The Royal Australasian College of Physicians

Rheumatology

Advanced Training Curriculum

Adult Medicine Division

Australian Rheumatology Association

The Royal Australasian College of Physicians

Physician Readiness for Expert Practice (PREP) Training Program

Rheumatology Advanced Training Curriculum

TO BE USED IN CONJUNCTION WITH:

Basic Training Curriculum – Adult Internal Medicine

Professional Qualities Curriculum (PQC)

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The following Fellows, in particular, deserve specific mention for their contribution:

- Dr Arvin Damodaran, FRACP
- A/Prof Peter Jones, FRACP
- Dr Roger Laurent, FRACP
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The process was managed by the Curriculum Development Unit within the College's Education Deanery, who designed the document, drafted content material, organised and facilitated writing workshops, developed resource materials, and formatted the final document.

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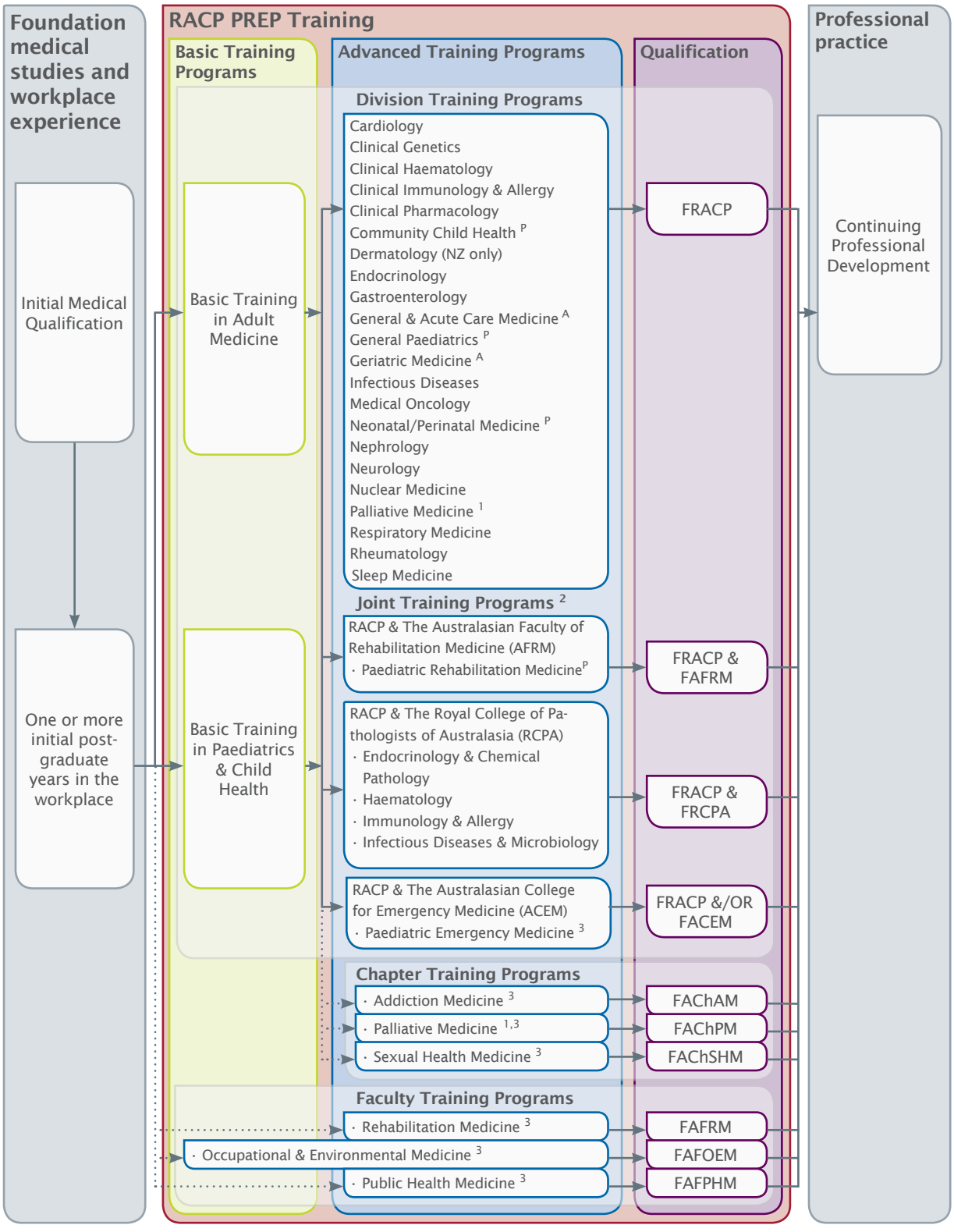
Please note: No Domains, Themes or Learning Objectives have been updated for this edition; design changes ONLY.

RACP FELLOWSHIP TRAINING PATHWAYS AND THE CONTINUUM OF LEARNING



P Trainees must complete Basic Training in Paediatrics & Child Health to enter this program.
A Trainees must complete Basic Training in Adult Medicine to enter this program.
1 Trainees who have entered Advanced Training in Palliative Medicine via a RACP Basic Training Program will be awarded FRACP upon completion and may subsequently be awarded FAChPM. Trainees who have NOT entered Advanced Training in Palliative Medicine via a RACP Basic Training Program will only be awarded FAChPM upon completion.
2 The Child & Adolescent Psychiatry Joint Training Program with the Royal Australian and New Zealand College of Psychiatrists (RANZCP) is currently under review by the RACP and RANZCP and closed to new entrants at present.
3 Alternative entry requirements exist for these training programs; please see the corresponding PREP Program Requirements Handbook for further information.

NB1: This diagram only depicts training programs that lead to Fellowship. Please see the RACP website for additional RACP training programs.
NB2: For further information on any of the above listed training programs, please see the corresponding PREP Program Requirements Handbook.

OVERVIEW OF THE SPECIALTY

Rheumatologists are specialist physicians with particular expertise in the diagnosis and holistic management of diseases that affect joints, muscles, and bones. This curriculum covers all forms of arthritis, autoimmune connective tissue disease, spinal and soft tissue disorders and certain metabolic bone disorders, such as osteoporosis and chronic musculoskeletal pain syndromes. An extensive list of conditions considered 'rheumatic disorders' for the purposes of this curriculum are appended. Key aspects of their clinical practice are the management of pain, the reduction of inflammation, and preservation of musculoskeletal function.

It is possible to practice rheumatology in a variety of settings in Australia and New Zealand. Some practise 'pure' rheumatology in private practice, at public hospitals or in conjunction with academic or research posts. Others combine rheumatology expertise with related clinical expertise, for example general medicine, nuclear medicine, aged care, or sports medicine. In all settings there is an increasing trend towards ambulatory care based treatment.

Rheumatologists are committed to the expansion of knowledge within their field. As such they are often actively engaged in research across a wide breadth of investigational opportunities.

In the context of a rapidly ageing population, there is recognition of an increasing need for rheumatology specialist services. Many patients with established arthritis face social and financial difficulty due to debilitating disease leading to decreased capacity to engage with the wider community and maintain employment. This often has a profound personal impact on the patient and their families and has broad implications for society and government. Arthritis has been identified as a national health priority in Australia.

Earlier diagnosis and aggressive treatment of inflammatory arthritis can prevent long-term pain and disability. Early accurate diagnosis has been facilitated by advances in laboratory-based tests, such as anti-cyclic citrullinated peptide antibody for rheumatoid arthritis, and in imaging techniques, such as musculoskeletal ultrasound and MRI. With the availability of conventional disease modifying treatments, like methotrexate, as well as newer 'biological' agents, such as tumour necrosis factor (TNF) -blockers, excellent outcomes for patients with newly diagnosed inflammatory arthritis are now a realistic expectation.

Rheumatic diseases are frequently chronic. Due to the longitudinal nature of care, skilful communication engendering lasting rapport with patients remains an enduring, critical facet of rheumatology practice. However, progress in understanding disease process has lead to exciting advances, such as the greatly improved management options for inflammatory arthritis. This sort of advance drives changes in clinical practice, and reinforces the importance of each rheumatologist being an engaged learner throughout their professional career.

CURRICULUM OVERVIEW

RHEUMATOLOGY – ADVANCED TRAINING CURRICULUM

This curriculum outlines the broad concepts, related learning objectives and the associated theoretical knowledge, clinical skills, attitudes, and behaviours required and commonly used by rheumatology physicians within Australia and New Zealand.

The purpose of Advanced Training is for trainees to build on the cognitive and practical skills acquired during Basic Training. At the completion of the Rheumatology Advanced Training Program, trainees should be competent to provide, at consultant level, unsupervised comprehensive medical care in rheumatology.

Attaining competency in all aspects of this curriculum is expected to take three years of training. It is expected that all teaching, learning, and assessment associated with the Rheumatology Advanced Training Curriculum will be undertaken within the context of the physician's everyday clinical practice and will accommodate discipline-specific contexts and practices as required. As such it will need to be implemented within the reality of current workplace and workforce issues and the needs of health service provision.

There may be learning objectives that overlap with or could easily relate to other domains; however, to avoid repetition, these have been assigned to only one area. In practice, it is anticipated that within the teaching/learning environment, the progression of each objective would be explored.

Note: The curricula should always be read in conjunction with the relevant College Training Handbook available on the College website.

WHO IS THIS CURRICULUM DESIGNED FOR?

This document is principally designed for rheumatology Advanced Trainees as a guide to their specialty specific learning objectives and assessment. It is intended that supervisors of training will also be very familiar with this document as well as the members of the relevant Rheumatology Association committees.

The curriculum will be used at several levels of program development: individual trainees should use the document to help develop their own personal learning plans and to negotiate learning plans with their supervisors; departments should use the curriculum to plan learning and assessment activities for their Advanced Trainees; the document should also inform organisers of state and national level rheumatology training activities.

Fellows of the College may be interested in the document as an indication of the standards that are applied to current trainees, and as a guide to their own CPD. Prospective trainees, accrediting and employing bodies, and members of the community may be interested in what rheumatologists consider their specific domains of expertise.

Lastly the document acknowledges some excellent rheumatology training curricula employed by other training and accreditation bodies internationally. While this document has been developed for the local context, it may be of use when considering accreditation of training for physicians that cross jurisdictions.

Professional Qualities Curriculum

The PQC outlines the range of concepts and specific learning objectives required by, and used by, all physicians, regardless of their specialty or area of expertise. It spans both the Basic and Advanced Training Programs and is also used as a key component of the CPD program.

Together with the various Basic and Advanced Training Curricula, the PQC integrates and fully encompasses the diagnostic, clinical, and educative-based aspects of the physician's/paediatrician's daily practice.

Each of the concepts and objectives within the PQC will be taught, learnt, and assessed within the context of everyday clinical practice. It is important, therefore, that they be aligned with, and fully integrated into, the learning objectives within this curriculum.

EXPECTED OUTCOMES AT THE COMPLETION OF TRAINING

Graduates from this training program will be equipped to function effectively as a rheumatology specialist within the current and emerging professional, medical, and societal contexts.

At the completion of their overall training program, it is expected that a new Fellow will:

- have a sound knowledge of the epidemiology and socio-economic impact of rheumatic disorders
- have a thorough understanding of basic and applied medical sciences relevant to rheumatic disorders, including morbid anatomy, pathophysiology, chemical pathology, immunology, and microbiology
- have a thorough understanding of the classification, clinical features, laboratory findings, pathophysiology, physical, and psychosocial impact of rheumatic disorders
- be expert in the wholistic assessment and management of patients with rheumatic disorders, including cognitive, behavioural, and biopsychosocial components
- be expert in the pharmacotherapy of rheumatic disorders, including the use of conventional and biologic disease modifying and immunosuppressive drugs and analgesic, steroidal and non-steroidal anti-inflammatory drugs (NSAIDs) with knowledge of their adverse effects and toxicity monitoring procedures
- be competent in the use of appropriate diagnostic and therapeutic procedures, including joint and soft tissue injection and aspiration, and synovial fluid examination
- have training in research techniques, statistical methods, and in critical evaluation of the medical literature
- promote research in rheumatology by supporting or participating in research activities
- contribute to the education of colleagues, junior medical officers, students, other health care workers, and the public
- maintain excellence personally and within the field of rheumatology by actively participating in CPD and quality assurance activities.

CURRICULUM THEMES AND LEARNING OBJECTIVES

This specialty curriculum builds on the Basic Training Curriculum and the competencies therein are assumed. The PQC maintains relevance through Basic and Advanced Training by staging the introduction of advanced competencies. These are considered integral to rheumatology Advanced Training and will be assessed.

The domains and themes from the PQC are reproduced here for reference:

Domain 1	**Communication**
Theme 1.1	Physician–Patient Communication
Theme 1.2	Communicating with a Patient's Family and/or Carers
Theme 1.3	Communicating with Colleagues And Broader Health Care Team
Theme 1.4	Communicating with The Broader Community
Domain 2	**Quality and Safety**
Theme 2.1	Using Evidence and Information
Theme 2.2	Safe Practice
Theme 2.3	Identifying, Preventing and Managing Potential Harm
Domain 3	**Teaching and Learning (Scholar)**
Theme 3.1	Ongoing Learning
Theme 3.2	Research
Theme 3.3	Educator
Domain 4	**Cultural Competency**
Theme 4.1	Cultural Competency
Domain 5	**Ethics**
Theme 5.1	Professional Ethics
Theme 5.2	Personal Ethics
Theme 5.3	Ethics and Health Law
Domain 6	**Clinical Decision Making**
Theme 6.1	Clinical Decision Making
Domain 7	**Leadership and Management**
Theme 7.1	Self-Management
Theme 7.2	Leadership and Managing Others

Domain 8	**Health Advocacy**
Theme 8.1	Advocacy for the Patient
Theme 8.2	Individual Advocacy
Theme 8.3	Group Advocacy
Domain 9	**The Broader Context of Health**
Theme 9.1	Burden of Disease
Theme 9.2	Determinants of Health
Theme 9.3	Prevention and Control
Theme 9.4	Priority Population Groups
Theme 9.5	Economics of Health

Each of the curriculum documents has been developed using a common format, thereby ensuring a degree of consistency and approach across the spectrum of training.

Domains

The domains are the broad fields which group common or related areas of learning.

Themes

The themes identify and link more specific aspects of learning into logical or related groups.

Learning Objectives

The learning objectives outline the specific requirements of learning. They provide a focus for identifying and detailing the required knowledge, skills, and attitudes. They also provide a context for specifying assessment standards and criteria as well as providing a context for identifying a range of teaching and learning strategies.

RHEUMATOLOGY SPECIFIC LEARNING OBJECTIVES

Physicians have a unique role, with a distinct body of knowledge, skills, attitudes, and behaviours which enable them to provide clinical care to the highest standards of excellence. Rheumatologists direct these fields of learning to the effective care of patients with rheumatic disorders. All physicians must apply effective forms of reasoning to make complex clinical decisions.

Their care is characterised by up-to-date, ethical, and resource efficient clinical practice as well as by effective communication in partnership with patients, other health care providers, and the community.

Domain 1 elaborates on Domain 6 of the PQC: Clinical decision making or 'Medical expert' as specifically required for Rheumatology Advanced Training. Theme 1.1 is reproduced from Domain 6 of the PQC for reference. Themes 1.2 and 1.3 are unique to this curriculum.

For Rheumatology Advanced Training, all themes and learning objectives should be considered as related to the investigations, procedures, and therapeutics in Domain 2 of the curriculum and the appended list of rheumatic disorders.

Where specific knowledge and/or skills require reinforcement, these are signposted by links from this specialist curriculum to relevant areas of the other curricula.

LEARNING OBJECTIVE TABLES

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.1	Clinical Decision Making – (PCQ)
Learning Objectives	
1.1.1	Understand and apply the process of diagnostic reasoning
1.1.2	Prognosticate and articulate risk
1.1.3	Derive therapeutic decisions which maximise patient benefit and acceptance
1.1.4	Use evidence effectively and efficiently to inform clinical decision making
Theme 1.2	Diagnosis in Rheumatology
Learning Objectives	
1.2.1	Elicit a medical history to diagnose accurately, and manage appropriately, patients with suspected or established rheumatic disorders
1.2.2	Examine the musculoskeletal and other systems to diagnose accurately, and manage appropriately, patients with suspected or established rheumatic disorders
1.2.3	Order and interpret relevant, cost-effective investigations to diagnose accurately and manage patients with suspected or established rheumatic disorders
Theme 1.3	Therapeutics in Rheumatology
Learning Objectives	
1.3.1	Prescribe and monitor pharmacological therapeutics in patients with rheumatic disorders
1.3.2	Use core rheumatologic procedures in the management of patients with rheumatic disorders
1.3.3	Use and monitor non-pharmacological and non-surgical interventions in patients with rheumatic disorders
1.3.4	Collaborate with other medical services to appropriately manage patients with rheumatic disorders

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.1	General Knowledge
Learning Objectives	
2.1.1	Demonstrate operational general knowledge as applied to musculoskeletal conditions
Theme 2.2	Basic Sciences
Learning Objectives	
2.2.1	Demonstrate operational knowledge of basic sciences as applied to musculoskeletal conditions
Theme 2.3	Clinical Sciences
Learning Objectives	
2.3.1	Demonstrate operational knowledge as applied to musculoskeletal conditions of adult rheumatic disorders and related conditions
2.3.2	Demonstrate operational knowledge as applied to musculoskeletal conditions of paediatric rheumatic disorders and related conditions
2.3.3	Demonstrate operational knowledge as applied to the investigation of musculoskeletal conditions
Theme 2.4	Therapeutics
Learning Objectives	
2.4.1	Therapeutic modalities and strategies
2.4.2	Physical therapy and rehabilitation
2.4.3	Prevention of musculoskeletal conditions
2.4.4	Appropriate use of and referral to rehabilitation specialists and pain clinics
2.4.5	Psychosocial aspects of disability
2.4.6	Surgical intervention
2.4.7	Complementary medicine
Theme 2.5	Clinical Skills
Learning Objectives	
2.5.1	Elicit a history
2.5.2	Perform physical examination
2.5.3	Use, apply, and interpret measures of disease activity, functional status, and cumulative damage that are appropriate for a patient's condition

2.5.4	Elaborate an appropriate differential diagnosis and an investigational plan
2.5.5	Analyse and interpret clinical, laboratory, and imaging data
2.5.6	Develop an appropriate management plan
2.5.7	Recognise, assess, and manage emergency rheumatological situations
2.5.8	Design an appropriate follow-up plan
2.5.9	Demonstrate effective, appropriate, and timely cooperation with other health professionals
Theme 2.6	Technical Skills
Learning Objectives	
2.6.1	Aspiration of joints and bursae
2.6.2	Injection of joints and soft tissue
2.6.3	Synovial fluid analysis under polarised light
2.6.4	Interpretation of musculoskeletal imaging, bone scintigraphy, and bone densitometry
Theme 2.7	Optional Skills
Learning Objectives	
2.7.1	Perform procedures considered optional
Theme 2.8	Attitudes
Learning Objectives	
2.8.1	Demonstrate effective behaviours to convey the highest standards of care for patients and make valuable contributions to the professional development of self and others

LEARNING OBJECTIVE TABLES	
PQC	Professional Qualities Curriculum
BTC	Basic Training Curriculum
Knowledge and Skill competencies are referenced to Domain 2 of the Rheumatology Advanced Training Curriculum	
Assessments are detailed with online links in Domain 1 of the Rheumatology Advanced Training Curriculum	

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.2	Diagnosis in Rheumatology
Learning Objective 1.2.1	Elicit a medical history to diagnose accurately, and manage appropriately, patients with suspected or established rheumatic disorders
Links	BTC 1.1.1 Elicit the history and obtain other relevant data
	BTC 1.1.3 Synthesise findings from history and examination to develop a differential diagnosis and management plan

Knowledge	Skills
• 2.1.1.1 classification of musculoskeletal conditions • 2.2.1.3 pathophysiology • 2.3.1 adult musculoskeletal conditions and problems • 2.3.2 paediatric musculoskeletal and connective tissue conditions and problems.	• 2.5.1 elicit a history • 2.5.3 use, apply, and interpret measures of disease activity, functional status, and cumulative damage that are appropriate for the patient's condition • 2.5.4 elaborate an appropriate differential diagnosis and an investigational plan • 2.5.5 analyse and interpret clinical, laboratory, and imaging data • 2.5.6 develop an appropriate management plan • 2.5.7 recognise, assess, and manage emergency rheumatological conditions • 2.5.8 design an appropriate follow-up plan • 2.5.9 demonstrate effective, appropriate, and timely cooperation with other health professionals.

Assessment Methods
• logbook • mini-clinical evaluation exercise (mini-CEX) • case review • supervisor's report.

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.2	Diagnosis in Rheumatology
Learning Objective 1.2.2	Examine the musculoskeletal and other systems to diagnose accurately, and manage appropriately, patients with suspected or established rheumatic disorders
Links	BTC 1.1.2 Conduct an appropriate physical examination
	BTC 1.1.3 Synthesise findings from history and examination to develop a differential diagnosis and management plan

Knowledge	Skills
• 2.1.1.1 classification of musculoskeletal conditions • 2.2.1.3 pathophysiology • 2.3.1 adult musculoskeletal conditions and problems • 2.3.2 paediatric musculoskeletal and connective tissue conditions and problems.	• 2.5.3 use, apply, and interpret measures of disease activity, functional status, and cumulative damage that are appropriate for the patient's condition • 2.5.7 recognise, assess, and manage emergency rheumatological conditions.

Assessment Methods
• logbook • mini-CEX.

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.2	Diagnosis in Rheumatology
Learning Objective 1.2.3	Order and interpret relevant, cost-effective investigations to diagnose accurately and manage patients with suspected or established rheumatic disorders

Knowledge	Skills

• describe laboratory investigations, e.g. blood and urine tests, relevant to rheumatological diagnosis, including:
  • blood counts, clinical chemistry and indices of inflammation
  • immunological tests, autoantibodies, immunoglobulins, and electrophoresis
  • specialised chemistry tests
  • genetic marker
  • coagulation tests
  • general medical tests, e.g. thyroid function
  • serological tests, e.g. hepatitis B, C and HIV screening
	• form an investigation plan for each patient presenting with suspected rheumatic disease
	• order tests in a logical sequence progressing from simple to more complex, and from screening to diagnostic testing, e.g. order anti-nuclear antibodies before double stranded DNA
	• recognise when tests are not required based on the clinical history:
	  • rheumatoid factor in a patient with chronic back pain and no history to suggest rheumatoid arthritis
	  • HLA B27 in a patient with an established diagnosis of ankylosing spondylitis

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.2	Diagnosis in Rheumatology
Learning Objective 1.2.3	Order and interpret relevant, cost-effective investigations to diagnose accurately and manage patients with suspected or established rheumatic disorders

- describe laboratory investigations, e.g. blood and urine tests, relevant to rheumatological diagnosis, including:
  - blood counts, clinical chemistry, and indices of inflammation
  - immunological tests, autoantibodies, immunoglobulins, and electrophoresis
  - specialised chemistry tests
  - genetic marker
  - coagulation tests
  - general medical tests, e.g. thyroid function
  - serological tests, e.g. hepatitis B, C, and HIV screening
- describe radiological and imaging investigations, including:
  - plain radiographs
  - MRI and CT scanning
  - specialised tests, e.g. PET scanning
  - isotope bone scanning
  - bone mineral density scanning
  - diagnostic ultrasound
  - microscopy and microbiology tests
  - polarised light microscopy of synovial fluid
  - standard microscopy, culture, and sensitivity testing of biological fluids
  - microscopy of urinary sediment
- describe the use of biopsy and histopathology, including:
  - renal biopsy
  - metabolic bone biopsy
  - skin biopsy
  - muscle biopsy
  - peripheral nerve biopsy
- outline the use of neuroelectrophysiological tests, including:
  - nerve conduction
  - electromyography
- explain the Bayesian theory as it applies to diagnostic tests in rheumatic disease
- describe resource implications and availability of investigations

- show sensitivity towards patient anxiety in relation to investigations and provide explanations appropriate to patient's level of knowledge and understanding
- follow-up on test results and take action based upon them, communicate results to patients
- maintain relationships with laboratory, imaging, and other diagnostic services
- ask for and receive advice in complex cases
- use diagnostic services cost-effectively.

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.2	Diagnosis in Rheumatology
Learning Objective 1.2.3	Order and interpret relevant, cost-effective investigations to diagnose accurately and manage patients with suspected or established rheumatic disorders

- recognise the impact on patients of the particular tests arranged, i.e. physical and emotional effects.

Assessment Methods

- direct observation (observed clinical encounters)
- chart review
- case presentation for peer review
- audit.

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.3	Therapeutics in Rheumatology
Learning Objective 1.3.1	Prescribe and monitor pharmacological therapeutics in patients with rheumatic disorders

Knowledge

- describe pharmacology, toxicology, and therapeutics, including:
  - symptomatic treatments for rheumatic disease, including analgesics and NSAIDs
  - disease modifying anti-rheumatic drugs, both conventional and biological
  - drugs used in chronic pain management
  - glucocorticoids
  - cytotoxic drugs as used for vasculitis
  - intravenous therapies for severe Raynaud's phenomenon and pulmonary arterial hypertension.

Skills

- use drug toxicity monitoring
- use disease activity indexes
- use combination therapies in inflammatory disease
- use laboratory, imaging, and bone density modalities to monitor patients for long-term effects of drugs
- select drug therapy related to severity of patient's condition and likelihood of benefit
- evaluate and manage risks and benefits of treatment, and communicate these to patients.

Assessment Methods

- direct observation (observed clinical encounter)
- audit (chart review).

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.3	Therapeutics in Rheumatology
Learning Objective 1.3.2	Use core rheumatologic procedures in the management of patients with rheumatic disorders

Knowledge	Skills
• describe indications for joint aspiration • describe indications for local and intra-articular steroid injection • identify risks and benefits of joint aspiration, local, and intra-articular injection treatment • describe indications and techniques for nerve block • explain how to perform polarised light microscopy for crystal arthritis • describe indications for intrathecal or epidural injection.	• use soft tissue injection therapy, e.g. bursitis and tendonitis • perform arthrocentesis of large and small joints • use intra-articular injection on small and large joints • explain metabolic bone biopsy (observed) • perform a skin biopsy • perform nerve block, e.g. suprascapular nerve block (observed) • examine synovial fluids by polarised light microscopy.

Assessment Methods

- direct observation of supervised procedures
- logbook.

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.3	Therapeutics in Rheumatology
Learning Objective 1.3.3	Use and monitor non-pharmacological and non-surgical interventions in patients with rheumatic disorders

Knowledge	Skills

• describe the role of:
  • physiotherapy
  • occupational therapy
  • orthotics
  • dietary therapy
  • exercise therapy
  • patient education
  • self-management
  • accessing community services.
	• work in a multidisciplinary team
	• make appropriate referral to allied health professionals, such as:
	  • nursing staff
	  • physiotherapists
	  • occupational therapists
	  • dieticians
	  • social workers.

Assessment Methods

- multi-source feedback (MSF)
- chart review
- direct observation.

DOMAIN 1	FUNDAMENTALS OF RHEUMATOLOGY PRACTICE
Theme 1.3	Therapeutics in Rheumatology
Learning Objective 1.3.4	Collaborate with other medical services to appropriately manage patients with rheumatic disorders

Knowledge	Skills

• describe the role of:
  • general practice
  • other physician subspecialties
  • dermatology
  • psychiatry
  • interventional radiology
  • orthopaedic surgery
  • plastic surgery
  • ophthalmology.
	• work collaboratively with other health service professionals to achieve desired outcomes for patients.

Assessment Methods

- MSF
- chart review.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES

To fulfil the learning objectives listed in Domain 1, the trainee must exhibit, at the completion of training, specific competencies which include knowledge, skills, and attitudes. These are listed in Domain 2. Explanatory notes follow.

Theme 2.1	General Knowledge
Learning Objective 2.1.1	Demonstrate operational general knowledge as applied to musculoskeletal conditions
2.1.1.1	Epidemiological methods in the study of rheumatic disease
2.1.1.2	Basic statistics for medical sciences
2.1.1.3	Principles of evidence-based practice
2.1.1.4	Economic, psychological, and social consequences of rheumatic disease
2.1.1.5	Regulation of local health systems, including allocation of resources and social policies specific to musculoskeletal conditions

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.2	Basic Sciences	
Learning Objective 2.2.1	Demonstrate operational knowledge of basic sciences as applied to musculoskeletal conditions	
2.2.1.1	**Anatomy** Including the structure and function of:	
	• bone • joints • connective tissue • muscle	• tendons • nerves • blood vessels.
2.2.1.2	**Immunology** Including the basic structure and function of:	
	• central and peripheral lymphoid organs	• cellular and molecular components of the immune system.
2.2.1.3	**Physiology** As applicable to the understanding of the mechanisms and the treatment of musculoskeletal conditions, including:	
	• cellular and molecular biology • biomechanics • pathophysiology of pain • immune mechanisms – auto-immunity, immune complex, and graft vs. host disease	• genetics • infectious agents • ageing.
2.2.1.4	**Pharmacology** Including basic principles of drug management, pharmacology of agents used in rheumatic disease, and their interactions with other medications.	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.3	Clinical Sciences	
Learning Objective 2.3.1	Demonstrate operational knowledge as applied to musculoskeletal conditions of adult rheumatic disorders and related conditions	
2.3.1.1	Classification of rheumatic disorders	
2.3.1.2	Demonstrate indepth and updated knowledge of the rheumatic disorders listed in the appended list of rheumatic disorders. For each disease this will include:	
	• epidemiology • natural history • aetiology	• clinical presentation • pathology • treatment.
	The depth of knowledge expected shall be proportional to the prevalence and potential seriousness of each condition in current rheumatology practice.	
2.3.1.3	Demonstrate operational knowledge of non-musculoskeletal conditions involved in differential diagnosis or which have implications for the management of musculoskeletal conditions, such as:	
	• cardiovascular and renal disease • interstitial lung diseases • hypertension • glaucoma	• muscle dystrophies • diabetes mellitus • hypercoagulable states • infections.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.3	Clinical Sciences
Learning Objective 2.3.2	Demonstrate operational knowledge as applied to musculoskeletal conditions of paediatric rheumatic disorders and related conditions
2.3.2.1	In Australia and New Zealand, paediatric rheumatology is a separate medical specialty, or is shared between paediatricians and rheumatologists. These recommendations are aimed at the minimum competence for all rheumatologists. Rheumatologists will often be responsible for continued care for children with musculoskeletal conditions through adolescence to adulthood and must, therefore, be well trained in dealing with adolescent and paediatric diseases persisting into adulthood and their sequelae.
2.3.2.2	Assess and formulate a limited differential diagnosis for the conditions listed under no.15 of the list of rheumatic disorders, including consideration of non-musculoskeletal conditions in children that can mimic musculoskeletal conditions (no.16 of the list of rheumatic disorders) and know how they differ from the same, or similar, disease in adults.
2.3.2.3	Recognise the principles of management of the child with a musculoskeletal condition and of specific diseases (as listed under no.15 of the list of rheumatic disorders).
2.3.2.4	Describe the natural history of paediatric musculoskeletal conditions (no.15 of the list of rheumatic disorders), their major complications (no.17 of the list of rheumatic disorders), and their implications in adult life.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.3	Clinical Sciences
Learning Objective 2.3.3	Demonstrate operational knowledge as applied to the investigation of musculoskeletal conditions

2.3.3.1	Demonstrate full understanding of the biologic rationale, use, cost, limitations, and interpretation of all investigations used in the regular management of musculoskeletal conditions and syndromes. This will include consideration of test-performance characteristics: sensitivity, specificity, and predictive value. The trainee will gain an understanding of the different methods used to measure analytes and how the different methods may influence the clinical use of a test.	
2.3.3.2	**Investigations include diagnostic testing**	
A.	**Laboratory tests** For each test, understand the biologic rationale, methods for performing, and use/limitations of specific laboratory tests, including but not 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-double stranded DNA • anti-U ribonucleoprotein • anti-Smith	• anti-centromere antibodies • anti-histone antibodies • 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:	
	• rapid plasma reagin • anticardiolipin	• lupus anticoagulant • beta-2-glycoprotein I antibodies
8.	antibodies to formed blood elements, including:	
	• direct and indirect Coombs testing • anti-granulocyte antibodies	• anti-platelet antibodies
9.	assays for complement activity (CH50) and components of the complement cascade	
10.	serum immunoglobulin levels, serum protein electropheresis, and immunofixation	
11.	human leukocyte antigen (HLA) typing	
12.	antistreptolysin O titer ASO and other streptococcal antibody tests	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.3	Clinical Sciences	
Learning Objective 2.3.3	Demonstrate operational knowledge as applied to the investigation of musculoskeletal conditions	
13.	serologic and polymerase chain reaction tests for:	
	• Lyme disease • hepatitis B • hepatitis C	• HIV • parvovirus • 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 • MRI • CT	• ultrasonography and radionuclide scanning of bones, joints and periarticular and vascular structures.
C.	**Synovial fluid analysis**	
	• cell count and differentia • viscosity • glucose	• crystal identification • protein • other special stains/analyses.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.4	Therapeutics	
Learning Objective 2.4.1	Therapeutic modalities and strategies	
2.4.1.1	**Pharmacology** For each medication understand the:	
	• dosing • metabolism • side effects • compliance issues	• pharmacokinetics • mechanisms of action • drug interactions • costs
	• use in specific patient populations, such as renal insufficiency and including fertile, lactating, and pregnant women	
a.	NSAIDs	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES		
Theme 2.4	Therapeutics		
Learning Objective 2.4.1	Therapeutic modalities and strategies		
b.	glucocorticoids:		
	• topical	• intra-articular	• systemic
c.	systemic antirheumatic drugs:		
	• antimalarials • gold compounds • D-penicillamine	• sulfasalazine • methotrexate	
d.	cytotoxic/anti-metabolite drugs:		
	• azathioprine	• cyclophosphamide	• chlorambucil
e.	immunomodulatory drugs:		
	• cyclosporine	• mycophenolate mofetil	• tacrolimus
f.	biologic agents:		
	• TNF alpha inhibitors • abatacept	• anakinra • tocilzumab	• rituximab
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.	cholinergics and non-pharmacologic agents used for the treatment of sicca symptoms		
l.	anticoagulants and anti-thombotic agents used in the treatment of immune mediated thrombophilic problems:		
	• warfarin • low molecular weight heparin	• heparin • aspirin	
m.	drugs used in the treatment of metabolic bone disease:		
	• calcium and vitamin • selective oestrogen receptor modulators • parathyroid hormone	• bisphosphonate therapy • strontium ranelate	
n.	others:		
	• apheresis	• ionising radiation.	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.4	Therapeutics	
Learning Objective 2.4.2	Physical therapy and rehabilitation	
2.4.2.1	Demonstrate operational knowledge of indications, risks, and limitations of physical therapy and rehabilitation, including:	
	• footwear and orthotics • hydrotherapy • adaptive equipment and assistive devices	• rest and splinting • spa therapy • joint protection and energy conservation techniques
	• exercise – range of motion, strengthening, conditioning, and stretching.	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.4	Therapeutics	
Learning Objective 2.4.3	Prevention of musculoskeletal conditions	
2.4.3.1	Demonstrate operational knowledge of methods used in prevention of musculoskeletal conditions, including:	
	• work-related • patient education	• life-style and nutritional issues.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.4	Therapeutics
Learning Objective 2.4.4	Appropriate use of and referral to rehabilitation specialists and pain clinics

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.4	Therapeutics
Learning Objective 2.4.5	Psychosocial aspects of disability
2.4.5.1	Demonstrate an understanding of the psychosocial aspects of disability.
	Understand the impact that the following factors have on the overall therapy of a patient with rheumatic disease.
	Demonstrate knowledge of what can be done to assist a patient in these areas.
1.	psychological, emotional, and spiritual aspects of disease, including sexuality

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES		
Theme 2.4	Therapeutics		
Learning Objective 2.4.5	Psychosocial aspects of disability		
2.	economic and vocational issues:		
	• vocational rehabilitation	• costs of therapy	• monitoring
3.	disability determination:		
	• impairment vs. disability • social security • worker's compensation	• evaluation and measurement • disability • other	
4.	compliance issues.		

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.4	Therapeutics	
Learning Objective 2.4.6	Surgical intervention	
2.4.6.1	For common surgical procedures employed in the treatment of musculoskeletal conditions, the trainee should demonstrate operational knowledge of:	
	• indications • contraindications • postoperative management	• preoperative evaluation and medication adjustments • complications • expected outcome.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.4	Therapeutics	
Learning Objective 2.4.7	Complementary medicine	
2.4.7.1	The trainee should demonstrate operational knowledge of alternative practices, including:	
	• diet • antimicrobials • chiropractic • topical therapies	• nutritional supplements • acupuncture • homeopathic remedies • venoms and others.
	The trainee should be able to discuss the evidence base for these treatments and communicate these to patients.	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
The core clinical skills required from the new rheumatologist include the ability to collect and interpret relevant information about a person with a musculoskeletal problem including: • history • physical examination • laboratory • imaging studies.	
The trainee should be able to use it in the light of medical knowledge to: • perform differential diagnosis • assess the patient's global status • plan further evaluation • organise and implement a comprehensive management plan for the patient and assess its effect. *This may include children, depending on the circumstances of practice.*	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.1	Elicit a history
2.5.1.1	Including history from patients, relatives, or other medical professionals that is relevant, concise, accurate, and appropriate to the patient's problem(s), including consideration of the patient's perspective.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.2	Perform physical examination
2.5.2.1	Including full detailed assessment of the musculoskeletal system that is appropriate to the patient's problems.
	The history and physical examination must recognise non-articular manifestations, especially those with potential implications in the diagnosis and/or management of musculoskeletal conditions.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.5	Clinical Skills	
Learning Objective 2.5.3	Use, apply, and interpret measures of disease activity, functional status, and cumulative damage that are appropriate for a patient's condition	
2.5.3.1	• health assessment questionnaire (HAQ)	• short form 36
	• disease activity score (DAS) for rheumatoid arthritis	• bath ankylosing spondylitis disease activity index (BASDAI)
	• bath ankylosing spondylitis functional index (BASFI)	• bath ankylosing spondylitis metrology index (BASMI)
	• systemic lupus erythematosus disease activity index (SLEDAI).	

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.4	Elaborate an appropriate differential diagnosis and an investigational plan
2.5.4.1	Demonstrating: • a rational and cost-effective use • interpretation of relevant investigations.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.5	Analyse and interpret clinical, laboratory, and imaging data
2.5.5.1	Derived by the above processes to establish the most likely diagnosis(es) and a comprehensive assessment of the patient's status.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.6	Develop an appropriate management plan
2.5.6.1	Based on up-to-date scientific information as well as clinical judgment, that accounts for cost and patient preferences and circumstances.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.6	Develop an appropriate management plan
	This will include demonstration of the ability to: • use medications and other therapeutic options • perform patient and family education and support • employment of preventive care • incorporation of the expertise of other health professionals.
	The new rheumatologist will demonstrate appropriate use of medications under special circumstances, including: • childhood • pregnancy • lactation • renal insufficiency and others.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES	
Theme 2.5	Clinical Skills	
Learning Objective 2.5.7	Recognise, assess, and manage emergency rheumatological situations	
2.5.7.1	Including:	
	• scleroderma renal crisis • atlantoaxial dislocation • temporal arteritis	• pulmonary arterial hypertension • catastrophic phospholipid antibody syndrome.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.8	Design an appropriate follow-up plan
2.5.8.1	Including:
	• the assessment of response to treatment, the knowledge of expectations, recognition of adverse events.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.5	Clinical Skills
Learning Objective 2.5.9	Demonstrate effective, appropriate, and timely cooperation with other health professionals
2.5.9.1	As needed for optimal patient care.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.6	Technical Skills
Routinely and safely perform without supervision the following technical procedures:	
Learning Objective 2.6.1	Aspiration of joints and bursae
Learning Objective 2.6.2	Injection of joints and soft tissue
Learning Objective 2.6.3	Synovial fluid analysis under polarised light
Learning Objective 2.6.4	Interpretation of musculoskeletal imaging, bone scintigraphy, and bone densitometry

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.7	Optional Skills
Learning Objective 2.7.1	Perform procedures considered optional
2.7.1.1	The performance of the following procedures are considered optional and may be the object of specific regulation at a national level: • biopsies of relevant tissues and organs, e.g. synovium, skin, subcutaneous fat, minor salivary glands, bone, muscle, nerves, kidney, and temporal artery • bone densitometry • musculoskeletal ultrasound • capillaroscopy • electromyography • arthroscopy • injection techniques under imaging guidance • radioactive or chemical synovectomy • other.

DOMAIN 2	KNOWLEDGE, SKILLS, AND ATTITUDES
Theme 2.8	Attitudes
Learning Objective 2.8.1	Demonstrate effective behaviours to convey the highest standards of care for patients and make valuable contributions to the professional development of self and others

2.8.1.1	This includes the ability to:
	• provide compassionate and humane care
	• work in a multidisciplinary and multiprofessional team
	• provide timely well-documented assessments and recommendations in written and/or verbal forms
	• perform disability determination and measurement in the field of social security disability, worker's compensation, and other
	• access, retrieve, critically evaluate, and apply information from all sources in maintaining the highest standard of patient evaluation, care, and management
	• show insight into own limitations of expertise by self-assessment
	• identify and respond appropriately to ethical issues relevant to rheumatology practice
	• demonstrate medical expertise in situations other than those involving direct patient care, e.g.:
	  • medical presentations
	  • teaching
	  • patient and referring physician education
	  • medico-legal opinions.

APPENDIX: LIST OF RHEUMATIC DISORDERS

1. Rheumatoid arthritis

2. Seronegative spondyloarthropathies

- ankylosing spondyliti
- reactive arthritis
- psoriatic arthritis
- inflammatory bowel disease-associated arthritis
- arthritis associated with acne and other skin disease
- SAPHO syndrome
- undifferentiated spondyloarthritis.

3. Lupus erythematosus and antiphosholipid syndrome

- systemic
- discoid
- primary and secondary antiphospholipid antibody syndrome
- drug-related systemic lupus erythematosus.

4. Scleroderma

- diffuse and limited systemic sclerosis
- chemical or drug-related
- localised syndromes
- sclerodermiform syndromes.

5. Other systemic connective tissue diseases

- eosinophilic fasciitis
- Sjögren's syndrom
- polymyositis and dermatomyositis
- relapsing polychondritis
- adult-onset Still's disease
- eosinophilia-myalgia syndrome
- relapsing panniculitis
- erythema nodosum
- undifferentiated connective tissue disease
- overlap syndromes, including mixed connective tissue disease.

6. Vasculitis and related diseases

- polyarteritis nodosa
- temporal arteritis and polymyalgia rheumatica
- hypersensitivity and small vessel vasculitis
- Takayasu's arteritis
- systemic necrotising vasculitis overlaps
- Behcet's disease
- cryoglobulinemia
- Cogan's syndrome
- Sweet's syndrome
- central nervous system vasculitis
- pseudovasculitis
- endangitis obliterans (Buerger's disease)
- periaortitis (Ormond's syndrome)

- Wegener's granulomatosis and other antineutrophil cytoplasmic antibodies (ANCA)-associated diseases like microscopic polyarteritis and allergic granulomatosis of Churg-Strauss.

APPENDIX: LIST OF RHEUMATIC DISORDERS

7.	Infectious and reactive arthritis Infectious/septic arthritis
• bacterial – non-gonococcal and gonococcal • spirochetal – syphilis and Lyme • viral – HIV, hepatitis B, parvovirus and other • fungal • reactive arthritis • parasitic Whipple's disease • arthritis associated with subacute bacterial endocarditis	• acute rheumatic fever • mycobacterial • intestinal bypass arthritis • post dysenteric arthritis • post-immunisation arthritis • other colitic-associated arthropathies.
8.	**Disorders of the locomotor system associated with primarily metabolic, endocrine, or haematological diseases**
Crystal-associated diseases:	
• monosodium urate monohydrate (gout) • basic calcium phosphate (hydroxyapatite)	• calcium pyrophosphate dihydrate deposition disease • calcium oxalate.
Endocrine-associated diseases:	
• hypoparathyroidism • acromegaly • hyperparathyroidism • rheumatic syndromes associated with diabetes mellitus	• hyperthyroidism • hypothyroidism • Cushing's disease.
Haematological-associated diseases:	
• angio-immunoblastic lymphadenopathy • haemoglobinopathies • myeloproliferative syndromes • rheumatic syndromes associated with haemophilia	• multiple myeloma • Hodgkin and non-Hodgkin lymphoma • primary and drug-induced myelodysplastic.
9.	**Bone and cartilage disorders**
Osteoarthritis:	
• primary and secondary osteoarthritis	• chondromalacia.

APPENDIX: LIST OF RHEUMATIC DISORDERS

9.	Bone and cartilage disorders

Patellae metabolic bone disease:

• osteoporosis	• osteomalacia

- bone disease related to renal disease, Paget's disease of bone and avascular necrosis of bone: idiopathic, secondary causes, and osteochondritis dissecans.

Others:

• transient osteoporosis • hypertrophic osteoarthropathy	• diffuse idiopathic skeletal hyperostosis • insufficiency fractures.

10.	Hereditary, congenital, and inborn errors of metabolism associated with rheumatic syndromes

Disorders of connective tissue:

• Marfan's syndrome • osteogenesis imperfecta • Ehlers-Danlos syndromes	• pseudo xanthoma elasticum • hypermobility syndrome • other mucopolysaccharidoses

Osteochondrodysplasias:

• multiple epiphyseal dysplasia	• spondylepiphyseal.

Dysplasia inborn errors of metabolism affecting connective tissue:

• homocystinuria	• ochronosis.

Storage disorders:

• Farber's lipogranulomatosis • Gaucher's disease	• Fabry's disease.

Immunodeficiency:

- acquired and hereditary neutropenia
- immunoglobulin A deficiency, common variable immunodeficiency and other forms of hypogammaglobulinemia, e.g. Bruton's disease and hyper-IgM syndromes

Primary: T cell defects, including:

• severe combined immunodeficiency (SCID)	• adenosine deaminase (ADA)	• purine nucleoside phosphorylase deficiency

Secondary: T cell deficiencies, e.g.

• HIV	• low cluster of differentiation (CD)4 syndrome	• drug induced

APPENDIX: LIST OF RHEUMATIC DISORDERS

Immunodeficiency:

Autoinflammatory syndromes, including:

- familial Mediterranean fever
- Muckle-Wells Syndrome
- tumour necrosis factor receptor-associated periodic syndromes.

Others:

- haemochromatosis
- myositis ossificans progressiva
- hyperlipidemic arthropathy
- Wilson's disease.

11. Non-articular and regional musculoskeletal disorders

- fibromyalgia
- myofascial pain syndromes

Axial syndromes:

- spinal stenosi
- coccydynia
- low back pain
- cervical pain syndromes
- intervertebral disc disease and radiculopathies
- osteitis condensans ili
- osteitis pubis
- spondylolisthesis/spondylolysis
- infectious and aseptic diskiti.

Regional musculoskeletal disorders:

In addition to bursitis, tendonitis, or enthesitis occurring around each joint, the trainee should be familiar with other disorders occurring at each specific joint site:

- cysts
- shoulder-rotator cuff tear
- adhesive capsulitis
- impingement syndrome
- wrist ganglions
- knee synovial plicae
- internal derangements
- trigger fingers and Dupuytren's contractures
- hallux rigidus
- heel pain and metatarsalgia
- temporomandibular joint disorder syndromes
- costochondritis.

Biomechanical/anatomic abnormalities associated with regional pain syndromes:

- scoliosis and kyphosis
- leg length discrepancy
- foot deformities.

Overuse rheumatic syndromes:

- occupational
- sports
- recreational
- performing artists.

APPENDIX: LIST OF RHEUMATIC DISORDERS

Sports medicine:

- injuries
- strains
- sprains
- nutrition
- female athlete
- medication issues.

Entrapment neuropathies:

- thoracic outlet syndrome
- lower extremity entrapments
- upper extremity entrapments.

Other:

- reflex sympathetic dystrophy
- erythromelalgia.

12. Neoplasms and tumour-like lesions

Benign:

Joints: loose bodies fatty and vascular lesions, synovial osteochondromatosis, pigmented villonodular synovitis and ganglions.

Tendon sheaths: fibroma, giant cell tumour and nodular tenosynovitis.

Bones: osteoid osteoma.

Malignant:

Primary: synovial sarcoma.

Secondary: leukaemia, myeloma and metastatic malignant tumours.

Malignancy-associated rheumatic syndromes: carcinomatous polyarthritis and palmo-plantar fasciitis.

13. Muscle diseases

Inflammatory:

- polymyositis
- dermatomyositis
- inclusion body myositis.

Metabolic:

- **Primary:** glycogen storage diseases, lipid metabolic disorders, myoadenylate deaminase deficiency and mitochondrial myopathies.
- **Secondary:** nutritional, toxic, endocrine disorders, electrolyte disorders, and drug-induced.
- muscular dystrophies
- myasthenia gravis

APPENDIX: LIST OF RHEUMATIC DISORDERS

14. Miscellaneous rheumatic disorders

Amyloidosis: primary, secondary and hereditary

- Raynaud's disease
- Charcot joint
- multicentric reticulohistiocytosis
- plant thorn synovitis.

- remitting seronegative symmetrical synovitis with pitting oedema.

Intermittent arthritis:

- palindromic rheumatism
- intermittent hydrarthrosis.

Arthritic and rheumatic syndromes associated with:

- sarcoidosis
- scurvy
- pancreatic disease
- chronic active hepatitis
- primary biliary cirrhosis
- drugs
- vaccinations
- environmental agents.

Others:

- rheumatic disease in the geriatric population
- rheumatic disease in the pregnant patient
- rheumatic syndromes in renal insufficiency and dialysis patients
- uveitis and scleritis.

15. Paediatric musculoskeletal conditions

- juvenile spondyloarthropathy
- Kawasaki disease
- systemic lupus erythematosus
- scleroderma syndromes
- Henoch-Shönlein purpura
- systemic juvenile rheumatoid arthritis (Still's disease)
- juvenile dermatomyositis
- polyarticular juvenile rheumatoid arthritis
- pauciarticular juvenile rheumatoid arthritis
- neonatal lupus syndrome
- acute rheumatic fever.

16. Non-rheumatic disorders in children that can mimic musculoskeletal conditions

Infectious or post-infectious syndromes:

- septic arthritis and osteomyelitis
- transient synovitis of the hip
- post-infectious arthritis and arthralgia
- post-viral myositis.

APPENDIX: LIST OF RHEUMATIC DISORDERS

Orthopaedic conditions:	
• spondylolysis and spondylolisthesis • slipped capital femoral epiphysis	• Legg-Calve-Perthes Disease and other avascular necrosis syndrome • patello-femoral syndrome.
Non-rheumatic pain:	
• benign limb pains of childhood – growing pains • pain amplification syndromes, including reflex sympathetic dystrophy	• benign hypermobility syndrome.
Neoplasm:	
• lymphoma	• primary bone tumours, especially osteosarcoma and Ewing's sarcoma
• leukaemia	• tumours metastatic to bone, especially neuroblastoma.
Other:	
• bone and cartilage dysplasias	• inherited disorders of metabolism.

17.	Complications of paediatric musculoskeletal conditions
Systemic onset juvenile rheuamtoid arthritis:	
• macrophage activation syndrome	• cardiac tamponade.
Pauciarticular juvenile rheuamtoid arthritis:	
• chronic uveiti.	
Juvenile dermatomyositis:	
• GI vasculitis	• calcinosis.
Kawasaki disease:	
• aneurysms of coronary and other arteries.	
Henoch-Schonlein purpura:	
• GI-intussusception, intestinal infarction	• renal – chronic nephritis.
Neonatal lupus syndrome:	
• congenital heart block	• thrombocytopenia.