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Recommended Curriculum Guidelines for Family Medicine Residents

Musculoskeletal and Sports Medicine

This document is endorsed by the American Academy of Family Physicians (AAFP).

Introduction

This Curriculum Guideline defines a recommended training strategy for family medicine residents. Attitudes, behaviors, knowledge, and skills that are critical to family medicine should be attained through longitudinal experience that promotes educational competencies defined by the Accreditation Council for Graduate Medical Education (ACGME), www.acgme.org. The family medicine curriculum must include structured experience in several specified areas. Much of the resident's knowledge will be gained by caring for ambulatory patients who visit the family medicine center, although additional experience gained in various other settings (e.g., an inpatient setting, a patient's home, a long-term care facility, the emergency department, the community) is critical for well-rounded residency training. The residents should be able to develop a skillset and apply their skills appropriately to all patient care settings.

Structured didactic lectures, conferences, journal clubs, and workshops must be included in the curriculum to supplement experiential learning, with an emphasis on outcomes-oriented, evidence-based studies that delineate common diseases affecting patients of all ages. Patient-centered care, and targeted techniques of health promotion and disease prevention are hallmarks of family medicine and should be integrated in all settings. Appropriate referral patterns, transitions of care, and the provision of cost-effective care should also be part of the curriculum.

Program requirements specific to family medicine residencies may be found on the ACGME website. Current AAFP Curriculum Guidelines may be found online at

www.aafp.org/cg. These guidelines are periodically updated and endorsed by the AAFP and, in many instances, other specialty societies, as indicated on each guideline.

Please note that the term “manage” occurs frequently in AAFP Curriculum Guidelines. “Manage” is used in a broad sense to indicate that the family physician takes responsibility for ensuring that optimal, complete care is provided to the patient. This does not necessarily mean that all aspects of care need to be directly delivered personally by the family physician. Management may include appropriate referral to other health care providers, including other specialists, for evaluation and treatment.

Each residency program is responsible for its own curriculum. **This guideline provides a useful strategy to help residency programs form their curricula for educating family physicians.**

Preamble

The approach to diseases and disorders of the musculoskeletal system requires specific attitudes, knowledge, and skills. Residency education is designed to provide experiences in a variety of settings that will give residents expertise in the diagnosis, prevention, treatment, and rehabilitation of musculoskeletal diseases. These experiences should include patients of all ages and conditions of congenital, traumatic, and degenerative causes.

In the United States, the combined burden of medical conditions affecting the musculoskeletal system and preventable chronic diseases that are related to improper nutrition and inactivity is staggering. Musculoskeletal complaints rank second only to upper respiratory infections as the reason for seeking medical attention (Woodwell 2004). Yet, studies indicate musculoskeletal and sports medicine education in U.S. medical schools and primary care residencies may be inadequate (Freedman 1998). The attitudes, knowledge, and skills outlined in this Curriculum Guideline will equip family medicine training programs to provide optimal care to prevent musculoskeletal complaints and treat patients who have musculoskeletal complaints.

Competencies

At the completion of residency training, a family medicine resident should be able to:

- Perform an appropriate musculoskeletal history and physical examination; formulate an appropriate differential diagnosis; and recommend treatment, including requisite subspecialty referrals (Patient Care, Medical Knowledge, Systems-based Practice)
- Perform an evidence-based, age-appropriate, and activity-specific preparticipation physical examination (Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism)

- Demonstrate the provision of care to athletes involved in athletic competition and events within the context of team-based care, including event risk assessment and support, collaborative work with trainers and other health care professionals, and post-event follow-up (Patient Care, Medical Knowledge, Systems-based Practice)
- Understand the limitations of evidence associated with the preparticipation physical examination (Patient Care, Medical Knowledge)
- Communicate effectively regarding musculoskeletal health care with a wide range of individuals, including patients, their families, coaches, school administrators, and employers (Interpersonal and Communication Skills)
- Understand how exercise impacts disease states such as obesity, diabetes, and hypertension and formulate an appropriate individualized exercise prescription (Patient Care, Medical Knowledge, Interpersonal and Communication Skills)
- Understand that sports medicine involves caring for the whole athlete, including medical and psychological conditions in addition to their musculoskeletal conditions (Patient Care)
- Describe performance metrics regarding patient referrals for musculoskeletal conditions and explain how to use those data to improve delivery of care to your patient population (Practice-based Learning and Improvement)

Attitudes and Behaviors

The resident should demonstrate attitudes and behaviors that encompass:

- Importance of diagnosing and treating musculoskeletal injuries in family medicine
- Physical activity as an important and beneficial part of patients' lives
- Appropriate preparticipation evaluation of athletes and pre-activity counseling for patients of all ages
- Awareness of the special needs of patients who have acute injuries
- Proper rehabilitation of acute musculoskeletal injuries to help speed recovery, maximize function, and minimize the risks of re-injury, chronic pain, and chronic disability
- Prevention strategies as an important part of the care of the musculoskeletal system

Knowledge

In the appropriate setting, the resident should demonstrate the ability to apply knowledge of the following:

1. Normal anatomy and physiology, including basic exercise physiology (e.g., cardiovascular effects of exercise) and biomechanics (e.g., normal mechanics of gait and foot strike)
2. Normal growth and development
3. Musculoskeletal history taking
4. Principles of musculoskeletal physical examination (e.g., knee, shoulder, hip, elbow, wrist, hand, neck, back, foot, and ankle)
5. Indications and contraindications for common musculoskeletal procedures (e.g., joint injections, casting)
6. Interpretation of laboratory data (e.g., joint fluid)
7. Indications, limitations, contraindications, and informed consent for office-based musculoskeletal procedures, such as:
 - a. Common joint aspirations
 - b. Common joint injections
 - c. Common injections for bursitis
 - d. Common injections for tendinopathy
 - e. Common tendon sheath injections
 - f. Splinting and casting
8. Testing
 - a. Appropriate ordering and basic interpretation of plain radiographs
 - b. Use of magnetic resonance imaging (MRI), computed tomography (CT), bone scan, and musculoskeletal ultrasound (including indications for use)
 - c. Indications for arthrogram, myelogram, and arthroscopy
 - d. Indications for electromyography (EMG) and nerve conduction studies
 - e. Exercise-induced bronchospasm testing
 - f. Understanding of cardiac screening for exercise-related cardiac problems
9. Pathogenesis/pathophysiology and recognition of:
 - a. Joint pain, swelling, and erythema
 - b. Muscular pain, swelling, and injury
 - c. Musculoskeletal trauma
 - d. Fractures
 - e. Dislocations

- f. Tendinopathy spectrum
- g. Tendon ruptures (partial and complete)
- h. Concussion
- i. Nerve injuries
- j. Bone and joint deformities
- k. Bone and joint infections
- l. Metabolic bone diseases
- m. Musculoskeletal congenital anomalies
- n. Musculoskeletal birth injuries
- o. Compartment syndrome
- p. Avascular necrosis
- q. Osteoporosis
- r. Overuse syndromes
- s. Back pain syndromes

10. Pediatric problems

- a. Hip dislocation
- b. Congenital hip dysplasia
- c. Avascular necrosis of the femoral head (Legg-Calvé-Perthes disease)
- d. Apophysitis
 - i. Osgood-Schlatter disease
 - ii. Sever disease
 - iii. Iselin disease
- e. Slipped capital femoral epiphysis (SCFE)
- f. "Clubfoot" (talipes equinovarus)
- g. Intoeing (metatarsus adductus, tibial torsion, femoral anteversion)
- h. "Bowleg" (genu varum) and "knock knee" (genu valgum)
- i. Physeal injuries (Salter-Harris classification)
- j. Transient synovitis
- k. Child abuse patterns of injury
- l. Dislocation of the radial head (nursemaid's elbow)
- m. Blount disease
- n. Rickets
- o. Osteogenesis imperfecta

- p. Thoracolumbar scoliosis
- q. Pes planus (flexible versus rigid)
- r. Special Olympics athletic clearance

11. Considerations specific to sports medicine

- a. General considerations of the impact of sport/physical activity on patients
- b. Ethical, psychosocial, economic, and medicolegal issues
- c. Interaction with members of the sports medicine team
- d. Nutrition, fluids and electrolytes, and dietary supplements
- e. Awareness of banned substances to avoid for National Collegiate Athletic Association (NCAA), Olympic, and other athletes subject to drug testing, specifically in the off season when they can still be tested
- f. Injury prevention
 - i. Use of proper techniques
 - ii. Promoting rule changes and enforcement of rules designed to enhance participant safety
 - iii. Proper equipment, fit, and maintenance
 - iv. Taping, strapping, and bracing techniques
 - v. Environmental factors affecting participant and spectator safety (including heat illness, hypothermia, and lightning safety)
- g. Conditioning and training techniques, including principles of aerobic and resistance training
- h. Appropriate exercise prescription for:
 - i. Healthy people of all ages, taking into account physiologic differences related to age and gender
 - ii. Patients who have chronic illnesses, including diabetes, hypertension, stable heart failure, asthma, and chronic obstructive pulmonary disease (COPD)
 - iii. Pregnant women
 - iv. Physically or mentally challenged athletes
 - v. Patients who have various cardiovascular conditions, especially those known to increase the risk of sudden death
- i. Sports medicine education and promotion for patients and their families, athletes and their families, allied health professionals, coaches, and school administrators
- j. Patient care aspects
 - i. The important role of family physicians as part of a team of physicians for organized sports
 - ii. The role of family physicians as medical directors and/or on-site medical care providers for mass participation sporting events
 - iii. Appropriate assessment and care of acutely injured athletes, including but not limited to:

- 1) Evaluation, on-field management, and transport of suspected cervical spine injury
 - 2) Evaluation, and on-field and sideline management of suspected concussion or other head injury
 - 3) Evaluation, on-field management, and transport of severe fractures and dislocations
 - iv. Medical management of ill and injured athletes, taking into account important sport-specific considerations
 - v. Rehabilitation oversight for ill and injured athletes, and return-to-play decision making
- k. Medical care considerations for special athlete groups
- i. Preadolescent athletes
 - ii. Adolescent athletes
 - iii. Female athletes
 - iv. Geriatric athletes
 - v. Physically challenged athletes (including those participating in the Special Olympics and Paralympics)
 - vi. Student athletes
 - vii. Recreational athletes
 - viii. Athletes who have chronic diseases
- l. Communication and interaction with patients and their families, athletes and their families, coaches, athletic trainers, allied health professionals, physical therapists, and school administrators

12. Problems associated with exercise

- a. Exercise addiction
- b. Abuse of anabolic steroids and other performance-enhancing substances
- c. Pressures placed on athletes by themselves, family members, teammates, coaches, and fans to participate even when injured
- d. Performance pressures placed on athletes by themselves, family members, teammates, coaches, and fans
- e. The intermittent exerciser
- f. How to deal with unmet and unrealized expectations
- g. Alcohol and illicit drug use and abuse
- h. Eating disorders and disordered eating
- i. Female Athlete Triad and Relative Energy Deficiency in Sport (RED-S) syndromes
- j. Depression and anxiety

13. Management and therapy

- a. Outline of expected course with and without therapy

- b. Patient education for acute and chronic problems
- c. Targeted pharmacologic treatment
- d. Supportive/corrective devices, including braces, casts, splints, and orthotics
- e. Complementary and alternative modalities
- f. Prevention
 - i. Preparticipation screening
 - ii. Conditioning and training
 - iii. Injury prevention
 - iv. Physical fitness/exercise prescription – Exercise is Medicine resource
 - v. Bone loss
 - 1) Nutrition
 - 2) Exercise
 - 3) Pharmacology
- g. Rehabilitation
 - i. Physical therapy
 - 1) Cold, heat
 - 2) Ultrasound and phonophoresis
 - 3) Exercises
 - 4) Electrical stimulation (e-stim) and iontophoresis
 - ii. Occupational therapy
 - iii. Complementary modalities (e.g., osteopathic manipulative therapy [OMT], massage, acupuncture)
 - iv. Psychosocial aspects of trauma
- h. Surgery and follow-up care
 - i. Internal and external fixation devices
 - ii. Artificial joint replacement
 - iii. Arthroscopy
 - iv. When to refer for surgical intervention

Skills

In the appropriate setting, the resident should demonstrate the ability to independently perform or appropriately refer the following:

1. Basic management of:
 - a. Fractures (simple, stable, closed, and nondisplaced that do not require surgical correction)
 - b. Ligament sprains
 - i. Finger
 - ii. Toe
 - iii. Midfoot
 - iv. Ankle

- v. Knee
 - vi. Vertebral column
 - vii. Wrist
 - viii. Elbow
 - ix. Shoulder
- c. Muscular strains (e.g., hamstring, gastrocnemius)
- d. Concussions (including NOT returning to play the day of injury)
- e. Other problems
- i. Costochondritis
 - ii. Bursitis, tendinopathy, tenosynovitis
 - iii. Common fibrocartilage injuries, such as labral and meniscal tears
 - iv. Dislocations (e.g., nursemaid's elbow)
 - v. Neurologic conditions (e.g., nerve entrapment syndromes, brachial plexopathies)
 - vi. Synovial cysts (e.g., Baker cyst, ganglion cysts)
 - vii. Patellofemoral syndrome
 - viii. Apophysitis (e.g., Osgood-Schlatter disease)
 - ix. Osteochondroses/aseptic necrosis
 - x. Osteoarthritis/crystal-induced arthritis (e.g., gout, pseudogout)
 - xi. Metabolic bone disease (osteoporosis, Paget disease)
 - xii. Acute and chronic low back pain
 - xiii. Foot conditions
 - 1) Hallux valgus (bunions)
 - 2) Pes planus and posterior tibialis tendon dysfunction
 - 3) Plantar fasciitis
 - 4) Morton neuroma
 - 5) Pes cavus
 - 6) Metatarsalgia
 - xiv. Osteomyelitis
 - xv. Rheumatologic disorders
- f. Procedures (indications, contraindications, and complications)
- i. Joint aspiration (arthrocentesis)
 - ii. Joint injection
 - iii. Common injections for bursitis
 - iv. Common injections for tendinopathy
 - v. Common tendon sheath injections
 - vi. Splints (upper and lower extremity)
 - vii. Plaster and fiberglass casts
 - 1) Short leg
 - 2) Short and long arm
 - 3) Thumb spica
 - 4) Cast problems (including compartment syndrome)
 - viii. Dislocation reduction
 - 1) Simple anterior shoulder
 - 2) Radial head

- 3) Simple posterior elbow
 - 4) Phalanges
 - 5) Patella
 - 6) Mandible
2. Recognition and initial management of:
 - a. Fractures
 - i. Closed tarsal and carpal bones, particularly tarsal navicular and scaphoid
 - ii. Smith fracture and Colles fracture
 - iii. Nondisplaced medial or lateral epicondyle of humerus
 - iv. Nondisplaced humeral neck fractures
 - v. Nondisplaced Salter-Harris Type I or Type II epiphyseal injuries in children
 - vi. Dancer's fracture and Jones fracture (proximal 5th metatarsal)
 - b. Recurrent dislocations (e.g., patella, shoulder)
 3. Orthopedic emergency recognition and stabilization, including trauma assessment
 - a. Acute compartment syndrome
 - b. Hip dislocation
 - c. Knee dislocation
 - d. Unstable pelvis fracture
 - e. Cervical spine fracture
 - f. Spinal cord injury
 - g. Cauda equina syndrome
 - h. Neurovascular compromise
 4. Functional rehabilitation
 - a. Prescription of home exercise programs
 - b. Prescription of physical therapy (including all appropriate components)
 5. Surgical assistance

Implementation

This Curriculum Guideline should be implemented longitudinally throughout the three years of residency training. Research has shown that early exposure to a sports medicine curriculum enhances basic medical knowledge in musculoskeletal medicine (Watts 2011). The continuing patient care experience in the family medicine center provides the principal site for training in ambulatory musculoskeletal care. Residents should have at least minimal experience in inpatient orthopedics. Preceptors who are competently trained must be available to work individually with residents, and to teach and assess performance of residents' desired skills. The teaching of musculoskeletal

care lends itself well to hands-on training in core conferences and workshops, using films, patient demonstrations, and models. Experience can be provided in bone, muscle, and joint examination; splinting; taping; casting; arthrocentesis; and rehabilitative measures. Additional training sites that have proved useful include private orthopedic offices; emergency departments; sports medicine and rehabilitation centers; game-time sidelines care sites; and specialized clinics, including adult back, scoliosis, and foot clinics. Electives can serve to consolidate orthopedic training, to expose the resident to a greater concentration of common problems, or to provide experience with unusual problems (e.g., acute ski injury clinics, military bases, paratrooper training, gait and balance clinics for the elderly).

Resources

Articles

American Family Physician (AFP) by Topic: Musculoskeletal Care. (Multiple articles) www.aafp.org/afp/topicModules/viewTopicModule.htm?topicModuleId=17.

Cassas KJ, Cassettari-Wayhs A. Childhood and adolescent sports-related overuse injuries. *Am Fam Physician.* 2006;73(6):1014-1022. www.aafp.org/afp/2006/0315/p1014.pdf. Accessed October 20, 2017.

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McCrorry P, Meeuwisse W, Dvořák J, et al. Consensus statement on concussion in sport: the 5th international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med.* 2017;51:838-847.

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Watts SA, Zhang Z. Competency in musculoskeletal and sports medicine: evaluating a PGY-1 curriculum. *Fam Med.* 2011;43(9):659-663.

Whiteside JW. Management of head and neck injuries by the sideline physician. *Am Fam Physician.* 2006;74(8):1357-1362. www.aafp.org/afp/2006/1015/p1357.pdf. Accessed October 20, 2017.

Woodwell DA, Cherry DK. National Ambulatory Medical Care Survey: 2002 summary. *Adv Data*. 2004;(346):1-44.

Books

Primary Resources (recommended for all residencies):

American College of Sports Medicine. *ACSM's Guidelines for Exercise Testing and Prescription*. 10th ed. Baltimore, Md.: Lippincott Williams & Wilkins; 2017.

Armstrong AD, Hubbard MC, eds. *Essentials of Musculoskeletal Care*. 5th ed. Rosemont, Ill.: American Academy of Orthopaedic Surgeons; 2015.

Bernhardt DT, Roberts WO, eds. *PreParticipation Physical Evaluation (PPE)*. 4th ed. Leawood, Ks.: American Academy of Family Physicians; 2010.

<https://nf.aafp.org/Shop/forms-downloads/preparticipation-physican-evaluation-monograph>.

Eiff MP, Hatch RL. *Fracture Management for Primary Care*. 3rd ed. Philadelphia, Pa.: Elsevier; 2017.

McKeag DB, Moeller JL. *ACSM's Primary Care Sports Medicine*. 2nd ed. Philadelphia, Pa.: Lippincott Williams & Wilkins; 2007.

Secondary Resources (to supplement primary resources):

Miller MD, Thompson SR. *DeLee & Drez's Orthopaedic Sports Medicine: Principles and Practice*. 4th ed. Philadelphia, Pa.: Saunders; 2014.

O'Connor FG, ed. *ACSM's Sports Medicine: A Comprehensive Review*. Philadelphia, Pa.: Lippincott Williams & Wilkins; 2012.

Pfenninger JL, Fowler GC. *Pfenninger and Fowler's Procedures for Primary Care*. 3rd ed. Philadelphia, Pa.: Saunders; 2010.

Website Resources

American Board of Family Medicine. Sports Medicine Examination Content; 2007. <https://www.theabfm.org/cert/SportsMedExaminationOutline.pdf>.

Bryan S, Heiman D, Hong E, Turner J, Trojian T. Evidence-based musculoskeletal examination: faculty development for competence in teaching musculoskeletal examination techniques; 2007. <http://slideplayer.com/slide/10282655/>.

Gentili A, Beller M, Masih S, Seeger LL. Interactive Atlas of Signs in Musculoskeletal Radiology. www.gentili.net/signs/.

National Athletic Trainer Association. Appropriate Prehospital Management of the Spine-Injured Athlete. Updated from 1998 document; 2015.
<https://www.nata.org/sites/default/files/executive-summary-spine-injury-updated.pdf>.

University of California, San Diego (UCSD). A Practical Guide to Clinical Medicine: Musculo-Skeletal Examination; 2015. <http://meded.ucsd.edu/clinicalmed/joints.htm>.

University of West Alabama Athletic Training & Sports Medicine Center. AH 323 Evaluation of Athletic Injuries I Laboratory. Shoulder Special Tests. Athletic Injury/Illness Special Tests. <http://at.uwa.edu/CurrHome/AH323/skillsshoulder.asp>.

Organizations

American Academy of Family Physicians. www.aafp.org

American Academy of Orthopaedic Surgeons. www.aaos.org

American College of Radiology. <http://acr.org>

American College of Rheumatology. www.rheumatology.org

American College of Sports Medicine. www.acsm.org

American Medical Society for Sports Medicine. www.amssm.org

American Orthopaedic Society for Sports Medicine. www.sportsmed.org

Arthritis Foundation. <http://arthritis.org>

Exercise is Medicine. Healthcare Providers.
www.exerciseismedicine.org/support_page.php/healthcare-providers/

National Collegiate Athletic Association. 2017-18 NCAA Banned Drugs List.
www.ncaa.org/2017-18-ncaa-banned-drugs-list

Society of Teachers of Family Medicine. www.stfm.org

World Anti-Doping Agency. www.wada-ama.org/

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