Rheumatology Elective Curriculum
Temple University Internal Medicine Residency Program

EVALUATION METHODS

A = Record Review	E = Standardized Patient (SP)	I = Portfolio	L = Procedures or Case Logs
B = Chart Stimulated-Recall	F = Observed Standardized Clinical Evaluation (OSCE)	J = MCQ Exam	M = Patient Survey
C = Checklist	G = Simulation and Models	K = Oral Exam	N = Mini-CEX
D = Global Rating	H = 360^0 Global Rating		

* Evaluations are based upon the pooled experience of the rheumatology faculty, but are communicated by the inpatient attending. The evaluation is communicated both verbally in a face-to-face meeting between the attending and resident and on a written, competency-based form developed along internal medicine RRC guidelines.

EDUCATIONAL TECHNIQUES

A = Lectures	F = Observed Standardized Clinical Evaluation (OSCE)	K = Musculoskeletal Elective	P = Team Building Workshops
B = Small Group Discussion	G = Simulation and Models	L = Doctor-Patient Relationship Workshops	Q = Multidisciplinary Rounds
C = Case Based Learning	H = TEAM learning	M = Communications Workshops	R = Videotaped Clinical Encounters
D = Self Directed Learning	I = SNAPPS**	N = Journal Club	S = Quality Improvement Exercises
E = Standardized Patient (SP)	J = Musculoskeletal Exam Workshop	O = Information Technology Workshop	T = Specialized Seminars

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Summarize
Narrow the differential diagnosis
Analyze the differentials, compare and contrast
Probe the precept with the uncertainties
Plan of care
Select reading based on case based issues

Patients are encountered in the outpatient rheumatology clinic on Monday-Thursday mornings and on the inpatient consult service on Monday-Friday afternoons. Typically, rheumatology fellows, internal medicine residents, and 4th year medical students participate in patient care, under the supervision of one or more of the rheumatology attendings.

NORMAL PROCESSES:

Comprehension of anatomy and physiology of the musculoskeletal system and basic principles of immunology, and understanding normal processes in development are all critical to understanding abnormal processes and therapeutic interventions in rheumatic disease.

Medical Knowledge

BASIC IMMUNOLOGY
Goal: Describe the mediators of inflammation

Objectives: Residents will be able to

1. Distinguish the roles of neutrophils, macrophages, platelets, eosinophils, and mast cells in the inflammatory process and list the major chemoattractants, granule mediators, and cytokines from each cell
2. List 3 major inflammatory cytokines or growth factors involved in inflammation in rheumatic diseases
3. Recognize the importance of the classical and alternative pathways of the complement cascade and list inhibitory proteins involved in regulation of the cascade
4. Distinguish the derivatives of arachidonic acid and their role in inflammation and thrombosis

Goal: Describe the process of wound healing

Objectives: Residents will be able to

1. Describe the components of wound healing, including granulation tissue, scar/keloid formation, angiogenesis, and hemostasis
2. Describe the processes involved in coagulation and thrombosis

Goal: Understand the role of laboratory testing in rheumatic diseases

Objectives: Residents will be able to

1. Define an antinuclear antibody (ANA), describe how the test is performed, and describe the prevalence in normal individuals
2. Discuss the pathophysiology of acute phase reactants, compare and contrast the utility and limitations of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), describe how the tests are performed, and list common false positive and false negative circumstances
3. Define a rheumatoid factor, and list conditions in which it can be positive

DEVELOPMENT, STRUCTURE, AND FUNCTION OF THE MUSCULOSKELETAL SYSTEM

Bone
Goal: Understand structure and function of bone

Objective: Residents will be able to

1. Describe bone architecture
2. List cellular components of bone and their function
3. Distinguish between cortical and trabecular bone
4. List components of long bones (diaphysis, metaphysis, physis, etc.)
5. List factors (thyroxin, growth hormone, inflammation, fracture, inactivity, etc.) that affect growth of the physis and the clinical consequences of these factors on the knee, and recognize that effects of these factors (e.g., longer/shorter leg and bone age) are different from physiological age
6. Describe the natural history of bone mass throughout the life span
7. List factors that affect peak bone mass
8. Define osteoporosis and list its causes
9. Define the effects of physical activity on bone
10. List ways of measuring bone density

Muscle
Goal: Understand muscle structure and function

Objective: Residents will be able to

1. Describe the components and architecture of muscle
2. List the types and function of muscle fibers
3. Describe the effects of exercise (strength and endurance training) on muscle

Joints and Cartilage
Goal: Understand the classification, tissue composition, and biomechanics of joint structure

Objectives: Residents will be able to

1. Describe classes of joints within the body (synarthroses, amphiarthroses, and diarthroses)
2. Identify the articular structures and their function within the joint capsule
3. Describe the role of bone, cartilage, and surrounding musculature in stress distribution and stabilization of the joint
4. Describe the biomechanical characteristics and purpose of normal synovial fluid

Goal: Understand the function of cartilage

Objectives: Residents will be able to

1. Recognize the structure and matrix composition of cartilage
2. Discuss the process of cartilage degradation in normal aging
3. Recognize cartilage turnover and the limitations in its repair

Optimum Trainee: Internal Medicine Residents, PGY I, II, or III

Evaluation Methods: D

Educational techniques: A, B, C

PATIENT CARE

Musculoskeletal Examination
Goal: Perform a complete musculoskeletal exam on an adult

Objectives: Residents will be able to

1. Observe gait for symmetry, stride length, normal heel strike-stance-toe off-swing through, and ability to turn quickly
2. Assess spinal curvature and alignment
3. Identify size and symmetry of muscle bulk in the torso and extremities
4. Describe and demonstrate range of motion for the spine and extremity joints
5. Locate the joint line and major bony landmarks around accessible extremity and torso joints
6. Detect the signs of musculoskeletal inflammation (tenderness, swelling, warmth, erythema, stiffness, and functional loss)
7. Distinguish intra- from extra-articular etiologies of musculoskeletal pain and/or inflammation

Injury Prevention
Goal: Understand prevention of injury

Objectives: Residents will be able to

1. List contraindications to beginning an exercise program
2. Explain the rationale and benefits of exercise, and provide examples of the three types of exercise: stretching, aerobic activity (“cardio”), and anaerobic activity (“resistance training”)
3. Define isometric, isotonic, and isokinetic forms of (anaerobic) exercise
4. Discuss the role of exercise in the prevention of disease and disability in osteoporosis, back pain, and osteoarthritis
5. Define the recommended Centers for Disease Control and Prevention recommendations for physical activity in adulthood
   http://www.cdc.gov/nccdphp/dnpa/physical/growing_stronger/index.htm
6. List diseases whose manifestations may be altered by exposure, or lack thereof, to light

Nutrition
Goal: Identify the important aspects of nutrition on musculoskeletal health and disease

Objectives: Residents will be able to

1. Screen patients for obesity thru calculation of body mass index (BMI) http://www.cdc.gov/nccdphp/dnpa/bmi/calc-bmi.htm
2. Identify counseling and behavioral interventions and resources that promote sustained weight loss for obese patients
3. Cite dietary risk factors associated with increased risk for hyperuricemia and gout
4. Recognize the role of weight reduction in ameliorating cartilage injury and the subsequent development and progression of osteoarthritis

Imaging
Goal: Use imaging techniques and recognize normal major structures identified with these techniques

Objectives: Residents will be able to

1. Compare and contrast the utility, limitations, and cost of plain radiography, computed tomography (CT), magnetic resonance imaging (MR), scintigraphy, and ultrasound for the evaluation of musculoskeletal tissues
2. Identify the plain radiographic appearance of bones and joints of the spine and extremity joints in both adult patients
3. List the indications and interpret results of bone densitometry

Optimum Trainee: IM Resident, PGY I, II or III

Evaluation Methods: K, N

Educational techniques: A, B, C, D, J, K

ABNORMAL PROCESSES

Musculoskeletal Diseases

Overview: Musculoskeletal disorders are prevalent. These diseases impact individuals' ability to live independently, and their quality of life. Further, when chronic, these diseases have a psychologic impact on both individuals and their family members. The economic impact related to disability and cost of both health care and drugs is significant. Diagnosis and therapeutic management are important and basic knowledge for a practicing physician.

MEDICAL KNOWLEDGE

Goal: Demonstrate a detailed understanding of selected musculoskeletal disorders[1]

Objectives: Residents will be able to

1. Define and recognize the cardinal clinical, laboratory, and imaging features of each disorder
2. Describe the basic pathology and pathophysiology of each disorder
3. Recognize the epidemiology of the disorder, including prevalence, and differences in age, race and sex
4. Describe the prognosis of the disorder
5. Discuss the general treatment options of the disorder

[1]Musculoskeletal disorders for detailed knowledge:

Infectious, Inflammatory, and Immunologic Disorders

- Rheumatoid arthritis
- Spondyloarthropathies (including reactive arthritis and psoriatic arthritis)
- Systemic lupus erythematosus
- Polymyalgia rheumatica
- Juvenile idiopathic arthritis
- Bacterial arthritis

Traumatic and Mechanical Disorders

- Low back and neck pain
- Common regional pain syndromes (tendonitis, bursitis)
- Fractures, sprains, strains, and dislocations

Metabolic, Regulatory, and Structural Disorders

- Osteoporosis
- Crystalline arthritis (gout, calcium pyrophosphate deposition disease)
- Osteoarthritis

Idiopathic Disorders

- Fibromyalgia

Goal: Demonstrate a basic understanding of selected musculoskeletal disorders[2]

Objectives: Residents will be able to

1. Define the cardinal features of the disorder
2. Discuss the prognosis of the disorder

[2]Musculoskeletal disorders for basic understanding:

Infectious, Inflammatory, and Immunologic Disorders

- Scleroderma
- Inflammatory muscle disease
- Sjögren syndrome
- Behçet disease
- Antiphospholipid syndrome
- Sarcoidosis
- Viral arthritis
- Lyme disease
- Osteomyelitis

Neoplastic Disorders

- Bone tumors

Metabolic, Regulatory, and Structural Disorders

- Heritable disorders of muscle and connective tissue

Vascular Disorders

- Systemic vasculitis of adults (giant cell arteritis, polyarteritis nodosa, Wegener granulomatosis, Churg-Straus vasculitis, Takayasu arteritis)
- Systemic vasculitis of children (Kawasaki syndrome, Henoch Schönlein purpura)

Idiopathic Disorders

- Paget disease of bone
- Complex regional pain syndrome
- Osteonecrosis

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation Methods: K, L

Educational techniques: A, B, C, D, K

PATIENT CARE

Goal: Recognize the initial diagnostic approach to patients with musculoskeletal disorders

Objective: Residents will be able to

1. Obtain a history appropriate for musculoskeletal disorders, including symptoms of extra-articular manifestations
2. Perform a complete musculoskeletal exam
3. Perform a physical examination with special attention to signs of extra-articular manifestations of musculoskeletal disorders
4. Differentiate the patterns of inflammatory vs. noninflammatory disease
5. Differentiate articular vs. nonarticular disease
6. Differentiate monoarticular vs. polyarticular disorders
7. Discuss the initial diagnostic approach to the following clinical scenarios: monoarthritis, polyarthritis, low back pain, and neck pain
8. Explain the utility of acute phase reactants (erythrocyte sedimentation rate, C-reactive protein), rheumatoid factor, antinuclear antibodies, synovial fluid analysis, and uric acid in the evaluation of patients with musculoskeletal disease
9. Explain the utility of plain radiographs, bone densitometry, CT, and MR in the evaluation of patients with musculoskeletal disorders

Goal: Know the indications for the use of pharmacologic and nonpharmacologic therapies in patients with musculoskeletal disorders

Objectives: Residents will be able to

1. Recognize the multidisciplinary nature of treatment for patients with musculoskeletal disorders
2. Specify the class of pharmacologic therapy – analgesics, anti-inflammatories, antibiotics, immunomodulatory agents, urate-lowering therapies, and bone-modulating agents – for each of the selected musculoskeletal disorders requiring detailed knowledge
3. Specify the class of nonpharmacologic therapy – physical and occupational therapy (including appropriate use of assistive devices), cognitive behavioral therapy, nutritional

counseling, and exercise – for each of the selected musculoskeletal disorders requiring detailed knowledge

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation Methods: A, I, K, N

Education Techniques: A, B, C, D, J, K, Q

PRACTICE-BASED LEARNING AND IMPROVEMENT

Goal: Analyze clinical experience and employ a systematic methodology for improvement

Objectives: Residents will be able to

1. Self-evaluate clinical performance for needed improvements in medical knowledge and skills
2. Revise medical knowledge and clinical skills based upon feedback
3. Evaluate and interpret the medical literature
4. Self-evaluate clinical performance in the ordering and interpretation of acute phase reactants (erythrocyte sedimentation rate, C-reactive protein), rheumatoid factor, antinuclear antibodies, auto-antibodies synovial fluid analysis, and uric acid in the evaluation of patients with musculoskeletal disease
5. Self-evaluate clinical performance in the ordering and interpretation of reports of plain radiographs, bone densitometry, CT, and MRI in the evaluation of patients with musculoskeletal disorders
6. Self-evaluate patient referrals for further rheumatologic evaluation and treatment

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation Methods: A, B, I, N

Educational Techniques: N, T

INTERPERSONAL AND COMMUNICATION SKILLS

Goals: Understand the importance of effective communication with patients and families in the diagnosis and treatment of their musculoskeletal disorder

Objectives: Residents will be able to

1. Listen to the concerns that patients and/or family members express in their experience with the musculoskeletal disorder, including the impact of pain and disability
2. Demonstrate effective listening skills and empathy to improve the patient's adherence to diagnostic and therapeutic recommendations

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation methods: N

Educational Techniques: B, K

PROFESSIONALISM

Goal: Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population

Objective: Residents will be able to

1. Recognize the importance of coordination and collaboration with multiple health professionals for optimum management of the patient with a musculoskeletal disorder
2. Demonstrate sensitivity and responsiveness to the patient's age, gender, education, socioeconomic status, culture, and disabilities that may affect diagnosis and treatment of musculoskeletal disorders, while carrying out professional responsibilities

Optimum Years: IM Residents, PGY I, II, or III

Evaluation Methods: D, N

Educational Techniques: Q

SYSTEM-BASED PRACTICE

Goal: Understand the impact of the health care systems and environment in treating a patient with a musculoskeletal disorder

Objectives: Residents will be able to

1. Calculate costs for chronic medication use, including costs related to prevention and monitoring for toxicity
2. Describe the role of advocacy for quality patient care and assisting patients in dealing with system complexities

Goal: Understand the role of the Americans with Disability Act (ADA) in treating a patient with a musculoskeletal disorder

Objectives: Residents will be able to

1. Recognize the implications of the ADA regarding accessibility for the patient with musculoskeletal disorders and for their own practice
2. Recognize the implications of the ADA regarding disability for patients with musculoskeletal disorders and their families

Optimum Years: IM Residents, PGY I, II, or III

Evaluation Methods: A, D, I, K

Educational Techniques: B, C, D, K, N, Q, T

PRINCIPLES OF THERAPEUTICS

Multiple different classes of drugs are used to treat patients with musculoskeletal disorders. Treatment may include pharmacologic therapies, therapeutic modalities such as physical therapy, and surgical procedures. Therapeutics are organized into the following categories:

Pharmacologic Therapy

- NSAIDs (including COX-2 inhibitors)
- Immunosuppressive therapy, including corticosteroids and biologic agents
- Anti-gout medications
- Medications used in the treatment of bone disorders
- Muscle relaxants
- Opioids
- Complementary and alternative medicine

Nonpharmacologic therapy

- Physical and occupational therapy
- Arthrocentesis
- Arthroscopy
- Casting and stabilization of bone fractures

- Total joint replacement
- Acupuncture

MEDICAL KNOWLEDGE

Goal: Demonstrate an understanding of the biochemical mechanisms of action of NSAIDs

Objectives: Residents will be able to

1. Describe the biochemical pathways affected by NSAIDs
2. State the biological actions of the metabolites of this pathway, and the rationale for their inhibition
3. Contrast the effects of COX-1 and COX-2 inhibition
4. Discuss the pharmacokinetics of NSAIDs
5. Describe the differences between corticosteroids and NSAIDs

Goal: Identify conditions in which NSAIDs may be useful, and list the potential side effects

Objective: Residents will be able to

1. List the common musculoskeletal conditions for which NSAID therapy may be useful
2. State the physiologic end organ effects of the metabolites of NSAIDs and their potential toxicities

Goal: Demonstrate an understanding of the underlying mechanisms of action of immunosuppressive drugs

Objectives: Residents will be able to

1. Identify the classes of immunomodulatory drugs:
   a. Corticosteroids
   b. Cytotoxic drugs (alkylating agents and anti-metabolites)
   c. Calcineurin inhibitors
   d. Biologics
2. List 5 similarities and differences between alkylating agents and anti-metabolites, fungal metabolites, biologics, and nonimmunosuppressive drugs
3. Understand basic pharmacokinetics of these drugs

Goal: Identify how immunomodulatory drugs are used in musculoskeletal conditions, and understand and know the toxicity profiles of major classes of these drugs

Objectives: Residents will be able to

1. Identify toxicity profiles for anti-metabolites, such as methotrexate
2. List appropriate monitoring of these drugs

Goal: Demonstrate an understanding of the molecular mechanisms of corticosteroid interactions with its receptors

Objectives: Residents will be able to

1. Describe cellular and nuclear receptor activation by corticosteroids
2. Discuss the pharmacokinetics of corticosteroids
3. Contrast corticosteroids and mineralocorticoids
4. Recognize the difference between physiologic doses of different corticosteroid formulations

Objective: Residents will be able to

1. List the side effects and toxicities of corticosteroids
2. Identify preventive strategies to minimize the toxicity of corticosteroids

Goal: Demonstrate and describe the rationale for use of biologic agents

Objectives: Residents will be able to

1. Describe cellular interactions in basic normal immunology
2. Describe cellular interactions that promote activation of T and B lymphocytes
3. Describe receptors on target cells that can be modulated by biologics
4. Identify cytokines and chemokines that are involved in the inflammatory cascade

Goal: Know the targets of biologics on the market or under development

Objective: Residents will be able to

1. Identify potential inhibition of cell surface interactions (i.e., ICAM-1/LFA-1 interaction or CD80/CD86-CD28 interaction)
2. Identify sites where biologics can interfere with intercellular machinery activation by inhibition of activation of kinase cascades and transcription factor activation (i.e., TNFb, jnk, or NFAT)
3. Identify biologics that can inhibit B-cell activation by interfering with cell signaling (i.e., TNFa , IL-1, IL-12, or IL-6)
4. Identify targets of intercellular machinery activation of the target cell

Goal: Demonstrate an understanding of the biochemical pathways and metabolism leading to urate production

Objectives: Students will be able to

1. Describe the biochemical pathways involved in purine metabolism
2. Discuss the rationale for enzyme inhibition in the treatment of gout
3. Recognize the role of acquired and genetic disorders, or drugs that alter urate metabolism
4. List agents or conditions that inhibit tubular urate secretion, or that increase tubular urate reabsorption to increase plasma urate levels

Goal: Demonstrate an understanding of the mechanisms of action and potential side effects and toxicities of drugs used to treat gout and hyperuricemia

Objective: Residents will be able to

1. Describe the mechanism of action of each agent, and relate this mechanism to the effects in the hyperuricemic patient
2. Describe the pharmacokinetics of each agent
3. List the potential toxicities, important drug interactions and rationale for monitoring of a patient on each of these agents

Goal: Demonstrate an understanding of the mechanisms of action and potential toxicities of bisphosphonates, calcitonin, parathyroid hormone, estrogen, testosterone, selective estrogen receptor modifiers, calcium, and vitamin D ***http://www.asbmr.org/news/primer/index.cfm***

Objective: Residents will be able to

1. Describe the mechanism of action of each agent, and relate this mechanism to the effects in the patient for management of osteoporosis, osteopenia and prevention while taking corticosteroids.
2. Discuss the pharmacokinetics of each agent
3. Recognize the potential toxicities, important drug interactions, and rationale for monitoring of a patient on each of these agents

Goal: Demonstrate an understanding of the clinical utility of the commonly used muscle relaxants

Objective: Residents will be able to

1. Recognize the potential toxicities, important drug interactions and rationale for monitoring of a patient on each of these agents

Goal: Demonstrate an understanding of the clinical utility of the opioid analgesics

Objective: Residents will be able to

1. Understand the mechanism of action of opioids on central and peripheral opioid receptors
2. Recognize the potential toxicities, important drug interactions, and rationale for monitoring of a patient on each of these agents

Goal: Recognize the multiple modalities of physical and occupational therapy

Objectives: Residents will be able to

1. List the modalities used to alleviate pain and improve function
2. Contrast differences among isometric, isokinetic, and isotonic exercises
3. List 3 assistive devices and explain the biomechanical principles that improve function or alleviate pain

Goal: Recognize the role of orthopedic surgery in the care of patients with musculoskeletal conditions

Objectives: Residents will be able to

1. List the methods of stabilizing bone fractures
2. List the indications for arthroscopic repair of injured tendons and ligaments
3. Describe the role of joint fusion, joint debridement, tenosynovectomy, osteotomy, and joint replacement as a treatment for arthritis and tendonitis
4. Describe the role of decompression in the treatment of nerve compression disorders
5. Describe the role of vertebral kyphoplasty in the management of compression fractures

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation Methods: K

Educational Techniques: A, B, C, D

PATIENT CARE

Goal: Understand the indications for the appropriate use of all pharmacologic agents

Objectives: Residents will be able to

1. Develop a description and summary of informed decision making for the use of pharmacologic agents in common musculoskeletal disorders
2. Develop a therapeutic plan for initiation, maintenance and toxicity monitoring for patients on pharmacologic agents

Optimum Trainee: IM Resident, PGY I, II, or III

Evaluation Methods: A, B, C, D, I, K

Education Techniques: A, B, C, D, K

PRACTICE-BASED LEARNING AND IMPROVEMENT

Goal: Understand how pharmacologic agents are used in the management of musculoskeletal disorders

Objectives: Residents will be able to

1. Identify a patient with a condition that may benefit from pharmacologic and nonpharmacologic therapy
2. Evaluate the literature supporting pharmacologic and nonpharmacologic therapy in the identified condition, including the identification of systematic reviews and meta-analyses
3. Develop a therapeutic plan for initiation, maintenance and monitoring for toxicities of the pharmacologic agents

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation Methods: A, B, C, I, K, N

Educational Techniques: B, C, D, K, N, T

INTERPERSONAL AND COMMUNICATION SKILLS

Goals: Understand the importance of effective communication with patients and families in the use of pharmacologic therapies used in the treatment of musculoskeletal disorders

Objectives: Residents will be able to

1. Listen to the concerns that patients and/or family members express with regard to their experience with their medication
2. Demonstrate effective listening skills and empathy to improve patients' adherence to their medication regimen and reduce medication toxicity

Optimum Years: IM Residents, PGY I, II, or III

Evaluation methods: N

PROFESSIONALISM

Goal: Demonstrate a commitment to carry out professional responsibilities, adhere to ethical principles, and be sensitive and responsive to a diverse patient population

Objective: Residents will be able to

1. Recognize the importance of coordination and collaboration with multiple health professionals for optimum management of patients on pharmacologic therapy for their musculoskeletal disorder
2. Understand the fears that patients may have in using pharmacologic therapy
3. Demonstrate sensitivity and responsiveness to age, gender, education, socioeconomic status, culture and disabilities that may affect medication prescribing for musculoskeletal disorders

Optimum Trainee: IM Residents, PGY I, II, or III

Evaluation Methods; D, N

Educational Techniques: A, B, C, D, Q

SYSTEM-BASED PRACTICE

Goal: Understand the impact of the health care systems and environment in treating a patient with conditions requiring pharmacologic therapy

Objectives: Residents will be able to

1. Describe the role of advocacy for quality patient care and assisting patients in obtaining medications and dealing with system complexity
2. Calculate costs for pharmacologic therapy, including costs related to prevention and monitoring for toxicity, as well as for the treatment of any medication toxicities

Optimum Years: IM Residents, PGY I, II, or III

Evaluation Methods: A, D, I, K

Educational Techniques: A, B, C, D, N, Q, T