kneesociety.org>) are 2 other societies within orthopedic surgery whose interests are joints and topics and controversies surrounding total joint replacements, reconstruction, and newer technologies involving mini-incisions and robotics. Hip Society Awards include the Otto Aufranc Award, the John Charnley Award, and the Frank Stinchfield Award. The Knee Society Awards within the society include the Mark Coventry, Chitranjan Ranawat, and John Insall. Further information regarding these joint societies may be found on their web site.
 9. The Limb Lengthening and Reconstruction Society: ASAMI–North America (<http://www.llrs.org>). Founded as ASAMI–North America (the Association for the Study and Application of Methods of Ilizarov), the Limb Lengthening and Reconstruction Society is devoted to clinical excellence in such areas as in limb lengthening, limb reconstruction, extremity deformity correction, reconstruction of failed fractures, and trauma.
 10. The Musculoskeletal Tumor Society (MSTS) (<http://www.msts.org>) aims to advance the science of orthopedic oncology and to promote high standards of patient care in those with bone and soft tissue tumors. Current principles in orthopedic oncology as well as newer modalities for the treatment of bone and soft-tissue tumors are major focuses.
 11. The Orthopedic Rehabilitation Association (ORA) (<http://www.orthorehabassoc.org>). These surgeons are interested in the orthopedic care of patients with complex musculoskeletal problems, which are global in nature and not necessarily being addressed by other specialty societies. Areas of interest include but are not limited to the following: interdisciplinary care; stroke, traumatic brain injury, cerebral palsy, and multiple sclerosis; spinal cord injury; various neuromuscular disorders; amputations; sports medicine; lower-extremity problems of the diabetic patient; care after tumor surgery; orthotics and prosthetics and robotics; and innovative scientific and engineering developments in rehabilitation. The Jacqueline Perry Award is given by this subspecialty orthopedic society.
 12. The Orthopaedic Trauma Association (OTA) (<http://www.ota.org>). The OTA serves to promote excellence in care for the injured patient. Varied areas of concern include disaster preparation, child abuse, cause and prevention of injury in motor sports, and patient with multiple fractures and musculoskeletal injuries. The OTA is very active in resident and surgeon education through courses. There are lectures available on the web site on over 75 topics in trauma. There are several membership categories including those for residents.
 13. The Pediatric Orthopaedic Society of North America (POSNA) (<http://www.posna.org>) specializes in the care of children's musculoskeletal health. Some areas of interest include the treatment of osteochondritis dissecans, amputation in the child, congenital deformity, pediatric hip and knee disorders, joint injuries, and growth and injury to the pediatric athlete.

Further information regarding specialty societies may be found on their web sites as indicated with each subspecialty.

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