

**Core Curriculum Outline for Rheumatology Fellowship
Program**

**RUSH UNIVERSITY
SECTION OF RHEUMATOLOGY
RHEUMATOLOGY FELLOWSHIP TRAINING PROGRAM**

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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 spondyloarthritis: 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. 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, and rounding discussions

Independent reading - recommended textbooks, journal articles and internet based research and study

Clinical 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.

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 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, and rounding discussions

Clinical experience in the hospital and clinic settings

Clinical Conference presentations and discussions

Independent reading - recommended textbooks, journal articles and internet based research and study

Attendance at regional and national clinical meetings and conferences

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. oral agents: methotrexate, antimalarials, sulfasalazine, leflunomide, tetracyclines, auranofin
 - b. 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
 5. Immunomodulators: cyclosporine, FK-506, mycophenolate mofetil
 6. Hypouricemic drugs: allopurinol, probenecid
 7. Antibiotic therapy for septic arthritis
 - 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.

J.

- **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**

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 the supervised, mentored clinical setting
Independent reading - recommended textbooks, journal articles and internet based research and study
Faculty-facilitated group discussions
Faculty role modeling
Clinical Conference case-based discussions
Faculty-facilitated group journal club
Presentations to peers
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.

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"¹.

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 hospital staff with respect to denial of certain tests or treatments.

- **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

Independent reading specifically related to systems-based practice issues

Participation in individual or group quality improvement projects

Performance Markers

- **Systems:** The fellow should be able to:
 - A. Demonstrate knowledge about how the two different health care delivery systems within the fellowship affect the management of patients with rheumatic diseases.

- B. Identify the strengths and weaknesses of the systems in which they are training and practicing. They should also demonstrate the ability to develop strategies to overcome systematic problems they have identified.
 - C. 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.
 - D. 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 hospital administration’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 evaluation

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 the supervised, mentored clinical setting

Faculty role modeling

Presentations to peers and lay audiences

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

V. 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 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 will be given the opportunity to participate in community service, professional organizations, and institutional committee activities.

Clinical experience in the 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.

Faculty-facilitated group discussions utilizing GME-Today curriculum.

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

Patient survey - with components that specifically address trainee's professionalism.

Appendices

Rotation Specific Goals and Objectives with Timelines for Achievement of Goals and Objectives

Signout Procedure

Appendix A. The Competencies in Outpatient/Ambulatory Rheumatology Clinic

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

Outpatient/Ambulatory Clinic

The Goals and Objectives of the Outpatient Clinic rotations are:

1. To allow rheumatology trainees to enhance their medical knowledge of the pathophysiology, clinical features, diagnosis and management of rheumatic diseases through supervised patient care in an outpatient setting. **(MK, PL)**
2. To enable trainees to become competent in the longitudinal care of patients 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. **(PC)**
4. To enable trainees to enhance their interpersonal and communication skills in dealing with the complex cultural, social, emotional and economic burden of chronic rheumatic illness. **(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 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 patients present. **(PL)**
7. To involve trainees in ongoing research studies, including laboratory studies of aberrant immune function, clinical outcome studies including therapeutic studies with new agents, research ethics, and the consent process. **(MK, PF)**

Timeline:

End of Months 1-3. Trainees should have acquired extensive knowledge of the pathophysiology and clinical features of rheumatic and its subtypes, the methods used to diagnose and evaluate disease activity, the medical therapies for rheumatic 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 Month 3-6. Trainees should be able to independently and comprehensively manage the longitudinal care of patients. 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 3 weekly rotations in Ambulatory Clinic for 24 months. Each fellow has patients and is supervised by a faculty attending **(PC, MK)**. 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 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 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)**. Some 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 Arthritis 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 these clinic populations and the fellows participate in identifying appropriate patients, obtaining informed consent and in some cases being the investigators on the projects **(MK, IC, PL)**.

Core Competency Acquisition in the Ambulatory/Outpatient Clinics

COMPETENCY	ACTIVITY			
	SCE	DID	SDL	DEM
Patient care (PC)	X	X	X	X
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

Lupus Clinic

Appendix B. The Competencies in Lupus Clinic

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**

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:

Months 1-3. 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.

Months 3-6. 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 6 months. Each fellow has a panel of patients and is supervised by a faculty attending (**PC, MK**). 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 investigators on the projects (**MK, IC, PL**).

Core Competency Acquisition in the Lupus Clinic

COMPETENCY	ACTIVITY			
	SCE	DID	SDL	DEM
Patient care (PC)	X	X	X	
Medical knowledge (MK)	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	

Activity Abbreviations

SCE – supervised clinical experience

DID – didactics – case conferences, lectures, meetings

SDL – self directed learning

DEM – demonstrations

Appendix C. Competencies for Inpatient Consultation at the Rush University Medical Center and Stroger Cook County Hospital

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 1-12

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 12-24

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 D. The Competencies in Rheumatoid Arthritis Clinic

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

Rheumatoid Arthritis 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 rheumatoid arthritis through supervised patient care in an outpatient setting. **(MK, PL)**
2. To enable trainees to become competent in the longitudinal care of patients with rheumatoid arthritis 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 infection, 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 rheumatoid arthritis. **(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 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 patients present. **(PL)**
7. To involve trainees in ongoing research studies in rheumatoid arthritis, 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 Month 3. Trainees should have acquired extensive knowledge of the pathophysiology and clinical features of rheumatoid arthritis, the methods used to diagnose and evaluate disease activity, the medical therapies for the disease, 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 Month 6. Trainees should be able to independently and comprehensively manage the longitudinal care of patients with rheumatoid arthritis. 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 rheumatoid arthritis clinic for 6 months. Each fellow has a panel of patients and is supervised by a faculty attending (**PC, MK**). The Fellows have to address complicated and expensive patient management issues and must make decisions about admission of acutely ill rheumatoid arthritis patients to the hospital (**PC, MK, SP**). When necessary, these 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 Arthritis 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**).

Core Competency Acquisition in the Rheumatoid Arthritis Clinic

COMPETENCY	ACTIVITY			
	SCE	DID	SDL	DEM
Patient care (PC)	X	X	X	X Infusion clinic
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 D. The Competencies for Research

Rush Rheumatology Research Goals and Objectives

Goals for the research component of fellowship training are designed to establish competency in the design, conduct, interpretation and presentation of research by requiring the fellow to complete at least one major project and to participate in additional projects time permitting. The research experience is based on a mentorship model. Therefore, the fellow and faculty research mentor work together to develop and execute a research project. Fellow research interest is matched with the appropriate faculty mentor.

- The fellow will visit the basic science laboratories and clinical research areas and select a research mentor during the first three months of their first year of fellowship. .
- The fellow will formally declare a research project, obtain approval from the research mentor and Program Director and enumerate critical design issues with regard to the project. Included in the proposal will be a timeline for completion of the project.
- The fellow will work with the mentor to prepare an oral and written presentation of the results every 6 months at Research conference.
- The fellow will be encouraged to submit a final manuscript for publication in a major scientific or clinical journal.
- Prior to graduation, the fellow will complete a manuscript that is ready for submission to the peer-reviewed literature and submit the research for presentation at the appropriate national specialty society meeting.

Practice Based Learning and Improvement

- To understand the research processes in development of a hypothesis, formulation of research methodology to investigate the hypothesis, proper execution of the research project, appropriate statistical analysis and presentation of data.
- To learn how to write a manuscript suitable for publishing in the peer-reviewed medical literature
- Evaluate and effectively critique published literature in critically acclaimed journals and texts. Participate in routine academic discussions.
- Attend and actively participate in research conferences.

Interpersonal and Communication Skills

- Establish and maintain professional relationships with patients and healthcare team members.

- Manage and maintain efficiency of the team.
- Demonstrate behaviors that reflect an ongoing commitment to continuous professional development, ethical practice, sensitivity to diversity and responsible attitudes.

Professionalism

- Actively seek and be receptive to feedback on performance.
- Be attentive to ethical issues.
- Be sensitive to gender, age, race, and cultural issues.
- Demonstrate leadership.

Systems Based Practice

- Be aware of cost-effective research issues.
- Be sensitive to medical-legal issues.
- Have information technology/computer resources available.

Approximate Research Rotation Timeline

months 1-3 = Selection of project and faculty/fellow match
 months 4-6 = Hypothesis generation, Project Design, IRB application
 month 6 = Research Conference Presentation
 months 6-18 = Data Collection
 month 12 = Research Conference Presentation
 month 18 = Research Conference Presentation
 months 19-24 = Data analysis, Manuscript writing
 month 24 = Research Conference Presentation

Methods of Evaluation

- 1) Research Conference Presentation
- 2) Manuscript Preparation

Appendix E: Competencies for Pediatric Rheumatology Rotation at LaRabida Hospital

Length: 4 weeks

I. Course Objectives:

The fellow will be taught how to examine and evaluate pediatric patients with collagen vascular disease. The focus will be on the importance of detailed history and musculoskeletal examination in the diagnosis of connective tissue diseases. The elective will demonstrate the importance of continuity of care and a multidisciplinary approach in the case of chronic patients and enhance fellows' ability to logically perform differential diagnosis. The fellow will be exposed to the physical findings in all major collagen vascular diseases including juvenile arthritis, lupus, dermatomyositis and scleroderma.

II. Course Goals and Objectives (ACGME Competencies)

Patient Care

Fellows, together with supervising faculty, must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and promotion of continuity of care.

Objectives: Fellows are expected to

- Evaluate their own patients and be responsible for these patients at a level commensurate with their training.
- Collect, assemble and interpret relevant history and physical findings.
- Present the above information to the attending in an oral presentation to the attending physician.
- Make informed recommendations about diagnostic and therapeutic interventions based on patient information
- Counsel and educate patients and families about the disease process, further evaluation and therapy
- Provide health care services aimed at preventing health problems or maintaining health. Discuss importance of compliance and follow-up.
- Work with health care professionals, including those from other disciplines such as occupational therapy and physical therapy to provide patient-focused care.

Medical Knowledge

Fellows must become familiar with the major rheumatologic diagnoses requiring subspecialty care, which promote the development of clinical problem-solving skills.

Objectives: Fellows are expected to

- Demonstrate knowledge that would allow for independent assessment and appropriate problem solving skills of outpatient pediatric rheumatology patients.
- Demonstrate knowledge in the management of patients with common rheumatic diseases.

For Example: juvenile idiopathic arthritis, dermatomyositis, systemic lupus, scleroderma

Practice-Based Learning and Improvement

Fellows must be able to assimilate scientific evidence to improve their patient care practices.

Objectives: Students are expected to

- Demonstrate proper evidence based decisions.
- Demonstrate appropriate use of educational resources for self-education, including medical literature and on-line medical information.

Interpersonal and Communication Skills

Fellows must be able to demonstrate interpersonal and communication skills that result in effective information exchange with healthcare professionals and families.

Objectives: Fellows are expected to

- Give case presentations in a clear, concise, organized and relevant manner.
- Communicate appropriate information to the family (and patient) concerning management.
- Be an integral member of the medical care team and exchange information effectively with other health care professionals.

Professionalism

Fellows must demonstrate attitudes and professional behavior appropriate for clinical practice, which encompass professional responsibilities, adherence to ethical principles and sensitivity to diverse patient populations.

Objectives: Students are expected to demonstrate

- Accurate representation of data
- Ethically sound decisions
- Professional appearance
- Attendance at clinics and conferences on time
- Respect for patients' confidentiality
- Mature behavior
- Sensitivity to culture, genders and disabilities

IV. Method of Instruction:

Fellows should attend all day Pediatric Arthritis Clinics at LaRabidal Hospital for practical bedside instruction and attend any conferences. Also fellows should review standard textbooks of rheumatology for topics listed in section VII (the pediatric "Top Ten") and discuss with attending.

V. Method of Evaluation of Students:

Overall performance in the clinic and assessment of the presentation are discussed on an individual basis at the conclusion of the rotation. Evaluations of fellows will be completed in Medhub by faculty. Fellows are given the opportunity to offer suggestions for improvement in the course structure and content.

Formal evaluations of the course will also be provided.

VII. 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 60 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 spondyloarthropathy. 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 spondyloarthropathy, 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 Xray

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.

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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 M2 (approximately 0.4 mg/kg) weekly, but may be increased to 20 mg per M2 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.

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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.

Selected Practical References:

Cassidy JT and Petty RE, eds. Fifth Edition 2005, or Fourth Edition 2001. Textbook of Pediatric Rheumatology. WB Saunders Company.
Hashkes PJ, Laxer RM. 2005. Medical Treatment of Juvenile Idiopathic Arthritis. JAMA 294:1671-84.
Laxer RL, ed. 2005. Pediatric Rheumatology. Pediatric Clinics of North America. Volume 52, No. 2. WB Saunders Company. (This volume contains twelve articles on pediatric rheumatic diseases.)

Appendix F: Sign-out/Sign-in Procedure for Fellows:

By 5pm on Friday (or at the end of rounds if later than 5pm), the Fellow on Service must give the weekend on-call Fellow a written sign-out on *all* service patients including the following information:

1. Patient name
2. medical record number
3. location in hospital
4. Patient's diagnosis, active medical issues, and specific rheumatologic issues that the Rheum consult service is managing. This could be in the form of a few sentences summarizing the patient's history, physical findings and hospital course.
5. The patients (and their specific issues) that need to be seen and followed-up on by the weekend/holiday team should be indicated clearly.

By 8:30am on Monday morning, the weekend covering Fellow must give a written update on the patients seen over the weekend, and the new consults received (including all the above information). It is acceptable to return original signout with modifications.

Both sign-out and sign-in could be communicated by email or email attachment, as long as the on-service and covering Fellows have agreed upon this method of communication. The sign-out/sign-in must be "cc'd" to the team and the covering attending as well.

The two Fellows should communicate between themselves any problems receiving the sign-out/sign-in as soon as possible (i.e. attachment not coming through, email not received).

To avoid confusion, all decisions on which patients need to be seen over the weekend should be based on discussion with the team attending prior to sign-out.