



Body System: Musculoskeletal		
Session Topic: Limping Pediatric Diagnosis and Orthopedics		
Educational Format		Faculty Expertise Required
REQUIRED	Interactive Lecture	Expertise in the field of study. Experience teaching in the field of study is desired. Preferred experience with audience response systems (ARS). Utilizing polling questions and engaging the learners in Q&A during the final 15 minutes of the session are required.
OPTIONAL	Problem-Based Learning (PBL)	Expertise teaching highly interactive, small group learning environments. Case-based, with experience developing and teaching case scenarios for simulation labs preferred. Other workshop-oriented designs may be accommodated. A typical PBL room is set for 50-100 participants, with 7-8 each per round table. <u>Please describe your interest and plan for teaching a PBL on your proposal form.</u>
Professional Practice Gap	Learning Objective(s) that will close the gap and meet the need	Outcome Being Measured
<ul style="list-style-type: none"> It is important for family physicians to understand and assess the prevalence of common musculoskeletal conditions in their pediatric patients in order to prepare appropriate diagnostic and treatment plans. Parents may not recognize or adequately report musculoskeletal problems in their children, so family physicians should conduct a thorough and accurate assessment of the musculoskeletal system during routine checkups. Parents may also require counseling on evaluating developmental milestones in their children. Family physicians should use screening tools and checklists, such as the “pGALS” test, to assess a child’s musculoskeletal development, which can 	<ol style="list-style-type: none"> Use an evidence-based, systematic approach to diagnosing children with deviations from normal age-appropriate gait patterns. Order or provide appropriate laboratory tests and imaging studies to confirm diagnosis, as suggested by the history and physical examination. Coordinate referral and follow-up care with a pediatric orthopedic surgeon, or other sub-specialist, as indicated by confirmation of the diagnosis. Counsel parents on developmental milestones to evaluate in their children. 	Learners will submit written commitment to change statements on the session evaluation, indicating how they plan to implement presented practice recommendations.



<p>help to facilitate an accurate diagnosis.</p> <ul style="list-style-type: none"> Because patients present to family physicians' offices with a variety of acute and chronic injuries that can require diagnostic imaging tools, family physicians should know which imaging modality (e.g., x-ray, CT scan, MRI, etc.) is the most appropriate and cost-effective based on the patient's signs and symptoms. 		
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ACGME Core Competencies Addressed (select all that apply)

X	Medical Knowledge		Patient Care
X	Interpersonal and Communication Skills		Practice-Based Learning and Improvement
	Professionalism		Systems-Based Practice

Faculty Instructional Goals

Faculty play a vital role in assisting the AAFP to achieve its mission by providing high-quality, innovative education for physicians, residents and medical students that will encompass the art, science, evidence and socio-economics of family medicine and to support the pursuit of lifelong learning. By achieving the instructional goals provided, faculty will facilitate the application of new knowledge and skills gained by learners to practice, so that they may optimize care provided to their patients.

- Provide up to 3 evidence-based recommended practice changes that can be immediately implemented, at the conclusion of the session; including SORT taxonomy & reference citations
- Facilitate learner engagement during the session
- Address related practice barriers to foster optimal patient management
- Provide recommended journal resources and tools, during the session, from the American Family Physician (AFP), Family Practice Management (FPM), and Familydoctor.org patient resources; those listed in the References section below are a good place to start
 - Visit <http://www.aafp.org/journals> for additional resources
 - Visit <http://familydoctor.org> for patient education and resources
- Provide recommendations for an evidence-based, systematic approach to diagnosing children with deviations from normal age-appropriate gait patterns.
- Provider recommendations for ordering or provide appropriate laboratory tests and imaging studies to confirm diagnosis, as suggested by the history and physical examination.
- Provide recommendations for coordinating referral and follow-up care with a pediatric orthopedic surgeon, or other sub-specialist, as indicated by confirmation of the diagnosis.



- Provide strategies and resources for counseling parents on developmental milestones to evaluate in their children.

Needs Assessment

Musculoskeletal disorders, complications and abnormalities in pediatric patients are very common (occurring in as many as 30% of children and adolescents)¹ and can present interesting challenges for family physicians. Pediatric patients are more susceptible to growth plate injuries, particularly in sports, and some may be diagnosed with gait abnormalities (including limp) or limb or spine deformities (such as club foot, scoliosis, limb length differences) from birth or as they begin to develop.² A variety of factors can influence the musculoskeletal system of a child, and because of the developmental nature of their body, fractures, muscle strains/sprains/tears or joint dislocations may be more complicated to assess and treat in children than they are in adults. A careful, thorough examination of the musculoskeletal system is especially important because undiagnosed conditions can lead to further complications and a poor quality of life for many patients.

Practice Gaps

CME outcomes data from American Academy of Family Physicians (AAFP) FMX (formerly Assembly) *Limping Pediatric Diagnosis and Orthopedics* sessions, suggest that physicians have knowledge and practice gaps regarding differential diagnosis; and ordering appropriate diagnostic tests.³

The American Academy of Orthopedic Surgeons (AAOS) lists the following as some of the diseases and conditions that can occur in children:²

- **Bowed legs**, which can occur as physiologic genu varum or Blount's disease, most typically in newborns and adolescents, and requires surgery or brace treatment.
- **Cerebral palsy**, a group of chronic disorders stemming from abnormalities or damage to the brain that can lead to impaired reflexes, coordination and balance.
- **Erb's Palsy**, a form of brachial plexus palsy that tends to affect the nerves of newborns during a difficult delivery and can resolve over time.
- **Juvenile arthritis**, occurring as a result of monoarticular, pauciarticular, polyarticular, or systemic inflammatory etiologies (notably bursitis, juvenile rheumatoid arthritis, reactive arthritis, or septic joint).
- **Muscular dystrophy**, a rare group of diseases that causes muscle fibers in children to atrophy; it is a genetic and progressive condition that most often affects boys.
- **Intoeing**, a common problem found in children and adolescents that are caused by curved foot, twisted shin or twisted thigh bone.
- **Slipped capital femoral epiphysis**, which is an unusual disorder of the adolescent hip that can cause limping, length variation of the leg, pain and limited range of motion.
- **Osgood-Schlatter disease**, a common overuse injury that causes knee pain and swelling in adolescents.
- **Legg-Calve-Perthes disease (LCPD)** is a childhood hip disorder initiated by a disruption of blood flow to the ball of the femur called the femoral head. Due to the lack of blood flow, the bone dies (osteonecrosis or avascular necrosis) and stops growing.



Additionally, many orthopedic problems can manifest as a result of overweight and obesity; one study reported a greater prevalence of fractures and musculoskeletal discomfort in overweight children as compared to non-overweight children.^{4,5} Family physicians should provide the necessary clinical direction for weight-loss activities – which typically involves physical activity in combination with improved nutrition – to enhance overall health.

Family physicians are uniquely positioned to examine pediatric patients for these and other musculoskeletal problems at any point in their growth during well-child visits. As many parents, may not be aware of the developmental milestones for physical growth in their children, they will likely look for guidance from a family physician to assess any abnormalities (even if they resolve over time). Parents may also have difficulty explaining problems to a family physician and may use non-specific terms that can make an accurate diagnosis challenging.¹ According to one recent study, family physicians can benefit from using a “GALS” test as a guide to examine the gait, arms, legs and spine of pediatric patients. The study found that a pediatric GALS (pGALS) test was quick to perform and helped to facilitate accurate diagnosis, which sometimes requires referral to sub-specialists but helps to improve patient outcomes.¹

Family physicians should use a systematic approach to diagnosing children with deviations from normal age-appropriate gait patterns, as delays in diagnosis and treatment can result in significant morbidity and mortality.⁶ Slipped capital femoral epiphysis (SCFE) is the most common hip disorder in adolescents, is associated with obesity and growth surges, and should be considered in the differential diagnosis of pediatric patients presenting with limp and/or hip pain.⁷ Physicians should be familiar with evidence-based evaluation techniques for the physical examination of children presenting with limp, orthopedic pain, or other lower extremity abnormalities. Physicians should be able to select appropriate laboratory tests and imaging studies to confirm diagnosis, as suggested by the history and physical examination.⁶

In cases in which patients have imaging tests conducted at facilities outside of a family physician’s office – such as an emergency department – it is imperative that the results of the tests be communicated between providers. A journal article reported that “34% of U.S. patients reported some kind of medical error. Over half of these patients claimed that their primary care physicians did not communicate directly with them about their treatment options or care decisions. In addition, 9-23% of patients who underwent blood testing, radiography or other diagnostic examinations experienced a delay in being notified about abnormal test results.”⁸ Of course, the onus of responsibility of relaying such results ultimately lies with the provider who interprets them, but family physicians can help to ensure that both they and their patients receive the necessary information to understand the diagnosis and move forward with treatment options.

In 2010, primary care physicians made a diagnosis of a musculoskeletal system disease in more than 94 million office visits, and ordered or provided imaging services in more than 153 million office visits.⁹ Of the 7.4 hours per week spend on administrative tasks, 1.3 hours are spent in administrative tasks related to prior authorizations for imaging.¹⁰ Family physicians frequently order imaging studies in the diagnosis and management of various musculoskeletal conditions and diseases; however, the American Academy of Family Physicians (AAFP) CME Needs Assessment Survey indicates that family physicians have a statistically significant and meaningful gap in the knowledge and skill to effectively and efficiently utilize imaging studies



for musculoskeletal conditions, diseases, and injuries in the optimal management of their patients.¹¹

In order to provide quality, cost effective care for patients with musculoskeletal conditions, injuries, and diseases, family physicians should be familiar with relevant evidence-based recommendations and guidelines for the use of diagnostic imaging. The AAFP position paper on radiology discusses ordering and interpreting radiographs in the outpatient setting, and referring for more extensive imaging when indicated; and further suggests that Broader use of the ACR Appropriateness Criteria[®] may have some beneficial impact by encouraging appropriate outpatient radiography use and discouraging unnecessary or inappropriate use.¹² Additionally, judicious use of imaging based on the clinical presentation and the evidence behind various modalities can help reduce the risk of cancer from radiation exposure and nephrogenic systemic fibrosis.¹³ When selecting diagnostic imaging, the physician must consider the potential health risks to patients and be mindful of costs, but must also carefully document decision making and referral to maximize patient satisfaction and minimize their malpractice risk.¹⁴⁻¹⁷

Physicians may improve their care of pediatric patients presenting with a limp by engaging in continuing medical education that provides practical integration of current evidence-based guidelines and recommendations into their standards of care, including, but not limited to the following:^{7,18-20}

- In a child with a limp and no localized pathology on clinical examination, plain radiography of both lower extremities should be performed.
- The use of musculoskeletal ultrasonography may be considered to diagnose subtle metatarsal fractures.
- If localized pathology is suggested on clinical examination, anteroposterior and lateral radiography of the affected areas should be performed.
- Ultrasonography is recommended over plain radiography for detecting hip effusions because of its high sensitivity.
- Bone scintigraphy is recommended for detecting underlying pathology when history, physical examination,
- The following clinical features make septic arthritis more likely than transient synovitis: oral temperature more than 101.3°F (38.5°C), refusal to bear weight on the affected leg, erythrocyte sedimentation rate more than 40 mm per hour, peripheral white blood cell count more than 12,000 per mm³ (12×10^9 per L), or C-reactive protein level more than 20 mg per L (180.96 nmol per L).
- Family physicians should consider SCFE when a child presents with limping and groin, hip, thigh, or knee pain.
- Physical examination of patients with SCFE usually shows decreased internal rotation of the hip and obligatory external rotation.
- Radiography to rule out SCFE should include anteroposterior and lateral views of the hips (frog-leg lateral views for stable SCFE; cross-table lateral views for unstable SCFE).
- The standard treatment of stable SCFE is in situ fixation with a single screw.
- The Ottawa ankle rules should be used to rule out fractures and prevent unnecessary radiography in patients with suspected ankle sprain.
- Cryotherapy should be applied for the first three to seven days to reduce pain and improve recovery time in patients with ankle sprain.



- An air stirrup brace combined with an elastic compression wrap, or a lace-up support alone, reduces pain and recovery time after an ankle sprain and allows early mobilization.
- Early mobilization and focused range-of-motion exercises reduce pain and recovery time after an ankle sprain, and are preferred to prolonged rest.
- Patients at risk of reinjury after an ankle sprain should participate in a neuromuscular training program.
- Air stirrup braces, lace-up supports, and athletic taping can reduce the risk of ankle sprains during sports.

These recommendations are provided only as assistance for physicians making clinical decisions regarding the care of their patients. As such, they cannot substitute for the individual judgment brought to each clinical situation by the patient's family physician. As with all clinical reference resources, they reflect the best understanding of the science of medicine at the time of publication, but they should be used with the clear understanding that continued research may result in new knowledge and recommendations. These recommendations are only one element in the complex process of improving the health of America. To be effective, the recommendations must be implemented. As such, physicians require continuing medical education to assist them with making decisions about specific clinical considerations.

Resources: Evidence-Based Practice Recommendations/Guidelines/Performance Measures

- A Systematic Approach to the Evaluation of a Limping Child¹⁸
- The limping child: a systematic approach to diagnosis⁶
- Slipped capital femoral epiphysis: diagnosis and management⁷
- Osteochondrosis: common causes of pain in growing bones²¹
- FPIN's clinical inquiries. Hip pain in preschool-age children²²
- Update on acute ankle sprains²⁰
- Diagnosis and Management of Common Foot Fractures¹⁹
- Chronic musculoskeletal pain in children: part II. Rheumatic causes²³
- Hip impingement: identifying and treating a common cause of hip pain²⁴
- Evaluation of the acutely limping child²⁵
- Appropriate and safe use of diagnostic imaging¹³
- How to reduce your malpractice risk¹⁴
- Thinking on paper: documenting decision making¹⁵
- Simple tools to increase patient satisfaction with the referral process¹⁶
- Exam documentation: charting within the guidelines¹⁷
- FamilyDoctor.org: Juvenile Rheumatoid Arthritis | Overview (patient resource)²⁶
- FamilyDoctor.org: Flat Feet | Overview (patient resource)²⁷
- FamilyDoctor.org. Intoeing | Overview (patient resource)²⁸
- FamilyDoctor.org. Osteochondritis Dissecans | Overview (patient resource)²⁹
- FamilyDoctor.org. Patellofemoral Pain Syndrome | Overview (patient resource)³⁰
- FamilyDoctor.org. Slipped Capital Femoral Epiphysis | Overview (patient resource)³¹



References

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