

**AMERICAN COLLEGE  
OF RHEUMATOLOGY**  
**EDUCATION • TREATMENT • RESEARCH**

## **Core Curriculum Outline for Rheumatology Fellowship Programs**

*A Competency-Based Guide to Curriculum Development*



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## Introduction

The subspecialty of rheumatology includes a wide array of inflammatory, non-inflammatory, and degenerative diseases that affect the musculoskeletal and other organ systems. The purpose of rheumatology training programs is to train fellows to be accomplished practitioners and consultants in the rheumatic diseases, as well as encourage the professional and scholarly attitudes and approaches of a competent subspecialist that are needed to maintain an understanding of current concepts in rheumatology as advances occur.

This Core Curriculum Outline is a substantial and comprehensive revision of the previous ACR Core Curriculum Outline for Program Directors that is designed to reflect the importance of competency-based training and assessment in graduate medical education, as defined by the Accreditation Council for Graduate Medical Education (ACGME), and to emphasize the six general competencies. These are:

- Medical Knowledge
- Patient Care
- Practice-based Learning and Improvement
- Systems-based Practice
- Interpersonal and Communications Skills
- Professionalism

The revised curriculum outline is organized by these competencies. The prior version of the core curriculum outline was divided into two major sections of Basic Science and Clinical Science. The factual components of both of these areas are now incorporated into the Medical Knowledge section. The clinical aspects of these areas now reside in the Patient Care section. Those aspects of the core curriculum that pertain to communication and professionalism have been expanded into individual major sections. The general competencies of Practice-based Learning and Improvement and Systems-based Practice are an integral part of the current practice of rheumatology and are already largely incorporated in rheumatology training programs. The purpose of specifically highlighting these in the core curriculum outline, as for the other competencies, is to clarify their essential components, describe how and where they are acquired in the course of fellowship training, set benchmarks or markers of performance expected of the trainee, and suggest some of the tools that can be used to measure that performance.

The revised curriculum outline has also been significantly expanded in the area of pediatric rheumatology. The ACGME suggests that “programs with the qualified faculty and facilities provide training in pediatric rheumatic disease.” The ACR recognizes that, because of the worldwide shortage of pediatric rheumatologists, many internist rheumatologists in clinical practice will be called upon to evaluate and treat children. The core curriculum reflects the goal of the ACR that every rheumatology fellow have familiarity with pediatric rheumatic diseases, whether or not they have the opportunity to

rotate through a pediatric rheumatology clinic. Because reading is no substitute for direct experience, training programs are encouraged to find opportunities for their fellows to see patients in a pediatric rheumatology clinic. However, because many will not have the opportunity to spend time in a pediatric rheumatology clinic, the curriculum now emphasizes a minimum set of core knowledge in pediatric rheumatology for the adult trainee. To further this end, Appendix E provides more detailed pediatric rheumatology information and a suggested reading list.

This outline is consistent with the requirements of the Residency Review Committee for training in rheumatology and serves as a guide for (1) Training Program Directors and fellows in meeting the requirements of the Residency Review Committee, (2) the ACR Reading List Subcommittee, and (3) the ACR Continuing Education Committee.

The Core Curriculum Outline is also meant to provide a detailed guide for Training Program Directors to use in the development of their own individual fellowship training curriculum. This outline presents a comprehensive view of the components of a competency-based training program in rheumatology. However, individual training programs will develop their own curricula that reflect their particular areas of expertise and resources. This document is meant to be a practical resource for Program Directors to provide detailed descriptions of general competencies in rheumatology and provide suggestions for performance markers and assessments in these areas. To further this goal, additional appendices are provided which contain practical examples of competency-based clinical training, samples of methods for documenting competency-based training, and detailed reference resources.

## **How to Use this Curriculum Outline**

A significant hurdle in the transition to a competency-based curriculum is the development of the language to describe these competencies. Much of this language is presented in the Curriculum Outline to be incorporated by the Program Director into an individual curriculum. The Outline divides each competency section into six sections. A Definition of the competency in the context of rheumatology training is provided. The Essential Components of each competency are then listed and described. These components can be used to provide the rationale for a given training activity. Suggested Methods of Acquisition of the competency are listed. These are the specific kinds of activities and methods by which trainees can acquire a specific competency. Of course this acquisition is not a passive activity and many of these methods require active planning and teaching by supervising physicians, as well as active learning by fellows. Many of the same acquisition or instructional methods are used for the development of different competencies, and a program may use different or additional methods than those suggested. Important Performance Markers for each essential component of a competency are listed. These markers of performance, or benchmarks, are the same as the Educational Goals. A list of suggested Evaluation Tools to measure this performance is also presented for each competency. These generic evaluation tools can be modified to include assessment of the specific performance

markers of a given competency. Again, an individual program may use some or others of these tools. Finally, a short list of References is given for additional detail and resources on each competency.

Documentation of a competency-based curriculum involves describing how the training program works to develop and assess the six general competencies in its trainees during the course of the fellowship training program. How the training and educational experiences are structured, which methods are used to evaluate the development of competency and the means by which the Program Director documents the curriculum are all at the discretion of the individual fellowship program and may vary widely from program to program. Several appendices have been included to provide examples of methods that can be used to develop and document a competency-based curriculum. Appendix A illustrates how the general competencies are developed in a typical rheumatology clinical experience or rotation. Appendix B is an example of a section of competency-based curriculum in narrative form. An alternative method of documenting a competency-based curriculum in grid or table form is presented in Appendix C. A description of Evaluation Methods is included in Appendix D. Sources for more detailed information on all of the general competencies are included in Appendix F.

## **I. Medical Knowledge**

The subspecialty of rheumatology includes a wide array of autoimmune, inflammatory, and degenerative diseases that affect the musculoskeletal and other organ systems. A working knowledge of the basic and clinical sciences that relate to musculoskeletal and rheumatic disease is fundamental to the practice of rheumatology. Understanding of normal and pathogenic processes of the immune system form the basis of reliable diagnosis and the development and use of an increasingly sophisticated range of immunomodulatory treatments for the rheumatic diseases. Similarly, knowledge of the basis for and use of laboratory tests of immune activity is a principal asset of the practicing rheumatologist. Rheumatology trainees must also have practical understanding of the approaches and modalities used by other specialists and allied health professionals for the treatment of rheumatic diseases in order to manage the care of their patients effectively. Training programs must teach and emphasize the cognitive skills that are necessary to apply this detailed knowledge to problem solving for diagnosis, treatment and research of the rheumatic diseases.

### **Definition**

Medical knowledge refers to the understanding of established and evolving biomedical, clinical, and cognate sciences, and to the application of this knowledge to patient care.

### **Essential Components**

- **Basic Sciences**

- A. Anatomy and biology of musculoskeletal tissues: for each tissue, understand the embryology, development, biochemistry and metabolism, structure, function, and classification.
  1. Connective tissue cells and components: fibroblasts, collagens, proteoglycans, elastin, matrix glycoproteins
  2. Joints and ligaments: diarthrodial joints, intervertebral discs, synovium, cartilage
  3. Bone: development, structure, cellular basis of turnover and remodeling, hormonal and cytokine regulation
  4. Muscle and tendons
  5. Blood vessels
- B. Immunology
  1. Anatomy and cellular elements of the immune system

- a. Lymphoid organs: gross and microscopic anatomy, structure and function
  - b. Organization of the immune system: innate and adaptive immune systems
  - c. Specific cells: for each cell type, understand the ontogeny, structure, phenotype, function, and major activation markers/receptors.
    - (1) Lymphocytes: T cells and B cells (naive, memory, activated, regulatory)
    - (2) Antigen presenting cells: dendritic cells, monocytes and macrophages
    - (3) Natural killer cells
    - (4) Neutrophils and eosinophils
    - (5) Other cells: NKT cells, mast cells, endothelial cells, platelets, fibroblasts
2. Immune and inflammatory mechanisms
- a. Antibody structure and genetic basis of antibody diversity
  - b. Receptor/ligand interactions: activating and inhibiting receptors, signal transduction, complement receptors, Fc receptors, toll receptors, adhesion molecules
  - c. Molecular basis of T cell antigen recognition and activation.
  - d. B cell receptors: structure, function, antigen binding, effector functions
  - e. Antigens: types, structure, processing, presentation, and elimination. Superantigens: types, site of binding, and effects on immune system
  - f. Major histocompatibility complex: structure, function, nomenclature, and immunogenetics
  - g. Major immune cell signaling pathways
  - h. Complement/Kinin systems: structure, function, and regulation
  - i. Acute phase reactants and enzymatic defenses
3. Cellular interactions and immunomodulation
- a. Cellular activation and regulation: for each cell type, understand mechanisms of activation and suppression of function (e.g. T cell:B cell interactions via CD28:CD80/86).
  - b. Cytokines: for each cytokine, understand the origin, structure, effect, site of action, metabolism, regulation, and gene activation.
  - c. Immune cell trafficking; adhesion molecules, chemokines

- d. Inflammatory mediators: for each mediator, understand the origin, structure, effect, site of action, metabolism, and regulation.
- 4. Immune responses
  - a. Antibody-mediated: opsonization, complement fixation, and antibody dependent cellular cytotoxicity
  - b. Cell-mediated: cells and effector mechanisms in cellular cytotoxicity and granuloma formation
  - c. IgE-mediated: acute and late - phase reactions
  - d. Mucosal immunity: interactions between gut and bronchus-associated lymphoid tissue and secretory IgA
  - e. Innate immune responses: natural killer cells, pattern recognition, interaction with adaptive responses
  - f. Pathologic immune responses: Immune complex-mediated (physicochemical properties and clearance of immune complexes), graft versus host response, abnormal apoptosis
- 5. Immunoregulation
  - a. Tolerance: mechanisms of central and peripheral tolerance, including clonal selection, deletion, and anergy
  - b. Cell-cell interactions: help and suppression. Understand the collaboration among cells for control of the immune response.
  - c. Idiotype networks: inhibition and stimulation
- C. Purine and uric acid metabolism
  - 1. Purine: biochemistry, synthesis, and regulation
  - 2. Uric acid: origin, elimination, and physicochemical properties
  - 3. Crystals: factors affecting formation, induction of inflammation
  - 4. Purine pathway enzyme deficiencies and immunodeficiency: ADA, PNP
- D. Biomechanics of bones, joints, and muscles: understand the principles of kinesiology of peripheral/axial joints and gait and how alterations in biomechanics contribute to musculoskeletal disorders.
- E. Neurobiology of Pain
  - 1. Peripheral afferent nociceptive pathways
  - 2. Central processing of nociceptive information
  - 3. Mechanisms of action of drugs used for the treatment of neuropathic pain.
  - 4. Biopsychosocial model of pain

- **Clinical Sciences**

- A. Rheumatic Diseases

For each disease, understand the epidemiology, genetics, natural history, clinical expression including clinical subtypes, pathology, and disease pathogenesis.

1. Rheumatoid Arthritis.
2. Seronegative spondyloarthritides: ankylosing spondylitis, reactive arthritis, psoriatic arthritis, inflammatory bowel disease-associated arthritis, arthritis associated with acne and other skin diseases, SAPHO syndrome, and undifferentiated spondyloarthritis.
3. Lupus erythematosus: systemic, discoid, and drug-related; antiphospholipid antibody syndrome, including primary APLS
4. Scleroderma: diffuse and limited systemic sclerosis, localized syndromes, chemical/drug-related
5. Other systemic connective tissue diseases: eosinophilic fasciitis, eosinophila-myalgia syndrome, Sjögren's syndrome, polymyositis and dermatomyositis, relapsing polychondritis, relapsing panniculitis, erythema nodosum, adult-onset Still's disease, overlap syndromes including mixed connective tissue disease, undifferentiated connective tissue disease
6. Vasculitides: polyarteritis nodosa, Wegener's granulomatosis and other ANCA-associated diseases, allergic granulomatosis of Churg-Strauss, temporal arteritis/polymyalgia rheumatica, Takayasu's arteritis, systemic necrotizing vasculitis overlaps, Behcet's disease, hypersensitivity and small vessel angiitis, cryoglobulinemia, Cogan's syndrome
7. Infectious and reactive arthritides
  - a. Infectious arthritides: bacterial (nongonococcal and gonococcal), mycobacterial, spirochetal (syphilis, Lyme), viral (HIV, hepatitis B, parvovirus, other), fungal, parasitic
  - b. Whipple's disease
  - c. Reactive arthritides: acute rheumatic fever, arthritis associated with subacute bacterial endocarditis, intestinal bypass arthritis, post-dysenteric arthritides, postimmunization arthritis, other colitic-associated arthropathies
8. Metabolic, endocrine, and hematologic disease associated rheumatic disorders

- a. Crystal-associated diseases: monosodium urate monohydrate (gout), calcium pyrophosphate dihydrate deposition disease, basic calcium phosphate (hydroxyapatite), calcium oxalate
  - b. Endocrine-associated diseases: rheumatic syndromes associated with diabetes mellitus, acromegaly, hyperparathyroidism, hypoparathyroidism, hyperthyroidism, hypothyroidism, Cushing's disease
  - c. Hematologic-associated diseases: rheumatic syndromes associated with hemophilia, hemoglobinopathies, angioimmunoblastic lymphadenopathy, multiple myeloma
9. Bone and cartilage disorders
- a. Osteoarthritis - primary and secondary osteoarthritis, chondromalacia patellae
  - b. Metabolic bone disease: osteoporosis, osteomalacia, bone disease related to renal disease
  - c. Paget's disease of bone
  - d. Avascular necrosis of bone: idiopathic, secondary causes, osteochondritis dissecans
  - e. Others: transient osteoporosis, hypertrophic osteoarthropathy, diffuse idiopathic skeletal hyperostosis, insufficiency fractures
10. Hereditary, congenital, and inborn errors of metabolism associated with rheumatic syndromes
- a. Disorders of connective tissue: Marfan's syndrome, osteogenesis imperfecta, Ehlers-Danlos syndromes, pseudoxanthoma elasticum, hypermobility syndrome, others
  - b. Mucopolysaccharidoses
  - c. Osteochondrodysplasias: multiple epiphyseal dysplasia, spondylepiphyseal dysplasia
  - d. Inborn errors of metabolism affecting connective tissue: homocystinuria, ochronosis
  - e. Storage disorders: Gaucher's disease, Fabry's disease, Farber's lipogranulomatosis
  - f. Immunodeficiency: IgA deficiency, complement component deficiency, SCID and ADA deficiency, PNP deficiency, others
  - g. Autoinflammatory syndromes including familial Mediterranean fever, Muckle-Wells Syndrome, tumor necrosis factor receptor-associated periodic syndromes (TRAPS).
  - h. Others: hemachromatosis, hyperlipidemic arthropathy, myositis ossificans progressiva, Wilson's disease, others
11. Nonarticular and regional musculoskeletal disorders
- a. Fibromyalgia

- b. Myofascial pain syndromes
  - c. Axial syndromes: low back pain, spinal stenosis, intervertebral disc disease and radiculopathies, cervical pain syndromes, coccydynia, osteitis condensans ilii, osteitis pubis, spondylolisthesis/spondylolysis, discitis
  - d. Regional musculoskeletal disorders: in addition to bursitis, tendinitis, or enthesitis occurring around each joint, the fellow should be familiar with other disorders occurring at each specific joint site (e.g., shoulder-rotator cuff tear, adhesive capsulitis, impingement syndrome; wrist ganglions; trigger fingers and Dupuytren's contractures; knee synovial plicae, internal derangements, cysts; hallux rigidus, heel pain, and metatarsalgia; TMJ syndromes; costochondritis.
  - e. Biomechanical/anatomic abnormalities associated with regional pain syndromes: scoliosis and kyphosis, leg length discrepancy, foot deformities
  - f. Overuse rheumatic syndromes: occupational, sports, recreational, performing artists
  - g. Sports medicine: injuries, strains, sprains, nutrition, female athlete, medication issues
  - h. Entrapment neuropathies: thoracic outlet syndrome, upper extremity entrapments, lower extremity entrapments
  - i. Other: reflex sympathetic dystrophy, erythromelalgia
12. Neoplasms and tumor-like lesions
- a. Benign
    - (1) Joints: loose bodies, fatty and vascular lesions, synovial osteochondromatosis, pigmented villonodular synovitis, ganglions
    - (2) Tendon sheaths: fibroma, giant cell tumor, nodular tenosynovitis
    - (3) Bone: osteoid osteoma, others
  - b. Malignant
    - (1) Primary: synovial sarcoma, others
    - (2) Secondary: leukemia, myeloma, metastatic malignant tumors
    - (3) Malignancy-associated rheumatic syndromes: carcinomatous polyarthritis, palmoplantar fasciitis, Sweet's syndrome
13. Muscle diseases

- a. Inflammatory: polymyositis, dermatomyositis, inclusion body myositis
- b. Metabolic
  - (1) Primary: glycogen storage diseases, lipid metabolic disorders, myoadenylate deaminase deficiency, mitochondrial myopathies
  - (2) Secondary: nutritional, toxic, endocrine disorders, electrolyte disorders, drug-induced
- c. Muscular dystrophies
- d. Myasthenia gravis

#### 14. Miscellaneous rheumatic disorders

- a. Amyloidosis: primary, secondary, hereditary
- b. Raynaud's disease
- c. Charcot joint
- d. Remitting seronegative symmetrical synovitis with pitting edema
- e. Multicentric reticulohistiocytosis
- f. Plant thorn synovitis
- g. Intermittent arthritides: palindromic rheumatism, intermittent hydrarthrosis
- h. Arthritic and rheumatic syndromes associated with: sarcoidosis, scurvy, pancreatic disease, chronic active hepatitis, primary biliary cirrhosis, drugs, and environmental agents
- i. Rheumatic disease in the geriatric population
- j. Rheumatic disease in the pregnant patient
- k. Rheumatic syndromes in dialysis patients

#### B. Pediatric rheumatic diseases:

Some rheumatic diseases are similar in pathogenesis, presentation, clinical course, and treatment in both adults and children. These diseases (such as systemic lupus, scleroderma syndromes, the systemic vasculitides, and enteropathic arthritides) are not specifically addressed in this section. Other diseases or specific aspects of management that are unique or more prevalent in children are included in this outline of knowledge content. A supplementary section, providing more detailed information and a reading list, is provided in Appendix E.

1. Diagnose the rheumatic diseases that occur primarily in children, and know how they differ from the same, or similar, disease in adults.
  - a. Systemic juvenile rheumatoid arthritis (Still's Disease)
  - b. Pauciarticular juvenile rheumatoid arthritis

- c. Polyarticular juvenile rheumatoid arthritis
  - d. Juvenile spondyloarthropathy
  - e. Juvenile dermatomyositis
  - f. Kawasaki Disease
  - g. Henoch-Schonlein Purpura
  - h. Acute rheumatic fever
  - i. Neonatal lupus syndrome
  - j. CINCA (NOMID)
  - k. PFAPA syndrome (periodic fever, aphthous stomatitis, pharyngitis, and adenitis)
2. Know the major sequelae or life-threatening complications of rheumatic diseases that occur primarily in children:
- a. Systemic onset JRA
    - (1) Macrophage activation syndrome
    - (2) Cardiac tamponade
  - b. Pauciarticular JRA
    - (1) Chronic uveitis
  - c. Juvenile dermatomyositis
    - (1) GI vasculitis
    - (2) Calcinosis
  - d. Kawasaki Disease
    - (1) Aneurysms of coronary and other arteries
  - e. Henoch-Schonlein Purpura
    - (1) GI- intussusception, intestinal infarction
    - (2) Renal - chronic nephritis
  - f. Neonatal lupus syndrome
    - (1) Congenital heart block
    - (2) Thrombocytopenia
3. Know the appropriate treatments of the above childhood rheumatic disorders, and complications of treatment.
4. Recognize non-rheumatic disorders in children that can mimic rheumatic diseases:
- a. Infectious or post-infectious syndromes
    - (1) Septic arthritis and osteomyelitis
    - (2) Transient synovitis of the hip

- (3) Post-infectious arthritis and arthralgia
    - (4) Post-viral myositis
  - b. Orthopedic conditions
    - (1) Legg-Calve-Perthes Disease and other avascular necrosis syndromes
    - (2) Slipped capital femoral epiphysis
    - (3) Spondylolysis and spondylolisthesis
    - (4) Patellofemoral syndrome
  - c. Non-rheumatic pain
    - (1) Benign limb pains of childhood (“growing pains”)
    - (2) Benign hypermobility syndrome
    - (3) Pain amplification syndromes including reflex sympathetic dystrophy
  - d. Neoplasms
    - (1) Leukemia
    - (2) Lymphoma
    - (3) Primary bone tumors (especially osteosarcoma and Ewing’s sarcoma)
    - (4) Tumors metastatic to bone (especially neuroblastoma)
  - e. Bone and cartilage dysplasias, and inherited disorders of metabolism
- 5. Know aspects of rheumatic disease and treatments specific to children:
  - a. Disease effects on growth
    - (1) Accelerated or decelerated growth of limbs or digits affected by arthritis
    - (2) Altered growth of mandible in TMJ arthritis
    - (3) Short stature and failure to thrive
  - b. Regular surveillance for uveitis in JRA
  - c. Drugs
    - (1) FDA approved drugs for childhood rheumatic diseases
    - (2) Drug metabolism and dosing different from adults
  - d. Child-specific side effects of chronic corticosteroid treatment
    - (1) Growth retardation
    - (2) Delay of puberty
  - e. Physical and occupational therapy

- (1) Exercises
- (2) Splinting
- f. Psychosocial and developmental issues
  - (1) Peer and sibling interaction
  - (2) Family adjustment
  - (3) School accommodations for disability
  - (4) School and recreational activities
  - (5) Transition to adulthood

### C. Therapeutic modalities and strategies

1. Pharmacology: for each medication, understand the dosing, pharmacokinetics, metabolism, mechanisms of action, side effects, drug interactions, compliance issues, costs, and use in specific patient populations, such as renal insufficiency and including fertile, lactating, and pregnant women.
  - a. Nonsteroidal anti-inflammatory drugs
  - b. Glucocorticoids: topical, intraarticular, systemic
  - c. Systemic antirheumatic drugs: antimalarials, sulfasalazine, gold compounds, methotrexate, D-penicillamine
  - d. Cytotoxic drugs: azathioprine, cyclophosphamide, chlorambucil
  - e. Immunomodulatory drugs: cyclosporine, mycophenolate mofetil, tacrolimus
  - f. Biologic agents
  - g. Hypouricemic drugs: allopurinol, sulfinpyrazone, probenecid
  - h. Antibiotic therapy for septic joints
  - i. Narcotic and non-narcotic analgesics
  - j. Tricyclics and other agents used for pain modulation
  - k. Anticholinergics and non pharmacologic agents used for the treatment of sicca symptoms
  - l. Others: apheresis, ionizing radiation
2. Rehabilitation and disability issues
  - a. Methods of rehabilitation: for each method, understand principles, mechanism of action, indications, precautions and contraindications, potential side effects, and costs.

- b. Importance of multidisciplinary approaches to rehabilitation and pain control. Appropriate use of and referral/prescription to rehabilitation specialists and pain clinics.
- c. Exercise: range of motion, strengthening, conditioning, and stretching
  - (1) Rest and splinting
  - (2) Modalities and hydrotherapy: ultrasound, TENS iontophoresis, spa therapy
  - (3) Joint protection and energy conservation techniques
  - (4) Adaptive equipment and assistive devices
  - (5) Job site/home evaluation and adaptation
  - (6) Footwear and orthotics
  - (7) Acupuncture and other alternative modalities
  - (8) Nutritional issues
- d. Demonstrate understanding of specific rehabilitative techniques/modalities and what modification of these techniques are needed depending on the patient's disease (e.g. osteoarthritis, myositis, etc.), location of symptoms (e.g. back, shoulder, etc) and other related issues.
- e. Psychosocial aspects of disability: understand the impact that the following factors have on the overall therapy of a patient with rheumatic disease and demonstrate knowledge of what can be done to assist a patient in these areas.
  - (1) Psychological and emotional factors including sexuality
  - (2) Economic and vocational issues: vocational rehabilitation, costs of therapy and monitoring
  - (3) Disability determination: impairment vs disability, evaluation and measurement, social security disability, workmen's compensation, other
  - (4) Compliance issues

### 3. Surgical management

- a. For each procedure, the fellow should possess a working knowledge of indications, preoperative evaluation and medication adjustments, contraindications, complications, postoperative management, and expected outcome.

- (1) Bone biopsy
- (2) Arthroscopy
- (3) Synovectomy of tendons and joints
- (4) Entrapment neuropathy release
- (5) Osteotomies: hip, knee
- (6) Arthrodesis: wrist, other
- (7) Spine surgery: radiculopathy, stenosis, and instability
- (8) Reconstructive surgery of hand and foot
- (9) Total joint replacement: hip, knee, shoulder, other
- (10) Specific surgical management problems:
  - i Rheumatoid arthritis patient
  - ii Infected joint: arthroscopy vs. arthrotomy
  - iii Infected prosthetic joint
  - iv Ankylosing spondylitis patient
  - v Pediatric rheumatic disease patient
  - vi Prevention and treatment of deep venous thrombosis
  - vii Perioperative antirheumatic medication management

4. Complementary and alternative medical practices: diet, nutritional supplements, antimicrobials, acupuncture, chiropractic, topicals, homeopathic remedies, venoms, others

- **Diagnostic Testing**

- A. Laboratory tests: for each test, understand the biologic rationale, methods for performing, and utility/limitations of specific laboratory tests including but limited to:
  1. Erythrocyte sedimentation rate, C-reactive protein, and other acute phase reactants
  2. Rheumatoid factors, cryoglobulins, and circulating immune complexes
  3. Anti-cyclic citrullinated peptide antibodies
  4. Antinuclear antibodies and subtype specificities including anti-dsDNA, anti-Smith, anti-U1 RNP, anti-centromere antibodies, and anti-histone antibodies; and LE cell preparation
  5. Antiribosomal P, anti-topoisomerase 1, and anti-synthase antibodies including anti-Jo-1

6. Anti-neutrophil cytoplasmic antibodies including specificities for neutrophil granule constituents [anti-PR3, anti-myeloperoxidase]
  7. Antiphospholipid antibodies including RPR, lupus anticoagulant, anticardiolipin and beta-2-glycoprotein I antibodies
  8. Antibodies to formed blood elements including direct and indirect Coombs testing, anti-platelet antibodies, anti-granulocyte antibodies
  9. Assays for complement activity (CH50) and components of the complement cascade
  10. Serum immunoglobulin levels, Serum protein electrophoresis and immunofixation electrophoresis
  11. HLA typing
  12. ASO and other streptococcal antibody tests
  13. Serologic and PCR tests for Lyme disease, HIV, Hepatitis B, Hepatitis C, parvovirus and other infectious agents
  14. Serum and urine measurements for uric acid
  15. Iron studies including ferritin
  16. Flow cytometry studies for analysis of lymphocyte subsets and function
  17. Specific genetic testing
- B. Diagnostic imaging techniques: understand the basic underlying principles and technical considerations in the use of plain radiographs, computed tomography, magnetic resonance imaging, ultrasonography and radionuclide scanning of bones, joints, and periarticular and vascular structures.
  - C. Synovial fluid analysis: cell count and differential, crystal identification, viscosity, protein, glucose, and other special stains/analyses
  - D. Test-performance characteristics: principles of sensitivity, specificity, and predictive value

- **Research Principles**

- A. Principles and methods of epidemiological research
  1. Definitions of incidence and prevalence
  2. Basic biostatistics: including major methods of comparative analysis, types of error, likelihood ratios
  3. Methods of health services research
    - b. Measurement of health and functional status (HAQ, SF36, etc).
    - c. Quality of life measurements/assessments
    - d. Components of cost analysis (direct costs, QALY, etc.)

- B. Principles of clinical research
  - 1. Major study designs and the limitations and biases associated with each
  - 2. Diagnostic criteria and assessment of disease activity
    - a. Objective assessments, e.g. tender joint count
    - b. Composite indices (ACR composite, DAS, WOMAC, etc.)
    - c. Damage and functional indices (e.g. HAQ)
  - 3. Clinical trials
    - a. Major design types
    - b. Definitions and uses of clinical trial Phases
    - c. Roles of principal investigator, sponsors, study coordinators, monitors, IRB.
- C. Evidence-based medicine: Data analysis, biostatistics, meta-analysis and medical informatics
- D. Laboratory techniques
  - 1. Serologic: ELISA, RIA, RID, nephelometry, immunoblots, protein electrophoresis, circulating immune complex assays.
  - 2. Cellular: lymphocyte proliferation, flow cytometry.
  - 3. Histochemistry and immunofluorescence of biopsied tissues.
  - 4. Molecular: Northern, Southern and Western blot analysis polymerase chain reaction; gene sequencing; genomics techniques (SNP, RFLP analysis, microarray techniques)
  - 5. Hybridoma and monoclonal antibody production
  - 6. Transgenic and gene knock-out animals
- E. Bioethics of clinical and basic research
- F. Critical literature review

### **Methods for Acquisition**

The fund of knowledge obtained through this curriculum should serve as the foundation for understanding the pathogenesis, diagnosis, and treatment of the rheumatic diseases. The methods and resources for acquiring the body of medical knowledge include, but are not limited to:

- Didactic teaching - conferences, lectures, or discussions
- Independent reading - recommended textbooks, journal articles and internet based research and study
- Clinical laboratory experience

- Research experience
- Attendance at regional and national meetings and conferences

### **Performance Markers**

The fellow is expected to know and apply basic and clinical science relevant to rheumatology and should demonstrate an analytic and investigatory approach to clinical situations.

**Basic Science** – The fellow should be able to demonstrate understanding of anatomy, basic immunology, cell biology and metabolism pertaining to the rheumatic diseases in both didactic and clinical settings.

**Clinical Science** – The fellow demonstrates understanding of pathogenesis, epidemiology, clinical expression, treatments and prognosis of the full range of rheumatic and musculoskeletal disease in both didactic and clinical settings.

**Diagnostic Testing** – The fellow displays an understanding of the biological and physical basis of the range of diagnostic testing in rheumatology and the clinical test characteristics of these procedures.

**Research Principles:** The fellow should be able to:

- A. Demonstrate an understanding of the essential components of clinical study design, patient assessment and data analysis.
- B. Exhibit familiarity with the common experimental approaches used in laboratory, clinical and epidemiology research.
- C. Exhibit familiarity with the principles of the ethical conduct of research and the ability to apply these principles in the conduct of their own research during fellowship.

### **Evaluation Methods**

- Faculty performance rating – with regard to medical knowledge
- Evaluation committee
- Formal oral or written exam
- Mentor evaluation of trainee's research performance

### **Suggested Reading List and Web Links**

1. Major textbooks of rheumatology
2. Clinical Epidemiology. A Basic Science of Clinical Medicine. Sackett DL, Haynes RB, Guyatt GH and Tugwell P, Little, Brown, New York, 2<sup>nd</sup> ed. 1991.
3. ACR Suggested Reading List for Rheumatology Fellows  
<http://www.rheumatology.org/educ/training/readinglist/index.asp?aud=mem>
4. Up-To-Date <http://www.utdol.com>

## **II. Patient Care**

The ability to provide quality patient care is the ultimate goal of clinical training in rheumatology. The fellowship program must require its residents to obtain competence in patient care to the level expected of a new practitioner. Programs must define the specific knowledge, skills, behaviors, and attitudes required, and provide educational experiences as needed in order for their residents to demonstrate quality patient care.

### **Definition**

Patient Care that is compassionate, appropriate, and effective for the treatment of disease and the promotion of health.

### **Essential Components**

The essence of being a rheumatologist is the ability to use information derived about a patient (history, physical examination, laboratory and imaging studies) along with medical knowledge to orderly synthesize a differential diagnosis, plan of further evaluation and comprehensive management for the patient with a rheumatologic problem. This may broadly be categorized under four components:

- **Information Gathering**

- A. Obtaining the history
- B. Performing a careful physical examination
- C. Obtaining appropriate tests, including laboratory tests, imaging studies, and others

- **Synthesis of Treatment Plan**

Informed medical decision making based on up-to-date scientific information and clinical judgement that also accounts for patient preferences and circumstances.

- **Implementation of Treatment**

- A. Prescribing medications and rehabilitation
- B. Patient education and counseling
- C. Preventive medicine and proactive care
- D. Therapeutic aspiration and injection
- E. Utilization of allied health care professionals, including those from other disciplines

- **Reassessment and patient follow up**
  - A. Assessment of treatment response
  - B. Recognition of treatment related adverse events

### **Methods for Acquisition**

Learning the essentials of patient care is primarily acquired by caring for patients in the outpatient clinic as well as the inpatient (hospitalized) settings. These supervised experiences are the focus of clinical training where the trainee observes skilled clinician role models, and participates with the patient in the management of their rheumatologic problem. Situations in which facets of patient care are taught and learned include:

- Didactic teaching - conferences, lectures, or discussions
- Clinical experience in a supervised, mentored clinical setting
- Interactive case-based discussions
- Independent reading - recommended textbooks, journal articles and internet based research and study
- Attendance at regional and national clinical meetings and conferences
- Preparation of patient care portfolios

### **Performance Markers**

- **Information Gathering** - The fellow should be able to:
  - A. Understand principles and demonstrate competency in obtaining a clinical history, relevant review of systems, and assessing functional status of patients with rheumatic disease symptoms.
  - B. Understand principles and demonstrate competency in performing and interpreting the examination of the structure and function of all axial and peripheral joints, periarticular structures, peripheral nerves and muscles. Additionally, the fellow should be able to identify extraarticular findings that are associated with specific rheumatic diseases.
  - C. Understand the indications for and costs of ordering laboratory tests, procedures to establish a diagnosis of rheumatologic disease and of different therapies used in the management of these diseases.
  - D. Understand the principles and interpretation of results of synovial fluid analysis and become proficient in the examination and interpretation of synovial fluid under conventional and polarized light microscopy from patients with a variety of rheumatic diseases.
  - E. Demonstrate understanding and competency in the assessment and interpretation of:

1. Radiographs of normal and diseased joints, bones, periarticular structures and prosthetic joints
  2. Bone densitometry
- F. Apply the principles of clinical epidemiology to day-to-day clinical decision making, demonstrating understanding and competency in the indications for and the interpretation of results from laboratory tests and procedures to establish a diagnosis of a rheumatologic disease, including:
1. Arthrography, ultrasonography, computed tomography, magnetic resonance imaging of joints, bones and periarticular structures
  2. Radionuclide scans of bones and joints
  3. Arteriograms (conventional and MRI/MRA) for patients with suspected or confirmed vasculitis
  4. Computed tomography of lungs and paranasal sinuses
  5. Magnetic resonance imaging of the central nervous system (brain and spinal cord)
  6. Electromyograms and nerve conduction studies
  7. Biopsy specimens including histochemistry and immunofluorescence of tissues relevant to the diagnosis of rheumatic diseases: skin, synovium, muscle, nerve, bone (e.g. metabolic bone disease), minor salivary gland, artery, kidney and lung
  8. Specific laboratory tests (including, but not limited to) erythrocyte sedimentation rate, C-reactive protein, other acute phase response proteins (e.g. ferritin), rheumatoid factor, anti-cyclical citrillunated peptides, antinuclear antibodies, anti dsDNA, anti SSA (anti-Ro), anti SSB (anti-La), anti-U1RNP, anti-Sm, anti-topoisomerase I (Scl-70), anti-Jo-1, anti-PM-Scl, antihistone antibodies, antineutrophil cytoplasmic antibodies (including anti-myeloperoxidase and anti-proteinase-3), cryoglobulins, complement component levels, CH50, serum protein electrophoresis, serum immunoglobulin levels, LE preparation, RPR, lupus anticoagulant assays, anticardiolipin and other antiphospholipid antibodies, HLA typing (e.g. HLA-B27), ASO and other streptococcal antibody tests, Lyme serologies, serum and urine uric acid levels, circulating immune complexes, lymphocyte subset and function data, anticellular antibodies (e.g. Coombs' test, neutrophil antibodies and anti-platelet antibodies)
  9. Arthroscopy
  10. Schirmer's and rose Bengal tests; parotid scans and salivary flow studies

- **Synthesis of Treatment Plan** - The fellow should be able to:
  - A. Demonstrate the ability to construct a differential diagnosis in patients presenting with signs and symptoms related to rheumatologic diseases and to outline further testing necessary to establish the correct diagnosis.
  - B. Demonstrate the ability to construct and implement an appropriate treatment plan for the care of a patient with a rheumatologic problem integrating the prescribing of medications (oral, injectable or infused), counseling, rehabilitative medicine, and, when necessary, surgical or other consultation. The fellow should be able to explain the rationale and the risks/benefits for the treatment plan.
  
- **Implementation of Treatment** - The fellow should be able to:
  - A. Demonstrate a working knowledge of clinical pharmacology: for each medication, understand the dosing, pharmacokinetics, metabolism, mechanisms of action, side effects, drug interactions, compliance issues, costs, and use in patients including fertile, lactating, and pregnant women.
    1. Nonsteroidal anti-inflammatory drugs and adequate gastroprotection
    2. Glucocorticoids: topical, intraarticular, systemic
    3. Disease modifying antirheumatic drugs:
      - a. historical agents such as gold compounds and penicillamine
      - b. oral agents: methotrexate, antimalarials, sulfasalazine, leflunomide, tetracyclines, auranofin
      - c. parenteral biological response modifiers including inhibitors of TNF, IL-1 and other cytokines and immune based therapies such as CTLA4Ig, anti-CD20
    4. Cytotoxic drugs: azathioprine, cyclophosphamide, chlorambucil,
    5. Immunomodulators: cyclosporine, FK-506, mycophenolate mofetil
    6. Hypouricemic drugs: allopurinol, sulfipyrazone, probenecid
    7. Antibiotic therapy for septic arthritis, Lyme disease
  - B. Experimental therapies: plasmapheresis, intravenous immunoglobulin, myeloablative therapy and immune reconstitution including stem cell transplantation
  - C. Understand the indications for and demonstrate competence in arthrocentesis. The fellow should understand the anatomy, precautions (including OSHA requirements) and potential sequelae of arthrocentesis and demonstrate competency in obtaining synovial fluid from diarthrodial joints, bursae and tenosynovial structures with adequate informed consent.
  - D. Understand pain assessment and pain management:

1. Methods of pain assessment including visual analog scale scores, pain questionnaires
  2. Non-pharmacological modalities of pain management including exercise, cognitive behavioral therapy
  3. Pharmacological therapy including:
    - a. Immunosuppressive and anti-inflammatory management of underlying rheumatic disorder.
    - b. Analgesic agents including acetaminophen, nonsteroidal anti-inflammatory agents and narcotic analgesics.
    - c. Antidepressants
    - d. Investigational uses of approved drugs such as gabapentin
- E. Understand changes required in patient management should the rheumatology patient become pregnant; this should include pre-pregnancy counseling about ramifications of becoming pregnant on the disease process, the use of medications before and during pregnancy and in the postpartum period.
- F. Demonstrate the ability to identify physical impairment; relate the impairment to the observed functional deficits; prescribe appropriate rehabilitation (physical therapy, occupational therapy) to achieve goals to improve the defined impairment.
- G. Understand indications for surgical and orthopedic consultation in acute and chronic rheumatic diseases.
- H. Pre- and Post-operative Management of the Surgical Patient:
1. Understand indications for surgical and orthopedic consultation in acute and chronic rheumatic diseases.
  2. Understand perioperative evaluation, appropriate referral and medication adjustments.
  3. Rehabilitation of the rheumatic disease patient after a surgical or orthopedic procedure, as well as aspects of postoperative medical management pertaining to the rheumatologic condition.
- I. Understand complementary and unconventional medical practices: diet, nutritional supplements, antimicrobials, acupuncture, topical therapeutic agents, homeopathic remedies, venoms, and others.
- **Reassessment and patient follow up** - The fellow should be able to demonstrate the ability to reassess the patient over time, including recognition of treatment related adverse events, and alter the treatment plan accordingly.

### Evaluation Methods

- Faculty performance rating – with regard to patient care

- Evaluation committee
- Chart review – for patient care, drug prescribing, or outcomes
- Clinical evaluation exercise (mini-CEX)
- Objective structured clinical examination (OSCE)
- 360 evaluations
- Portfolio review

### **Suggested Reading List and Web Links**

1. Bingham JW, Quinn DC, Richardson MG, Miles PV, Gabbe SG, Using a healthcare matrix to assess patient care in terms of aims for improvement and core competencies, J Qual Patient Safety 2005;31:98-105.
2. The American Board of Internal Medicine has published a series of trainee evaluation tools including guidelines and forms for a Mini-CEX and several professional associate rating forms that can be used to rate fellow performance.  
<https://www.abim.org/resources/publications/index.shtm> and  
<https://www.abim.org/resources/publications/SSGENERI.pdf>

### **III. Practice-based Learning and Improvement**

The practice of rheumatology entails the assessment and treatment of patients with clinical disorders that are often complex with regard to the variable organ systems involved, variations in musculoskeletal and immune system biology, and impact upon patient lifestyle and livelihood. This complexity and the rapid advances in understanding of both disease pathogenesis and treatment of the rheumatic diseases demands that the rheumatologist continually evaluate and improve the quality of their care in the context of their own clinical practice. The development of skills in self-directed, reflective learning and practice improvement will facilitate the delivery of state-of-the-art, evidence-based patient care that maximizes the likelihood for successful clinical outcomes.

#### **Definition**

Practice-based learning and improvement involves the evaluation of care provided to both individual patients as well as to groups of patients in a given practice, the appraisal and assimilation of scientific evidence relevant to clinical problems encountered, evaluations of the care provided in the context of this evidence, and effecting improvements in patient care based upon these evaluations.

#### **Essential Components**

In addition to structured learning of the basic components of medical knowledge and patient care, the rheumatologist must evaluate their knowledge base and care delivery on an ongoing basis with the goal of continually improving that care. This process includes the following components:

- **Independent learning**

The ability to access and critically appraise appropriate information systems and sources to improve understanding of underlying pathology, assess the accuracy of diagnoses, and gauge appropriateness of therapeutic interventions for the patient population they encounter.

- **Self-evaluation of performance**

The effective rheumatologist must engage in ongoing self-assessment activities. This includes the ability to continuously self-evaluate learning needs and to monitor practice behaviors and outcomes to ascertain whether clinical decisions and therapeutic interventions are effective, and adhere to accepted standards of care.

- **Incorporation of feedback into improvement of clinical activity**

The ability to appropriately interpret results of clinical outcome studies, practice data, quality improvement measures, and faculty/peer feedback and evaluations and apply them to patient care and practice behavior.

### **Methods for Acquisition**

- Clinical experience in a supervised, mentored clinical setting
- Independent reading - recommended textbooks, journal articles and internet based research and study
- Faculty-facilitated group discussions and tutorials
- Faculty role modeling
- Interactive case-based discussions
- Systematic chart review of their own patients
- Preparation of patient care portfolios
- Presentations to peers and lay audiences
- Participation in individual or group quality improvement projects

### **Performance Markers**

- **Independent learning** - the fellow should be able to:
  - A. Utilize information technology to search, retrieve, and interpret medical information relevant to the care of patients with rheumatic disease from sources such as:
    1. Peer-reviewed clinical journal articles
    2. Clinical case reports
    3. Internet-based resources such as Up-To-Date
    4. Clinical performance guidelines published by the ACR and other groups
    5. Conversations with colleagues and peers
    6. CME activities including attendance at national and regional meetings
  - B. Critically evaluate and interpret the medical literature using knowledge of clinical study methodology, statistics and methods of health services research.
  - C. Apply learned concepts and conclusions from studies and case reports to the care of individual patients.

D. Facilitate the learning of students and other health care professionals.

- **Self-evaluation of performance** - the fellow should be able to use a systematic approach, such as a chart review, to analyze own practice and identify learning or practice improvement needs.
- **Incorporation of feedback into improvement of clinical activity** - the fellow should be able to:
  - A. Demonstrate the ability to improve own practice based upon specific feedback and learned concepts.
  - B. Assess the impact of practice improvements on the care of own patients.
  - C. Implement global quality improvement measures in own practice.

### **Evaluation Methods**

- Faculty performance rating - with regard to demonstration of reflective learning in clinical venues.
- Evaluation committee - review of trainee presentations, portfolio-based presentations, and journal article reviews related to practice-based learning and improvement.
- Portfolio review - with respect to residents' narratives of critical incidences or other experiences (usually accompanied by reflection on the event), and practice improvement.

### **Suggested Reading List and Web Links**

1. Moore DE, Pennington FC, Practice-based learning and improvement, J Cont Educ Health Prof, 2003;23:S73-80.
2. Epstein RM, Mindful practice, JAMA, 1999;282:833-9.
3. "Advancing Education in Practice-Based Learning and Improvement." An educational resource developed by the ACGME to aid program directors in teaching and assessing PBLI located at [http://www.acgme.org/outcome/implement/complete\\_PBLIBooklet.pdf](http://www.acgme.org/outcome/implement/complete_PBLIBooklet.pdf)
4. A comprehensive list of professionalism references is also available from the ACGME at [http://www.acgme.org/outcome/comp/refs\\_PBLI805.pdf](http://www.acgme.org/outcome/comp/refs_PBLI805.pdf)

## IV. Systems-based Practice

The increasing complexity and diversity of health care delivery systems presents both challenges and opportunities for the practice of rheumatology. Knowledge of the nature and variety of the external and internal systems that can impact clinical practice and the effective utilization of that knowledge to positively impact patient care is an essential skill. Trainee competence in such systems-based practice "...includes an understanding of how their own practices affect others, and knowing how to partner with others to improve health care"<sup>1</sup>.

The knowledge base of systems-based practice comprises the advantages and disadvantages of different health care systems that impact on patients with rheumatic disease. Some of these include the academic system in which rheumatology fellows are training, the various private and public health care delivery systems, the governmental agencies and programs that regulate these systems, the volunteer, private and governmental agencies that are available to educate and assist patients, the bureaucracy faced by disabled patients negotiating these systems and the social and economic burden of chronic rheumatic diseases. The goal of the systems-based practice curriculum is to enhance the ability of rheumatology trainees to positively influence patient care by effectively utilizing these internal and external resources, to serve as effective advocates for their patients, and to provide cost-effective patient care. In some cases this may also mean identifying and organizing change in the local systematic problems that lead to inferior patient care.

These two major aspects of systems-based practice (systems knowledge acquisition and systems utilization) are already incorporated in rheumatology training programs. The purpose of the systems-based practice curriculum is to clarify the components of systems-based practice, describe how and where the knowledge is acquired, set benchmarks of performance expected of the trainees, and describe the tools used to measure that performance.

### Definition

Systems-based practice reflects an understanding of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.

### Essential Components

- **Systems:** a concept of "systems thinking" in health care delivery  
This includes an understanding of the limitations and opportunities of various types of rheumatology practices and delivery systems, practice management strategies, managed care and health insurance issues. It also comprises an

ongoing analysis of the strengths and weaknesses of the local academic system, in both the inpatient and outpatient settings, and its impact on the health care delivery to rheumatic patients. In particular, efforts should be made to identify potentially correctable systematic weaknesses and medical errors due to systems failure and to develop strategies to rectify the problems (i.e. Quality Improvement projects)

- **Partners in health care delivery:** the various providers and resources available to deliver optimal care.

The principal partners in delivering health care to rheumatic patients include providers such as nurses, physiatrists, orthopedists and allied health professionals available within the local healthcare system. Partners also include outside volunteer agencies, both locally and nationally, such as the American College of Rheumatology, the Arthritis Foundation, the disease-specific foundations (Lupus, Scleroderma, Ankylosing Spondylitis, etc), the National Institute of Arthritis, Musculoskeletal and Skin Diseases (NIAMS) and pharmaceutical companies that have specific patient-related initiatives. Other agencies that impact on the practice of rheumatology include the American Medical Association (AMA), the Food and Drug Administration (FDA) and the Center for Medicare and Medicaid Services (CMS).

- **Advocacy for the patient:** the importance, opportunities and limits of patient advocacy

This advocacy might consist of assisting patients with applications for Medicaid disability, completing preauthorization documents for the use of certain medications and appealing to HMOs with respect to denial of certain treatments, benefits and claims.

- **Cost-effective health care:** the principles of cost allocation and resource management within the external (state, national) and local systems

This includes a knowledge of the cost and availability of certain drugs (and unavailability of others) on the trainee's hospital formulary, the mechanisms by which compensation (by CMS and other carriers) is dependent upon the delivery of various levels of service to patients and the methods in place for Quality Review of inpatient and outpatient practice patterns. The utilization of evidence-based cost-conscious strategies for the diagnosis and treatment of patients with rheumatic diseases is paramount.

## Methods for Acquisition

- Clinical experience in a supervised, mentored clinical setting

- Didactic teaching - conferences, lectures, or discussions that highlight particular systems-based practice issues, including multidisciplinary conferences related to individual patients
- Faculty-facilitated group discussions and tutorials used to identify systematic problems in patient care delivery
- Independent reading specifically related to systems-based practice issues
- Preparation of patient care portfolios. Appropriate portfolio entries might include:
  - Documentation of instances of leadership in the multidisciplinary management of complicated patients, of utilization of outside resources for patient care, of patient advocacy.
  - Participation in a project to modify the patient medical record system (electronic medical record or hard copy system).
  - Participation in a program to improve triage system in ER for patients with acute rheumatic disease.
  - Developing an outpatient system that would allow patients with acute rheumatic complaints appointments within 24 hrs.
  - Outpatient records survey for compliance with evidence-based diagnostic or therapeutic guidelines and development of strategies to correct deficiencies, e.g. laboratory monitoring of patients on DMARDs, PPD testing before TNF antagonists.
- Participation in individual or group quality improvement projects

### **Performance Markers**

- **Systems:** The fellow should be able to:
  - A. Demonstrate knowledge about how different health care delivery systems affect the management of patients with rheumatic diseases.
  - B. Practice management: be familiar with types of practice, equipment, insurance, economics, personnel, ethical aspects, quality assurance, and managed care issues relating to the practice of rheumatology.
  - C. Identify the strengths and weaknesses of the system in which they are training and practicing. They should also demonstrate the ability to develop strategies to overcome systematic problems they have identified, and/or QI projects to improve it.
  - D. Be familiar with the history of rheumatology, and national organizations such as the American College of Rheumatology, the Arthritis Foundation, and the Association of Rheumatology Health Professionals.
  - E. Understand the influence on rheumatology of the American Medical Association, Food and Drug Administration, CMS and other governmental agencies involved in health care legislation, and peer review organizations.

- **Partners** – The fellow should be able to utilize multiple providers and resources as needed for optimal patient care.
  - A. Understand the rheumatologist's role as well as when to consult other health professionals (physiatrist, nurse practitioner, visiting nurse, physical therapist, occupational therapist, podiatrist, social worker, vocational rehabilitation counselor, psychologist, others) in the outpatient and inpatient rehabilitation of patients with rheumatic diseases.
  - B. Demonstrate the ability to educate patients about outside resources which might be of assistance to their physical, emotional and financial well being. Examples of these external resources include the Arthritis Foundation self help groups, Lupus Foundation support groups and pharmaceutical company initiated financial aid programs.
  
- **Advocacy**
  - A. The rheumatology fellow should demonstrate the ability to act as effective advocates for quality care for their patients in a variety of needs, such as dealing with insurance companies and HMO's, for preauthorizations for medications, filing disability claims, etc.
  - B. The fellow should demonstrate the ability to assist patients in dealing with health system complexities.
  
- **Cost effective care**
  - A. The fellow should know the local costs of medications they prescribe, rheumatologic lab tests they order and commonly used diagnostic tests and procedures.
  - B. The fellow should demonstrate a commitment to the practice of appropriate evidence-based cost-conscious patient care.

## **Evaluation Methods**

- Faculty performance rating - with regard to demonstration of effective systems-based performance markers.
  - An example would be an assessment of the trainee's performance in assembling and leading multidisciplinary health care teams in the management of inpatients (e.g. a complicated SLE patient) and outpatients (e.g. a severe rheumatoid arthritis patient). This might involve directing patient management with social work, physical and occupational therapists, rehabilitation medicine specialists, orthopedics, and/or geriatrics.
  
- Patient survey - with components that specifically address advocacy issues and cost effective health care delivery.
  
- 360 evaluations

- Portfolio review - for documentation of systems-based practice performance markers, including QI projects.
- Formal written or oral exam – testing for knowledge about SBP issues

### **Suggested Reading List and Web Links**

1. Systems-based practice: to learn about and improve the system. ACGME Bulletin, November, 2004.

*Useful bulletin with papers and abstracts on SBP and how different institutions have attempted to teach and assess it.*

2. Nolan TW, Understanding medical systems, Ann Intern Med 1998; 128: 293-298.

*Describes the nature of medical systems, their problems and key principles to improve them*

3. Macones GA, Goldie SJ, Peipert JF: Cost-effective analysis: an introductory guide for clinicians. Obstet Gynecol Surv 1999; 54:663-672.

*Summarizes principles of cost-effective analysis*

## **V. Interpersonal and Communications Skills**

Interpersonal and communication skills are essential for the formation of a desirable and effective physician-patient relationship. The complexity of most of the rheumatic diseases, as well as the increasingly complicated treatment regimens, require a working partnership between patient and physician, and often between physician and the patient's family. In addition to improved patient satisfaction, confidence and understanding, such working partnerships promote medical compliance. Effective physician collegial relationships are also dependent upon these skills.

### **Definition**

Interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and other health professionals.

### **Essential Components:**

- **Gathering information**

Reliable and effective communication depends upon the availability of accurate and complete information obtained from patients, their family and the complete medical record. This requires the use of effective listening and communication skills.

- **Understanding and incorporating patient's perspective**

Such understanding impacts the ability of the physician to appreciate the functional impact of disease and the desire and ability of the patient to be an active partner in the physician's treatment efforts.

- **Providing Information**

Communication regarding disease causation, diagnosis and treatment is only as effective as the ability of the recipient to understand the information. Effective explanation therefore requires that the physician communicate in a manner that is understandable to the listener.

- **Trust**

Establishment of trust with patient and patient's family.

## Methods of Acquisition

- Clinical experience in a supervised, mentored clinical setting
- Faculty role modeling
- Independent reading
- Faculty-facilitated group discussions and tutorials
- Interactive case-based discussions
- Systematic chart review of their own patients
- Presentations to peers and lay audiences
- Participation in quality assurance/improvement initiatives

## Performance Markers

- **Gathering information** - the fellow should be able to:
  - A. Use effective verbal, nonverbal, listening, questioning and explanatory skills to obtain a complete and accurate history.
  - B. Obtain properly informed consent.
- **Understanding and incorporating patient's perspective** - the fellow should be able to:
  - A. Reliably and accurately communicate the patient's and their family's views and concerns to others.
  - B. Interact with patients in an empathic and understandable manner.
- **Providing information** - the fellow should be able to:
  - A. Write clear and effective consultations in the medical record and in letters to referring physicians.
  - B. Work effectively with colleagues and peers as a member or leader of a health care team.
  - C. Clearly explain benefits and risks of treatment.
  - D. Display effective teaching skills to colleagues and patients.
- **Trust** - the fellow should be able to create and maintain an effective therapeutic and ethically sound relationship with patients over time.

## Evaluation Methods

- Faculty performance rating – with respect to communication skills and interpersonal relations

- Patient survey - with components that specifically address trainee's interpersonal skills
- Objective structured clinical examination (OSCE)
- Clinical evaluation exercise (CEX)

### **Suggested Reading List and Web Links**

1. Laine C, Davidoff F, Patient-centered medicine. A professional evolution, JAMA 1996; 275:152-6.
2. Burack JH, Irby DM, Carline JD, Root RK, Larson EB, Teaching compassion and respect. Attending physicians' responses to problematic behaviors, J Gen Intern Med 1999;14:49-55.
3. "Interpersonal and Communication Skills." An educational resource developed by the ACGME to aid program directors in teaching and assessing interpersonal and communication skills located at <http://www.acgme.org/outcome/implement/interperComSkills.pdf>

## **VI. Professionalism**

Professionalism is one of the foundations of the practice of medicine and is frequently an inherent character trait in a well-rounded physician. By virtue of their prior medical school and internal medicine training, rheumatology fellows have already attained a substantial level of professionalism, which can be refined during the fellowship training period. The range of current therapies, including biologic agents, and the complexity of many severe or life threatening rheumatic diseases that require potentially toxic chemotherapeutic agents, place rheumatology trainees in close contact with referring providers, subspecialty consultants, allied health care providers, and hospital and health insurance administrators during the care of their patients. Trainees in many programs also interact with patients from a wide range of cultural and socioeconomic backgrounds. In addition, fellows are increasingly targeted by the pharmaceutical industry in an attempt to influence prescribing habits at an early phase of their careers. A substantial level of professionalism is thus required to maintain the balance required to be an effective rheumatologist.

### **Definition**

Professionalism is manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to patients of diverse backgrounds.

### **Essential Components**

- **Primacy of patient interest**

Placing the interest of the patient before all other external interests is the most fundamental aspect of the medical profession and forms part of the unwritten contract in the patient-physician relationship. This primacy also implies patient autonomy in the determination of treatment.

- **Physician autonomy in medical decision making**

While an increasing array of bureaucratic, administrative and economic forces continue to limit physician autonomy, some degree of autonomy at the level of medical decision making must be preserved by the physician in order to maintain the primacy of interest.

- **Physician responsibility and accountability**

The practice of medicine incurs responsibility and accountability to:

A. Patients

- B. Colleagues
- C. Society
- D. Self

- **Humanistic qualities and altruism**

Physicians should provide compassionate care and serve all patients with respect to their cultural, emotional, spiritual and social needs.

- **Ethical behavior**

This includes being trustworthy and cognizant of conflicts of interest. Integrity as a physician and consultant rheumatologist must pervade all of the components of professionalism.

### **Methods for Acquisition**

Professionalism can be fostered throughout the fellowship training period beginning with an emphasis on the essential components of professionalism and the specific performance goals at the beginning of the fellowship.

- Faculty role modeling. A culture of professionalism in the training environment is created by mentors, role model clinicians, and a resident culture that demonstrate the values of professionalism and a spirit of collegiality in placing the needs of patients first, maintaining a commitment to scholarship, helping colleagues meet their responsibilities, establishing a commitment to continuous quality improvement, and being responsive to society's healthcare needs. A commitment to professional ethics is demonstrated by establishing and maintaining a high standard of moral and ethical behavior within the clinical setting in the care of patients, in the education of residents, in conducting research, and in interacting with medical device and pharmaceutical companies and funding organizations.
- Participation in professional activities. Trainees should be given the opportunity to participate in community service, professional organizations, and institutional committee activities.
- Clinical experience in a supervised, mentored clinical setting - to provide experiential learning opportunities to observe and practice the key components of professionalism. Faculty can be encouraged to highlight pertinent professional issues with their fellows at the bedside, at weekly conferences, and in the outpatient clinic setting.
- Didactic teaching - conferences, lectures, or discussions devoted to topics of professionalism. These might also include instructive case conferences using case scenarios to highlight professionalism and ethical issues.

- Faculty-facilitated group discussions. Case vignettes or journal club discussions of issues of professionalism that provide the opportunity for frank discussions between faculty and trainees about these issues.
- Independent reading. Reading assignments of peer reviewed publications and specialty organization publications from the AMA, ABIM, ACP, ACGME and web-based discussions on professionalism.

### **Performance Markers**

By the end of their training, fellows should be able to demonstrate competency in the following areas:

- **Patient Primacy** - the fellow should be able to:
  - A. Demonstrate responsiveness to the needs of patients that supercedes self-interest.
  - B. Demonstrate sensitivity and attention to the interests of own patients in formulation of treatment plans.
  - C. Demonstrate the ability to provide autonomy to their patients to decide upon treatment once all treatment options and risks have been outlined for them.
  - D. Provide and obtain key elements of informed consent in an understandable manner for therapeutic interventions and clinical research endeavors.
- **Physician Autonomy** - the fellow should be able to demonstrate independent medical decision-making skill.
- **Physician accountability and responsibility including:**
  - A. Demonstrates timeliness and reliability in clinical care of patients, including completion of medical records and in responding to patient calls and requests.
  - B. Reliably follows through on duties and clinical tasks, including timely response to calls from colleagues. Exhibits regular attendance and active participation in divisional and departmental training activities and scholarly endeavors.
  - C. Strives for excellence in care and scholarly activities as a rheumatologist.
  - D. Works to maintain personal physical and emotional health and demonstrates an understanding of and ability to recognize physician impairment in self and colleagues.
- **Humanistic qualities and altruism**
  - A. Exhibits empathy and compassion in physician-patient interactions and is sensitive to patient needs for comfort and encouragement.

- B. Is courteous and respectful in interactions with patients, staff and colleagues.
- C. Treats all patients with respect regardless of race, gender, ethnic, religious or socioeconomic background.
- D. Provides equitable care to all patients.
- E. Demonstrates culturally competent care, which is defined here as the ability to deliver effective medical care to patients, regardless of cultural or language differences between the patient and the physician.

- **Ethical behavior**

- A. Demonstrates a commitment to ethical principles relating to provision and withholding of clinical care, confidentiality of patient information and business practices.
- B. Is trustworthy in following through on clinical questions, laboratory results, and other patient care responsibilities.
- C. Recognizes and addresses actual and potential conflicts of interest including pharmaceutical industry involvement in their medical education and program funding and guarding against this influencing their current and future prescribing habits.
- D. Demonstrates integrity in reporting clinical and research findings to supervisors and colleagues.

### **Evaluation Methods**

It is very important to utilize measures that accurately evaluate professionalism. Providing feedback to the fellows will allow constructive or corrective action to be taken in the final phase of their medical education prior to embarking on their career when, although frequently proceeding without any specific supervision, they remain accountable to their patients, society, their peers and themselves.

- Faculty performance rating - with regard to demonstration of professional behavior
- 360 evaluations – regarding professional attitudes and behavior. Fellows may also fill out self-evaluations in the sphere of professionalism and compare it to responses from others for self-reflection and self-improvement.
- Portfolio review – which should include a section to include reflective entries on issues of professionalism such as difficult patient and peer encounters, conflicts of interest, and barriers to providing equitable care.
- Patient survey - with components that specifically address trainee's professionalism.

## Suggested Reading List and Web Links

1. Rothman DJ, Medical professionalism - focusing on the real issues, N Engl J Med 2000;342:1284-6.
2. Klein EJ, Jackson JC, Kratz L, Marcuse EK, McPhillips HA, Shugerman RP, Watkins S, Stapleton FB, Teaching professionalism to residents, Acad Med. 2003 Jan;78(1):26-34.
3. Hatem CJ. Teaching approaches that reflect and promote professionalism. Acad Med. 2003 Jul;78(7):709-13.
4. Steinert Y, Cruess S, Cruess R, Snell L, Faculty development for teaching and evaluating professionalism: from programme design to curriculum change, Med Educ. 2005 Feb;39(2):127-36.
5. McCormick BB, Tomlinson G, Brill-Edwards P, Detsky AS, Related Articles, Effect of restricting contact between pharmaceutical company representatives and internal medicine residents on post-training attitudes and behavior, JAMA. 2001 Oct 24-31;286(16):1994-9.
6. "Advancing Education in Professionalism." An educational resource developed by the ACGME to aid program directors in teaching and assessing professionalism located at [http://www.acgme.org/outcome/implement/Profm\\_resource.pdf](http://www.acgme.org/outcome/implement/Profm_resource.pdf)
7. The ACGME provides several assessment tools for the evaluation of professionalism at <http://www.acgme.org/outcome/assess/profIndex.asp>
8. The ACGME also has a comprehensive list of professionalism references available at <http://www.acgme.org/outcome/comp/refProf1.asp>
9. In 1995 the American Board of Internal Medicine published a monograph: Project Professionalism; it was last reprinted in 2001 and can be accessed at <http://www.abim.org/pdf/profess.pdf>  
*A very comprehensive document covering multiple issues facing medical professions today and in the future.*
10. The American Medical Association Ethics Publication "Virtual Mentor" found at [www.virtualmentor.org](http://www.virtualmentor.org).  
*Faculty members and fellows can subscribe at no charge. This can be utilized with the trainees as a self-reading program or as a basis for discussion forums. The January 2005, volume 7 Number 1 issue of this publication was devoted in its entirety to challenges to professionalism which confront internal medicine residents and fellows in a case based format. The following general areas are covered in detail: Patient-Physician Relationships; Informed Consent; Privacy and Confidentiality; Medical Student Participation in Patient Care; End-of-Life Care; Conflicts of Interest; Access to Care.*
11. The Association of American Medical Colleges and National Board of Medical Examiners published the proceedings of a conference focusing on professionalism in undergraduate medical education in 2002: "Embedding Professionalism in Medical Education: Assessment as a tool for implementation." This can be accessed at [http://www.nbme.org/PDF/NBME\\_AAMC\\_ProfessReport.pdf](http://www.nbme.org/PDF/NBME_AAMC_ProfessReport.pdf)

This document provides useful information for medical educators in general to include topics of professionalism into medical school curricula.

## Appendices

### Appendix A. The Competencies in a Specialized Clinic or Rotation: Lupus Clinic

This is as an example of how a specialized clinic or rotation may be shown to address the competencies in some generic and some unique ways. Throughout this description, notations are included to note that a specific activity relates to one or more general competencies. The competencies are abbreviated as follows:

- PC** – Patient care
- MK** – Medical knowledge
- PL** – Practice-based learning and improvement
- IC** – Interpersonal and communication skills
- PF** – Professionalism
- SP** – Systems-based practice

#### Lupus Clinic

The Goals and Objectives of the Lupus Clinic rotation are:

1. To allow rheumatology trainees to enhance their medical knowledge of the pathophysiology, clinical features, diagnosis and management of SLE, lupus subtypes and other autoimmune connective tissue diseases through supervised patient care in an outpatient setting. **(MK, PL)**
2. To enable trainees to become competent in the longitudinal care of patients with SLE and to recognize how to diagnose and manage disease flares, infection and other comorbid illnesses and the side effects of medications. **(PC)**
3. To enable trainees to diagnose and prevent those disease-related and treatment-related complications that lead to long term morbidity such as avascular necrosis, osteoporosis, and cardiovascular disease. **(PC)**
4. To enable trainees to enhance their interpersonal and communication skills in dealing with the complex cultural, social, emotional and economic burden of a serious chronic illness such as SLE. **(IC)**
5. To instruct trainees on the important systems-based practice issues including the internal and external systems that contribute to the betterment or detriment of the health care of these SLE patients and the practice of evidence-based cost effective care. **(SP)**
6. To develop practice-based learning skills in the trainees to help deal with the complicated diagnostic and therapeutic challenges these SLE patients present. **(PL)**
7. To involve trainees in ongoing research studies in SLE, including laboratory studies of aberrant immune function, clinical outcome studies including therapeutic infusion studies with new biological agents, research ethics, and the consent process. **(MK, PF)**

## **Timeline:**

End of Year 1. Trainees should have acquired extensive knowledge of the pathophysiology and clinical features of SLE and its subtypes, the methods used to diagnose SLE and evaluate disease activity, the medical therapies for autoimmune connective tissue diseases and their side effects. Trainees will also have first hand knowledge of the impact of these chronic illnesses on patients and their families, the obstacles to providing optimal health care for this population and the systems available to help overcome these issues. These skills will have employed all of the general competencies.

End of Year 2. Trainees should be able to independently and comprehensively manage the longitudinal care of patients with SLE. Such care includes attention to multisystem involvement by the disease, the frequently multidisciplinary care required, and the psychological support systems needed by these patients.

## **Description:**

The rheumatology fellows have a weekly rotation in Lupus Clinic for 2 years. Each fellow has a panel of patients and is supervised by a faculty attending (**PC, MK**). An electronic medical record (ERM) used for all rheumatology patients is being utilized in this clinic; our fellows have already noted areas in the ERM where recording lupus-specific clinical and laboratory data could be improved (**SP**). This has resulted in a quality improvement project spearheaded by some fellows and attendings to develop a lupus module within the ERM to better document those specific diagnostic and treatment issues of this population (**PC, MK, PL, SP**). The Fellows have to address complicated and expensive patient management issues and must make decisions about admission of acutely ill lupus patients to the hospital (**PC, MK, SP**). When necessary, these lupus patients are admitted to the Rheumatology Teaching Service and inpatient management is coordinated and supervised by the fellow who works with and teaches the medical housestaff team (**PC, PL, IC, PF**).

Multiple health care providers must be called upon to assist in the management of lupus patients; this includes nursing, radiology, dermatology, nephrology, neurology, social work, orthopedics and physical therapy (**PC, IC, PF, SP**). Some patients speak English poorly and an interpreter is required (**IC, SP, PF**). Many patients need financial assistance in obtaining appropriate medications, emotional support in dealing with their illness, help with letters for absence from work and assistance in filing for disability benefits (**PF, IC, SP**). Some patients are nonadherent to their medical regimens for social or financial reasons and alternative approaches to their management may be needed (**IC, PF, SB**). Clinic visits address comorbid illnesses, such as diabetes and hypertension, and side effects of therapy (**PC, MK, PL**). The local Lupus Foundation provides assistance to many patients and the faculty and fellows participate in their programs (**IC, SP**). Fellows must frequently research the literature about diagnostic and therapeutic problems related to these complicated patients both for patient care and for clinical conferences (**PC, MK, PL**). Research studies are being conducted in this lupus

population and the fellows participate in identifying appropriate patients, obtaining informed consent and in some cases being the principal investigators on the projects **(MK, IC, PL)**. Some of these studies involve the infusion of biologic modulators in a rheumatology infusion center and fellows see the occasional research patient to address adverse events **(PC, MK)**.

### Core Competency Acquisition in the Lupus Clinic

COMPETENCY	ACTIVITY			
	SCE	DID	SDL	DEM
Patient care (PC)	X	X	X	X (infusions of biologics)
Medical knowledge (MK)	X	X	X	X
Practice-based learning and improvement (PL)	X	X	X	
Interpersonal and communication skills (IC)	X (consenting)			
Professionalism (PF)	X	X	X	
Systems-based practice (SB)	X	X	X (QI project)	

#### Activity Abbreviations

**SCE** – supervised clinical experience

**DID** – didactics – case conferences, lectures, meetings

**SDL** – self directed learning

**DEM** – demonstrations, e.g. joint injection, infusion of biologics

## **Appendix B. Example of a Section of a Competency Based Curriculum**

### **Curriculum for Inpatient Consultation at the Medical Center**

#### **Description of Rotation**

The educational purpose of inpatient consultation is to develop and refine the knowledge base and skills essential for the clinical evaluation and management of hospitalized patients with rheumatic diseases. A wide variety of patients will be seen as the Medical Center is comprised of a large tertiary hospital with teaching and non-teaching Internal Medicine services, Obstetrics/Gynecology, Surgical subspecialties, Transplantation, Neurology and a subacute (geriatrics) care unit. There are separate facilities for Psychiatry, Pediatrics and Rehabilitation within the medical center where, on occasion, our services are requested.

Consultation for patients on these services is initiated in a number of ways: directly by phone or face to face contact, by beeper request, by computer request and recognition of patients that we follow that have been admitted to the hospital. The beeper that documents the consultation request for billing purposes should be “rolled over” to the fellow or resident on service and at nights/weekends to the physician on call.

It is expected that the fellow obtain a complete history, perform a thorough physical examination and review pertinent information from the chart, outside records, radiology, laboratory and referring physicians. Medical records of the initial consultation will be accomplished in the electronic medical record in a manner suitable for billing purposes. A thoughtful assessment and differential diagnosis is expected; recommendations for further evaluation and management should be appropriate for the level of training. The attending physician will review the evaluation and recommendations and make additions as necessary. Supervision of these patient encounters will comply with the resident supervision and attending practitioner responsibilities required by CMS for billing purposes. Continued patient management, including assessment of testing requested, will be done in a timely fashion with direct communication with the team in charge of patient care. Aspiration and/or injection of joints or soft tissues will be performed as indicated under supervision of the attending physician. Documentation (patient log) of procedures will be kept for credentialing purposes and to allow evaluation by the attending physician.

Results of laboratory tests ordered will be available in the electronic medical record, radiographs will be available online through a Web-based imaging system and pathologic specimens will be reviewed with the pathologist or cytologist, including synovial fluid analysis, surgical pathology specimens, and, when possible, autopsy specimens.

A log of inpatient consultations should be maintained to provide a source for relocating interesting patient cases for scholarly study/publication in the future.

Ongoing feedback may occur at each patient encounter as well as after notes are reviewed and approved. Formal evaluation will be done with ABIM forms to assess the competencies of patient care, medical knowledge, interpersonal and communication skills, professionalism, system-based practice and practice-based learning. A mini-CEX will be completed by the attending physician during the rotation. Mid year and end of year reviews will address these formally, but they will have been discussed on a continuous basis throughout the year.

## **Particular milestones for achievement of general competencies during this rotation**

### **Months 1-6**

#### **Medical Knowledge**

- Understand the differential diagnosis of inflammatory arthritis.
- Understand the differential diagnosis of fever with arthritis.
- Recognize rheumatologic emergencies and the complexities of patients ill with rheumatologic disease.
- Understand the use of laboratory tests used in evaluation of rheumatologic diseases: RF, anti-CCP, ANA, ANA subsets, anti-DNA, ANCA, urinalysis, CPK, complement, cryoglobulins.
- Understand the pharmacology and use of immunosuppressives, corticosteroids, narcotic analgesics and NSAIDs.

#### **Patient care**

- Obtain a comprehensive history and physical examination and present to the attending in logical fashion. Differentiation between regional joint disorders and systemic diseases should be recognized. Exam elements for specific joints should include understanding findings of instability, deformity, inflammation, repair, proliferative synovitis and effusion. Similarly, spinal radicular distribution should be understood (e.g. EHL is supplied by L5).
- Review all imaging studies to be able to present to the attending the positive and negative findings of the investigation.
- Examine all synovial fluids obtained and be able to estimate WBC and differential and also begin to differentiate MSU and CPPD crystals (latter with polarized microscopy).
- Demonstrate skill in aspiration/injection of shoulders and knees to point where could be independent in performing these.

#### **Practice based learning and improvement**

- Interact with the attending on rounds to discern why a particular course of action is taken. Look up literature/other information to support treatment decisions

- Prepare for patient case conference by addressing (through the literature) particular clinical questions and problems encountered.

### **Systems based learning**

- Develop an understanding of how to function as a consultant to a great many different services in the hospital.
- Learn how to effectively consult physical medicine/rehabilitation.
- Determine cost-effectiveness of alternative proposed interventions.
- Identify problems in delivery of optimal patient care and propose corrective actions.

### **Interpersonal communication skills**

- Demonstrate the ability to interact with patients in an empathic and understandable manner and to reliably and accurately communicate the patient's and their family's views and concerns to the attending.
- Develop rapport with other members of the consult team as well as with services requesting consultation.
- Write an effective consultation note – addressing both the requested information as well as pertinent discussion of other rheumatologic issues the patient may have.

### **Professionalism**

- Be prompt for rounds; if time appointed for rounds does not allow sufficient time for information review, attempt to reschedule a later time.
- Demonstrate the understanding of the importance of patient primacy, patient privacy, patient autonomy, informed consent, and equitable respect and care to all.
- Demonstrate humanistic qualities in interactions with patients, staff and colleagues.
- Demonstrate ethical behavior by reporting back to the team key clinical findings, by following through on clinical questions, laboratory testing and other patient care issues, and recognizing potential conflicts of interest.

### **Months 7-12**

All of the above noted goals should be continually improved upon over time. In addition, the following can be achieved over time.

### **Medical knowledge**

- Understand bone and joint anatomy and how it pertains to the physical examination.
- Understand immunopathophysiology that leads to abnormalities detected by rheumatologic lab testing (e.g. RF, ANA, etc).

- Understand the pharmacology of the entire range of medications used in rheumatologic practice. Particular attention should be placed on drug-drug interactions and possible adverse effects of medications used.
- Understand the complexities of patients admitted with active SLE, scleroderma, vasculitis.
- Understand potential complications of rheumatologic patients admitted for surgical procedures.

### **Patient Care**

- Demonstrate an understanding and competency in the indications and interpretation of imaging and laboratory studies (including pathologic specimens).
- Demonstrate competency in arthrocentesis of small joints (in addition to large joints); be able to demonstrate aspiration/injection of knee and shoulder to other practitioners.
- Demonstrate competency in synovial fluid analysis, being able to consistently identify MSU and CPPD crystals.
- Demonstrate the ability to reassess the patient over time and alter the treatment plan accordingly.

### **Practice-based learning and improvement**

Self evaluation of practice by searching and retrieving appropriate medical literature and applying this information to the care of the patient.

### **Systems-based practice**

Learn how to transition ongoing rheumatologic care from the inpatient to outpatient practice with careful attention to costs of medications and testing, availability of outpatient groups (Arthritis Foundation, Lupus Foundation, etc) and arranging optimal time and place of follow up appointments.

### **Interpersonal and communication skills**

The fellow should be the primary communicator for the consultation team for both written and verbal information. This includes: a) clearly delineating risk benefit and consent concerns to the patient, b) teaching other trainees, c) communicating recommendations to the physicians requesting consultation.

### **Months 13-24**

When consultation is provided as a second year fellow, it is expected the above goals have been accomplished. During the second year of fellowship, the fellow is expected to increase the depth and breadth of medical knowledge to more effectively discuss salient features of the history and physical examination, differential diagnosis, alternative plans of management and provide sound decision making rationale for the course recommended. This includes the ability to critically evaluate the medical literature and apply learned findings to individual patients. In addition, the trainee should become an effective teacher and a consultation team leader; being able to set the tone for the operation of the consultation team.

## Appendix C. Sample Curriculum Activity and Evaluation Grid

This appendix illustrates how to describe a specific training program in grid form.

**Introduction:** Description of a fellowship rotation, or an entire curriculum, in grid or table form is an alternative method for presenting a curriculum. This format has some advantages over a narrative description (for example as depicted in Appendix B); in particular, when presenting the curriculum to an external reviewer. The goal of constructing a grid like this is to project a two year fellowship curriculum in an accessible format. Such a format can be especially accessible to an external reviewer. This format highlights and documents a progressive, sequential quality of the goals and objectives over the two years for use in the accreditation process. Additional benefits of constructing such a table are that it can reveal "holes" in the program well before the Computer Assisted Accreditation Review (CAAR) is due and it may also help fellows get a sense of how they are expected to progress during the course of fellowship.

**Step 1: Redefine the word "rotation"** for this administrative, descriptive purpose. Use something less cumbersome than the usual monthly rotations as the definition of "rotation". Most programs have fellows rotating on a monthly basis from one setting to another with very similar goals from one month to the next (e.g. rotating from VA hospital clinics and consults to the university hospital clinics and consults). A straightforward approach to making a grid showing goals and objectives progressing over time is to define rotations as one month of training in the program. Display 24 months across the top of the table and display "Essential Elements" under each of the six competencies from the Core Curriculum Outline down the left hand margin. Specific "Performance Markers" (goals or objectives operationalized to very specific check offs) then fill in the cells. Many of these month-long "rotations" would then have the same or nearly the same goals and objectives, changing only incrementally as one moves from left to right across the table and through the two years.

A separate administrative definition of a "Training Period" as a 6 month period of development in a fellow's progress has the overwhelming advantage of creating a table with 4 or 5 columns instead of a table with 24 columns. The use of just five columns makes the display concise and readable, as well as facilitating thinking about the longitudinal nature of the training. There are then 3 or 4 big transitions in level of competency for each general competency rather than 23 little transitions. While the latter may be closer to reality, the former is easier to understand and emphasizes the fact that a fellow in the second half of their first year, for example, is a significantly more competent rheumatologist than in the first. In the examples that follow, one extra column is added for a single introductory month at the beginning of the fellowship, defined as a separate introductory rotation. In addition to the sequential advance of competency performance markers or benchmarks as the primary data displayed in the cells, reference can also be made to changes in venue, teaching method, and evaluation tool, if applicable. The cells are thus multidimensional but always anchored with a goal/objective/benchmark as their main content.

Descriptions of the actual rotations (e.g. "Inpatient Consult Service at the University Hospital") can also be included in narrative form elsewhere in the CARR to provide additional detail and clarity for the reviewer.

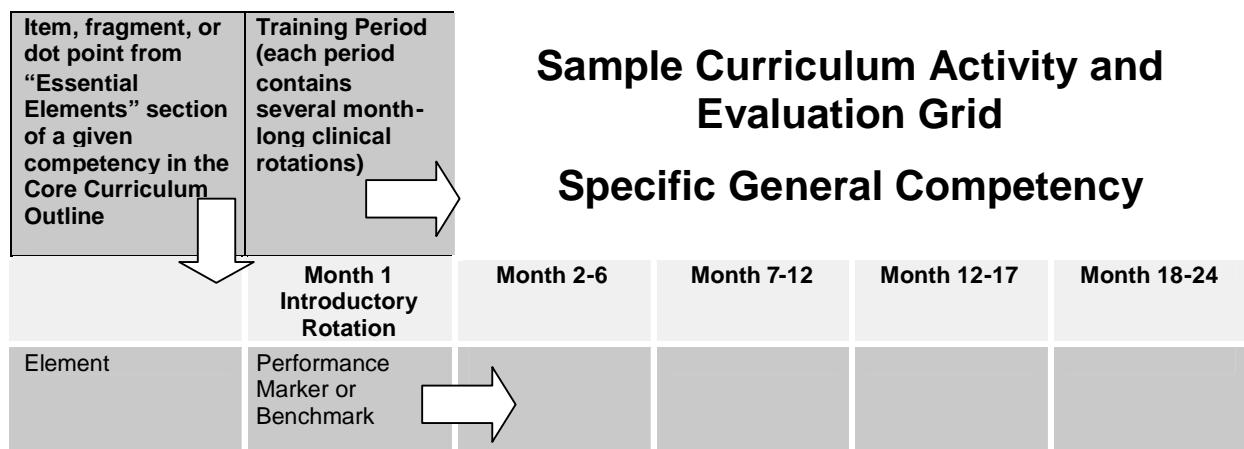
**Step 2: Create the grid.** Rotations ("Training Periods") go across the top, "Essential Elements" (listed and explained within the main body of this document) of each of the six general competencies are listed down the left margin.

**Step 3: Fill in the cells.** Use various details from the program but always include for each cell an accessible, easily understood and specific, possibly even quantitative, performance marker or bench mark. The ideal bench mark is one that an average faculty member not particularly engaged in this process could check off as met or not met by the average fellow using his or her own knowledge or results from one of the evaluation tools employed by the program. Specific evaluation tools (e.g. faculty performance rating or portfolio review) can also be specified within the cell.

**Step 4: Repeat** steps 2 and 3 for each of the remaining 5 competencies.

**Step 5: Orient the fellows to the grid** before the CARR is due so their input can be incorporated before outside review.

**Grid Format:**



## Sample Curriculum Activity and Evaluation Grid

### Medical Knowledge

Essential Element of Competency	Month 1 Introductory Rotation	Month 2-6	Month 7-12	Month 12-17	Month 18-24
<b>Basic Sciences</b>		Didactic conferences in basic and clinical immunology, and musculoskeletal anatomy	Didactic conferences in immunology, and musculoskeletal anatomy.	Presents division journal club including comprehensive review of pertinent basic science topics.	Demonstrates understanding anatomy, basic immunology, cell biology and metabolism pertaining to the rheumatic diseases.
<b>Clinical Sciences</b>	Introductory lectures on key clinical and diagnostic features of acute inflammatory arthritis and common rheumatology consults	Didactic and case-based conferences with emphasis on the most common rheumatic diseases	Didactic and case-based conferences covering the full range of rheumatic diseases	Didactic and case-based conferences  Demonstrates understanding of pathogenesis, epidemiology, clinical expression, treatments and prognosis of the full range of rheumatic and musculoskeletal disease	Didactic and case-based conferences
<b>Laboratory Testing</b>	Understands the biologic rationale for basic serologic test (ANA, RF) acute phase reactants (ESR, CRP) and joint fluid analysis	Uses appropriate laboratory testing for evaluation of a	Displays an understanding of the biologic and physical and basis of the full range of diagnostic testing in rheumatology and the clinical test characteristics of these procedures.		
<b>Research Principles</b>		Didactic conferences in principles of clinical epidemiologic research	Demonstrates an understanding of the essential components of clinical study design, patient assessment and data analysis in journal club and case conferences	Exhibits familiarity with the common experimental approaches used in laboratory, clinical and epidemiology research.	Exhibits familiarity with the principles of the ethical conduct of research and the ability to apply these principles in the conduct of their own research during fellowship.

## Sample Curriculum Activity and Evaluation Grid

### Patient Care

Essential Element of Competency	Month 1 Introductory Rotation	Month 2-6	Month 7-12	Month 12-17	Month 18-24
<b>History taking</b>	Document elements necessary to fulfill CMS guidelines for billing purposes	Obtain detailed history for regional joint disorders and specific joints/spinal levels. Obtain detailed history for systemic inflammatory diseases	Organize scenario into rational progression of events emphasizing more important points	Develop/learn lines of questioning allowing more precise history and promoting patient comfort and interaction.	Able to teach obtaining history to others, emphasizing important nuances (e.g. severity of stiffness as important as time for RA patients).
<b>Physical examination</b>	Document elements necessary to fulfill CMS guidelines for billing purposes	Perform/document peripheral joint exam for range of motion, swelling, tenderness; spinal exam for motion and radicular abnormalities. Describe gait/ overall appearance. Describe nature of skin rashes.	Identify effusions, synovial proliferation, specific patterns of joint involvement, vasculitis signs/symptoms and extraarticular findings of rheumatologic disorders	Quantitative peripheral and axial joint assessment, skin scores.	Able to teach physical examination skills to others.
<b>Laboratory investigation</b>	Have specific reasons for ordering any laboratory test, understanding the cost of tests ordered	Understand nature of RF, anti-CCP, ANA, acute phase reactants. Understand principles of laboratory monitoring. Review all studies ordered.	Understand nature of ANA subsets, cryoglobulins, complement assays and other tests ordered. Have a working relationship with the immunopathology lab.	Understand predictive values of tests as ordered. Understand rheumatologic indications for renal, brain, lung, skin, nerve, artery, synovium, bone, parotid and liver biopsy.	Review testing to assure validity (e.g. be able to reasonably review findings with pathologist). Able to teach others salient histologic features of rheumatologic disorders.
<b>Diagnostic imaging</b>	Orders must include adequate useful clinical information. Understand cost of study ordered	Review available studies, identify features of repair, inflammation or infection. Understand indications for angiography	Develop differential diagnosis of imaging findings. Distinguish inflammatory vs non-inflammatory findings	Understand how to perform quantitative assessment for RA, OA and spondylitis on plain radiography.	Able to teach others salient features of differential diagnosis of imaging findings.
<b>Medical record review</b>	Compile complete and orderly reviews with pertinent history, previous testing and medical opinions.	Attempt to receive complete information from previous providers. Assign relative quality to information and assemble			

	Learn rheumatologic terms.	in a meaningful manner			
<b>Differential diagnosis</b>	Determine if a focal or systemic problem; inflammatory vs noninflammatory	Learn meaning of classification criteria for RA, SLE and other conditions. Be able to diagnose RA, SLE and OA.	Develop differential diagnosis of specific joint findings (e.g. discern spondyloarthropathy from RA)	Identify relative importance of history and exam findings. Discern when information is discordant and redefine the differential diagnosis	Be able to discern non-rheumatologic problems in patients with rheumatologic diseases. Be able to run patient care conference discussions of differential diagnosis
<b>Treatment plan and documentation</b>	Understand differences in strategy for treating inflammatory disease vs noninflammatory. Document elements necessary to fulfill CMS guidelines for billing purposes	Understand toxicities of therapies chosen. Appropriate use of immunotherapy, NSAIDs, osteoporosis agents, steroids, physical medicine. Referral letters should detail the above.	Adequately discuss risk/benefit of treatment options to patients and document in records. Understand specific contraindications to therapies (e.g. concomitant allopurinol and azathioprine)	More in depth discussion of management options with patients. CQI to assess if benchmarks accomplished (e.g. osteoporosis prevention/management for patients on steroids)	Referral letter to be concise, instructive (educational) and outline treatment options and rationale for option chosen.
<b>Joint aspiration and injection</b>	Demonstrate competence in sterile technique and universal precautions for joint aspiration. Understand indications for joint aspiration and/or injection. Write a procedure note	Able to aspirate/inject knees, shoulders independently and interpret synovial fluid findings. Understand differences in intraarticular medications. Appropriate post-injection care (splinting, etc)	Able to consistently identify MSU/CPPD crystals in synovial fluid under polarized microscopy. Able to aspirate wrists, ankles, elbows and bursae independently.	Able to independently inject tendon sheaths	Able to demonstrate to others joint aspiration techniques and synovial fluid analysis
<b>Reassessment and follow up</b>	Demonstrate due diligence  Determine when patient will need to return for follow up (for toxicity monitoring and/or disease monitoring)	Appropriate toxicity monitoring. Ability to discern change in status from previous visit (current and previous documentation important)	Continue applying differential diagnosis to patient situation to assure correct course being taken. Use information previously obtained to refine encounter (to correct data or promote more efficient encounter)	Understand the evolving nature of the disease including physical findings, morbidity, comorbidity. Incorporate assessment tools into practice as appropriate (e.g. DAS, HAQ)	Be able to develop possible alternative treatment plans for one or two encounters in future.

## Sample Curriculum Activity and Evaluation Grid

### Practice-Based Learning and Improvement

Essential Element of Competency	Month 1-6	Month 7-12	Month 13-18	Month 19-24
<b>Accessing information to affect independent learning and practice improvement.</b>	Maintain clinical portfolio of instructive cases including case-directed review of current medical literature.	Obtain QI data on continuity clinic practice  Maintain clinical portfolio of instructive cases	Obtain QI data on continuity clinic practice  Maintain clinical portfolio of instructive cases	Obtain QI data on continuity clinic practice  Maintain clinical portfolio of instructive cases
<b>Self-evaluation of performance</b>	Maintain clinical portfolio of instructive cases	Evaluate QI data  Maintain clinical portfolio of instructive cases	Evaluate QI data, assess improvements and/or ongoing deficiencies  Maintain clinical portfolio of instructive cases	Evaluate QI data, assess improvements and/or ongoing deficiencies
<b>Incorporation of self-assessment data and feedback into improvement of clinical practice</b>	Maintain clinical portfolio of instructive cases	Implement plans to improve practice based on QI data assessment  Maintain clinical portfolio of instructive cases	Implement plans to improve practice based on QI data assessment  Maintain clinical portfolio of instructive cases	Implement plans to improve practice based on QI data assessment  Maintain clinical portfolio of instructive cases

## Sample Curriculum Activity and Evaluation Grid

### Systems - Based Practice

Essential Element of Competency	Month 1-2 Introductory Rotation	Month 3-6 Clinical Rotation	Month 7-12 Clinical Rotation	Month 12-17 Clinical Rotations Research	Month 18-24 Clinical Rotations Research
<b>Systems Thinking</b>  external and internal QI project (s)	Learns of national and local systems through introductory didactic sessions, self-directed learning and supervised clinical experience	Analyses strengths and weakness of local health system and presents these at Section meetings	Able to identify one problem area potentially amenable to improvement and design a QI project	Conducts QI project, including obtaining IRB approval if needed	Presents results of QI project, documents systems issues in portfolio
<b>Partners in Health Care Delivery</b>  local and national resources	Learns of national and local resources through introductory didactic sessions, self-directed learning and supervised clinical experience	Interacts with local partners (hospitalists, physical and occupational therapy, social work)	Able to coordinate multidisciplinary approach to care of patients	Identify and utilize disease - specific partners (RA, SLE, Sjogren's, pediatric rheum), interacts with local foundations	Team leadership in provision of multidisciplinary care documented in portfolio, 360 degree evaluation
<b>Advocacy for the Patient</b>  in dealing with the local medical systems	Learns of the systems issues facing the rheumatic patient population in local institution through supervised clinical experience	Able to obtain preauthorizations for medications	Able to assist patients in filing disability claims	Assists patients in obtaining financial aid for medications, orthotics when needed and possible	Advocacy documented in portfolio, patient surveys, 360 degree evaluation
<b>Cost-Effective Health Care</b>  knowledge and application		Learns of methodology of cost effective analysis through didactic sessions and self directed learning, can discuss journal articles on this topic	Understands the local costs of diagnostic services and rheumatic medications	Practices cost - conscious patient care based on evidence	Cost-conscious patient care documented in global assessment, patient surveys

## Sample Curriculum Activity and Evaluation Grid

### Interpersonal Communications

Essential Element of Competency	Month 1 Introductory Rotation	Month 2-6	Month 7-12	Month 12-17	Month 18-24
<b>Gathers Information</b> from patients, family and colleagues	Obtains patient informed consent	Patient Component of CEX (e.g. 90% of a "communications checklist")	Faculty ABIM global assessments >6 on applicable Likert scale averages	Two telephonic CEX's sessions with program director or core faculty member	Pfizer Pain Scholar Award <i>or</i> two favorable 360 degree evaluations emphasizing nursing feedback
<b>Understands and incorporates the patient's perspective</b>		Demonstrates diversity sensitivity according to University guidelines	one video feedback of family conference		
<b>Provides Information</b> to patients, family and colleagues	Able to discuss cost-benefit of all RA DMARDs.	Able to discuss cost-benefit of all lupus nephritis treatments.  Writes effective consultations, letters and referrals	Lectures/group discussions. Takes responsibility for Tuesday Gateway conferences on OA, RA, and SLE	Satisfactory completion of Stanford teaching program	One observed death and dying family meeting
<b>Trust.</b> Establish trust with patient and patient's family.	Clearly describes risks and benefits of therapeutic interventions and procedures.		Favorable letters or other unsolicited feedback	Favorable rating in Patient Surveys	Able to maintain a sound relationship with patients over time
<b>Functions as a Team Member</b> Serves as both a member and leader of a health care team	Uses interpreters and allied health professionals appropriately	Effectively interacts and communicates with colleagues and peers	Demonstrate the ability to effectively teach patients and colleagues—primary responsibility for one weekly conference.	Committee participation as member of MCVH committee or Department of Internal Medicine committee	Effectively interacts and communicates with colleagues and peers—360 degree evaluation

## Sample Curriculum Activity and Evaluation Grid

### Professionalism

Essential Element of Competency	Month 1-6	Month 6-12	Month 12-18	Month 18-24
<b>Primacy of patient interest</b>	Demonstrate sensitivity and attention to the interest of patients in formulating treatment plans	Demonstrate ability to provide autonomy to patients in treatment decisions	Demonstrate ability to obtain informed consent for procedures	
<b>Physician autonomy</b> in medical decision making	Recognize bureaucratic, administrative and economic forces affecting physician autonomy	Demonstrate ability to work within the clinical training environment to make treatment decision for patients	Demonstrate ability to effectively advocate for patients to receive effective care despite expense and other administrative barriers	
<b>Physician responsibility</b> and accountability	Demonstrate timeliness and reliability in clinical care of patients	Reliably follow through on duties and clinical tasks. Attend and participate in divisional and institutional training and scholarly activities	Demonstrate willingness to strive for excellence in care and scholarly activities	Maintain personal physical and emotional health. Recognize and act upon physician impairment in self and others
<b>Humanistic qualities</b> and altruism	Exhibits empathy and compassion in physician-patient interactions	Demonstrate courtesy and respect in interactions with patients and staff	Demonstrate respect for all patients regardless of race, gender and socio-economic background	Provides equitable care to all patients
<b>Ethical behavior</b>	Demonstrate integrity in reporting clinical and research findings to supervisors	Demonstrates trustworthiness in following through on patient care responsibilities	Recognize actual and potential conflicts of interest in pharmaceutical funding of medical education	Address actual and potential conflicts of interest in pharmaceutical funding of medical education

## Appendix D. Suggested Evaluation Methods

A wide variety of evaluation methods or tools have been developed that are particularly useful for assessing competency development. A glossary of the major evaluation methods based upon the ACGME definitions and recommended in the Curriculum Outline is included here. Additional methods are described in the ACGME Outcomes Project Toolbox <http://www.acgme.org/outcome/assess/assHome.asp>

**Faculty Performance Ratings** - Monthly, rotation, semi-annual or annual ratings by supervising faculty of resident performance

**360° Evaluations** - Evaluation by MDs (supervisors, residents, medical students) and non-MDs (nurses, technicians, social workers, PAs) using the same or similar evaluation forms

**Objective structured clinical examination (OSCE)** - A multi-station exam of simulated clinical tasks, which might include SPs, anatomical models, X-ray interpretation, lab test interpretation, etc.; a resident performs the tasks and is evaluated concurrently by a trained observer.

**Formal Oral Exam** - "Mock" oral exam in which an examiner asks residents questions about what to do in a clinical scenario presented verbally or role played by the examiner.

**Evaluation Committee** - Evaluation of fellow performance in a small group discussion format amongst faculty, senior fellows, etc.

**Chart review** - abstraction of information from patient records, such as tests ordered, and comparison of findings against accepted patient care standards. May also include systematic review of drug prescribing for selected conditions to determine adherence to accepted norms.

**Clinical Evaluation Exercise (CEX)** - An informal structured mini-oral exam consisting of a small set of pre-determined questions; the exam occurs during a resident's case presentation to his/her supervisor.

**Portfolio review** - Evaluation of fellow work products, such as reports of research studies, practice improvement, or systems-based improvement. Includes evaluation of performance based on residents' narratives of critical incidences or other experiences, usually accompanied by reflection on the event.

**Patient Survey** - Written survey for patients to provide evaluation of a provider on specific performance attributes, e.g. interpersonal communication or professionalism.

## **Appendix E. Pediatric Rheumatology Supplement**

### **The Pediatric “Top Ten”**

This appendix is a more detailed discussion of some unique and important aspects of pediatric rheumatology, relevant to internist rheumatologists who may be evaluating children. It is by no means complete. The essential reference is the “Textbook of Pediatric Rheumatology.” A few additional practical references are listed at the end of the appendix.

#### **1. Pediatric musculoskeletal evaluation**

Much can be inferred from the parent’s description of changes of usual habits, and observation of the child’s mobility and behavior in the office. Young children can be difficult to examine because of anxiety and lack of cooperation. They are likely to feel more comfortable sitting on the parent’s lap or beside the parent on the examination table. Establish trust by allowing the child to handle the examining instruments first. Make a game of various portions of the exam, such as muscle strength testing and range of motion. Undress the child a little at a time, examining the non-painful areas first, and the reportedly painful areas last. Children may verbally deny pain, but show pain or tenderness by body language (flinching, withdrawing) or facial expression.

#### **2. Juvenile Rheumatoid Arthritis (JRA) - presentation**

Serologic markers may be absent in JRA patients. The ESR may be normal even with severe joint inflammation. In Pauciarticular JRA (4 or fewer joints), the ANA may be positive and predicts increased risk of the development of uveitis. In Polyarticular JRA (5 or more joints), ANA and/or RF may be positive. Statistically, a positive RF predicts a worse prognosis, though some RF negative patients have very destructive disease. In Systemic JRA, the ANA and RF are only rarely positive.

Children with JRA may not express all the usual manifestations of inflammatory arthritis. In “dry synovitis”, no effusion is apparent, but painful limitation of motion is present. In “painless” arthritis, children with definite effusions or passive limitation of motion may exhibit little or no pain or tenderness. In general, children with JRA do not appear to be in as much pain as their adult counterparts, and swelling may be out of proportion to pain. In a child with pain out of proportion to swelling, multiple other diagnoses must be considered, including leukemia or lymphoma, bone or joint infection, and pain amplification disorders.

In Systemic Onset JRA, fever and rash may precede arthritis. The fever occurs every day but is not continuous, spiking 1-2 times daily with return to normal or subnormal in between. Systemic JRA is a diagnosis of exclusion. Thorough evaluation to rule out infections and neoplasms is necessary. Macrophage activation syndrome (MAS) in systemic JRA is similar to hemophagocytic lymphohistiocytosis in its manifestations of life-threatening hepatic dysfunction, coagulopathy, cytopenias, and capillary leak

syndrome. An unexpected rapid fall in acute phase reactants may signal the onset of MAS.

JRA, like any chronic inflammatory disease, can retard the overall growth of children. Arthritis can severely affect the growth of individual limbs or digits, resulting in lifelong length discrepancy. Single joint arthritis with actual or functional length discrepancy can lead to altered body mechanics (example, knee contracture leading to pelvic tilt and scoliosis). TMJ arthritis can lead to micrognathia and orthodontic problems. Uveitis may be asymptomatic and is rarely apparent on routine examination, but leads to severe sequelae if untreated. The age of onset, type of arthritis, and ANA positivity determine the recommended schedule of ophthalmology examinations for surveillance of uveitis.

### **3. JRA – treatment**

Usual treatment of JRA includes early use of methotrexate, biologic response modifiers, and appropriately spaced joint injections. Oral or intravenous corticosteroids are indicated for severe anemia, pericardial/pleural effusions, and failure of NSAID therapy to relieve joint and constitutional symptoms in systemic JRA. The biologic response modifiers, particularly IL-1 inhibitor therapy, hold promise for treatment of systemic JRA. The accepted treatment of MAS includes pulse corticosteroids and Cyclosporine A, but biologic responses modifiers may also have a role in treatment. Physical therapy is important for preventing contractures, and maintaining normal mobility.

### **4. Hip pain**

The child who limps and seems to have knee pain may have a hip abnormality. JRA rarely starts in the hip alone. Isolated hip arthritis may be a presenting feature of juvenile spondyloarthritis. Other causes of isolated hip pain or effusion that must be considered first include septic arthritis, osteomyelitis, transient synovitis, neoplasms (lymphoma, neuroblastoma, primary bone tumors), avascular necrosis, slipped capital femoral epiphysis, and congenital hip dysplasia (in the younger age group). X-rays and ultrasound are important in the initial evaluation of hip pain. Even if bacterial infection is not suspected, moderate or large hip effusions should be tapped to decompress the arterial supply to head of femur (running externally over the femoral neck) and prevent secondary avascular necrosis.

### **5. Back pain**

Causes of back pain in children include osteomyelitis, discitis, spinal cord tumors, pelvic tumors, and spondylolisthesis. Juvenile spondyloarthritis, or juvenile ankylosing spondylitis (JAS), most often presents with arthritis and/or enthesitis in peripheral joints, especially of the lower extremities, years before onset of back involvement. Because X-ray diagnosis of early JAS is unreliable, bone scan and MRI are important tools for evaluation of children with back pain. It is possible for adolescents to have functional back pain; however, evaluation should be performed to rule out more serious causes.

In general, the younger the child, the more likely the complaint of back pain is due to serious non-rheumatic disease.

## 6. Myositis

Juvenile dermatomyositis is much more frequent in children than polymyositis. The characteristic rash usually precedes or accompanies muscle involvement. Muscle weakness without rash should prompt a thorough search for non-rheumatic causes including muscular dystrophy, metabolic muscle disease, and neurologic disorders. Unlike dermatomyositis in adults, JDM is rarely associated with neoplasia (anecdotal reports). JDM may present at a very young age, with onset before age 3 years in up to a quarter of patients. In a young child, a malar rash should suggest JDM before lupus. Parents may note only a decrease in activity level or motor tasks, and may attribute these changes to pain rather than weakness.

Initial treatment of JDM is high-dose corticosteroids (oral and often i.v. pulse therapy), with or without methotrexate. Severe cases may benefit from intravenous immunoglobulin (IVIG). Cutaneous and gastrointestinal ulceration may occur in severe cases. With appropriate treatment, complete resolution of disease occurs in approximately a third of cases, allowing medications to be tapered off during 1-2 years (monophasic course). Other children will have a relapsing (polyphasic) course, but eventually recover. Up to 30% will have a chronic continuous course. Prolonged inflammation is associated with calcinosis, permanent loss of muscle mass, fixed joint contractures, and cutaneous atrophy and scarring.

Acute onset of severe, bilateral leg pain, especially in the calves, after a respiratory illness is most likely to be viral-associated myositis. Influenza B and A are the most common causes of this disorder, which is self-limited and may be treated conservatively. Occasionally, rhabdomyolysis is severe enough to cause renal damage.

## 7. Child-specific aspects of drug therapy

Corticosteroids: Aside from the usual side effects of corticosteroids, children also experience growth failure and pubertal delay. Osteoporosis due to chronic steroid treatment is both a short-term and long-term problem, since bone accretion occurs during childhood. Acne and weight gain create noncompliance issues with adolescents.

Drug dosing: Because of more rapid metabolism, children may need proportionately higher drug doses than adults. Methotrexate is a good example; the usual dose for JRA is 10 mg per M<sup>2</sup> (approximately 0.4 mg/kg) weekly, but may be increased to 20 mg per M<sup>2</sup> with careful monitoring for toxicity. The only NSAIDs with FDA indications for JRA are naproxen (10 mg/kg/day), ibuprofen (30-40 mg/kg/day), tolmetin (15-30 mg/kg/day) and choline magnesium trisalicylate (50mg/kg/day, or titrate to salicylate level). Although higher doses per kg are sometimes used, the doses listed are per package insert, and are not to exceed adult doses. Other NSAIDs have been used "off-label," many without appropriate dosing studies.

## **8. Transient arthritis**

Objective arthritis must last at least 6 wks for a diagnosis of JRA. Postinfectious syndromes, especially post-viral synovitis, are common in children and usually resolve within 6 weeks. Transient synovitis of the hip is common in young children, and may be a post-infectious syndrome. For children with very painful joints, migratory arthritis, or fever, evaluation for acute rheumatic fever is indicated even if no sore throat is recalled. A previous streptococcal pharyngitis may have been minimally symptomatic.

## **9. Henoch-Schonlein Purpura (HSP)**

This vasculitis is due to immune complexes containing IgA, and often occurs after upper respiratory infection. Purpuric rash is a requirement for diagnosis, but other manifestations may precede the rash, making diagnosis initially difficult. Urticarial rash and migrating angioedema (often in odd locations) may precede the purpura. Other manifestations include arthritis, abdominal pain, and nephritis. Serious complications are rare but include intussusception, and hemorrhage in the GI tract, lungs, and CNS. The course may be recurrent over several months, but subsequent episodes tend to be less severe than the initial one. Nephritis may be a very late manifestation, beginning up to 3 months after onset of disease. Most patients require only conservative care, with or without NSAIDs. Opinions vary regarding use of corticosteroids.

## **10. Kawasaki Disease**

Manifestations include fever lasting for 5 or more days, non-exudative conjunctivitis, lymphadenopathy, mucous membrane inflammation (strawberry tongue, red cracked lips, diffusely red oropharynx), polymorphous rash, and red swollen hands and feet. Babies and younger children tend to have more atypical or incomplete manifestations. Desquamation of fingertips and thrombocytosis are convalescent manifestations. Treatment with intravenous immunoglobulin (IVIG), if started within 10 days of onset of fever, reduces the frequency of coronary artery aneurism, the major life-threatening complication. Corticosteroids are likely to have a role in treating disease that is severe or unresponsive to IVIG.

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## Appendix F. Curriculum Reference Resources

1. A comprehensive overview of the competencies and their evaluation is provided by the ACGME at :<http://www.acgme.org/Outcome/>
2. An educational document is available instructing faculty in the new competencies at <http://www.abim.org/resources/publications/Attendig.pdf>
3. A “toolbox” of assessment methods has been produced jointly by the ACGME and the American Board of Medical Specialties that contains detailed descriptions and characterizations of a number of evaluation tools, located at <http://www.acgme.org/outcome/assess/toolbox.asp>

This toolbox also includes a table of “Suggested Best Methods for Evaluation” of the ACGME Competencies, at:

<http://www.acgme.org/Outcome/assess/ToolTable.pdf>

4. “Teaching and Assessing the General Competencies: A toolkit for Rheumatology Program Directors” is a detailed resource for program directors that describes the use of specific evaluation tools to assess the general competencies.
5. A glossary of Assessment Methods is listed at [http://www.acgme.org/pifoutcome/pifoutcome\\_glossary.asp](http://www.acgme.org/pifoutcome/pifoutcome_glossary.asp)
6. An extensive glossary of additional acquisition methods ("Instructional Methods") is listed at [http://www.acgme.org/pifoutcome/pifoutcome\\_glossary.asp](http://www.acgme.org/pifoutcome/pifoutcome_glossary.asp)
7. The ABIM has a comprehensive evaluation tool incorporating all the competencies found at [http://www.abim.org/resources/publications/Residents\\_Competency.pdf](http://www.abim.org/resources/publications/Residents_Competency.pdf).
8. A comprehensive document pertinent to evaluations in subspecialty programs is available at <http://www.abim.org/resources/publications/SSGENERI.pdf>

AMERICAN COLLEGE OF RHEUMATOLOGY  
TRAINING GUIDELINES & ASSESSMENT SUBCOMMITTEE

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