

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate undergoing training MS in Orthopaedics should be trained to identify and recognize various congenital, developmental, inflammatory, infective, traumatic, metabolic, neuromuscular, degenerative and oncologic disorders of the musculoskeletal systems. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/secondary/tertiary healthcare centres.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

This will be dealt with under the following headings:

- Theoretical knowledge (Cognitive domain)
- Practical and clinical skills (psychomotor domain)
- Attitudes including communication skills (Affective domain)
- Writing thesis / Reviewing Research activities (Scholarly activity)
- Training in Research Methodology (Practice based learning, Evidence based practice)
- Professionalism
- Teaching skills

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive domain**

**At the end of the M.S. Orthopaedics programme, the post graduate student should be able to:**

1. Demonstrate sufficient understanding of the basic sciences relevant to orthopaedic speciality through a problem based approach.
2. Describe the Principles of injury, its mechanism and mode, its clinical presentation, plan and interpret the appropriate investigations, and institute the management of musculoskeletally injured patient.

3. Identify and describe the surface anatomy and relationships within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck.
4. Define and describe the pathophysiology of shock (circulatory failure).
5. Define and describe the pathophysiology of Respiratory failure
6. Describe the principles and stages of bone and soft tissue healing
7. Understand and describe the metabolic, nutritional, endocrine, social impacts of trauma and critical illness.
8. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.
9. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.
10. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage
11. Describe the physiological coagulation cascade and its abnormalities
12. Describe the pharmacokinetics and dynamics of drug metabolism and excretion of analgesics, anti inflammatory, antibiotics, disease modifying agents and chemotherapeutic agents.
13. Understanding of biostatistics and research methodology
14. Describe the clinical presentation, plan and interpret investigations, institute management and prevention of the following disease conditions
  - a. Nutritional deficiency diseases affecting the bones and joints
  - b. Deposition arthropathies
  - c. Endocrine abnormalities of the musculoskeletal system
  - d. Metabolic abnormalities of the musculoskeletal system
  - e. Congenital anomalies of the musculoskeletal system
  - f. Developmental skeletal disorder of the musculoskeletal system
15. Describe the pathogenesis, clinical features plan and interpret investigations and institute the management in adults and children in
  - a. Tubercular infections of bone and joints (musculoskeletal system)
  - b. Pyogenic infections of musculoskeletal system
  - c. Mycotic infections of musculoskeletal system
  - d. Autoimmune disorders of the musculoskeletal system
  - e. Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy
  - f. Osteoarthritis and spondylosis
16. Describe the pathogenesis, clinical presentation, plan and interpret investigations and institute appropriate treatment in the following conditions:
  - a. Post polio residual paralysis
  - b. Cerebral palsy
  - c. Muscular dystrophies and myopathies
  - d. Nerve Injuries
  - e. Entrapment neuropathies
17. Identify the diagnosis and describe management of musculoskeletal manifestation of AIDS and HIV infection

18. Describe the aetiopathogenesis, identify, plan and interpret investigation and institute the management of osteonecrosis of bones.
19. Identify situations requiring rehabilitation services and prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care
20. Identify a problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings.
21. Identify and manage emergency situation in disorders of musculoskeletal system
22. Understanding of the basics of diagnostic imaging in orthopaedics like:
  - a. Plain x-ray
  - b. Ultrasonography
  - c. Computerised axial tomography
  - d. Magnetic resonance imaging
  - e. PET scan
  - f. Radio Isotope bone scan
  - g. Digital Subtraction Angiography (DSA)
  - h. Dual energy x-ray Absorptiometry
  - i. Arthrography
23. Describe the aetiopathogenesis, clinical presentation, Identification, Plan investigation and institute treatment for oncologic problems of musculoskeletal system both benign and malignancies, primary and secondary.
24. Understand the basics, principles of biomaterials and orthopaedic metallurgy
25. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.
26. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.

**B. Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**Attitudes including Communication skills and Professionalism**

**a. Communication skills:**

- Exhibits participation in honest, accurate health related information sharing in a sensitive and suitable manner
- Recognizes that being a good communicator is essential to practice effectively

- Exhibits effective and sensitive listening skills
  - Recognises the importance and timing of breaking bad news and knows how to communicate
  - Exhibits participation in discussion of emotional issues
  - Exhibits leadership in handling complex and advanced communication
  - Recognizes the importance of patient confidentiality and the conflict between confidentiality and disclosure
  - Able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication
  - Able to obtain comprehensive and relevant history from patients/relatives
  - Able to counsel patients on their condition and needs
- b. Teamwork:** Seek cooperation. Coordination and communication among treating specialties and paramedical staff
- c. Counseling of relatives:** regarding patients condition, seriousness, bereavement and counseling for organ donation in case of brain stem death
- d. Leadership:** Trauma prevention, education of the public, paramedical and medical persons.  
**Advocacy:** with the government and other agencies towards cause of trauma care
- e. Ethics:** The Code of Medical Ethics as proposed by Medical Council of India will be learnt and observed.

### **C. Psychomotor domain**

**1. At the end of the first year of M.S. Orthopaedics programme, the student should be able to:**

1. Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis
2. Impart wound care where applicable
3. Apply all types of POP casts/slabs, splints and tractions as per need
4. Identify shock and provide resuscitation
5. Perform aspiration of joints and local infiltration of appropriate drugs
6. Perform appropriate wound debridement
7. Perform arthrotomy of knee joint
8. Perform incision and drainage of abscess
9. Perform split thickness skin grafting
10. Perform fasciotomes
11. Apply external fixators
12. Apply skeletal tractions including skull tongs
13. Triage a disaster situation and multiple trauma patients in an emergency room
14. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating
15. Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.

16. Perform on a cadaver standard surgical approaches to the musculo skeletal system

**2. At the end of the second year of M.S. Orthopaedics course, the student should be able to:**

1. Take an informed consent for standard orthopaedic procedures
2. Perform closed/open biopsies for lesions of bone, joints and soft tissues
3. Perform split thickness skin grafting and local flaps
4. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing.
5. Perform sequestrectomy and saucerisation
6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow
7. Perform repair of open hand injuries including tendon repair
8. Perform arthodesis of small joints
9. Perform diagnostic arthroscopy on models and their patients
10. Perform carpal tunnel/tarsal tunnel release
11. Apply ilizarov external fixator
12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities
13. Perform amputations at different levels
14. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia

**3. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:**

1. Assist in the surgical management of polytrauma patient
2. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle
3. Assist in spinal decompressions and spinal stabilizations
4. Assist in operative arthroscopy of various joints
5. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow
6. Assist in corrective osteotomes around the hip, pelvis, knee, elbow, finger and toes
7. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
8. Assist in open reduction and internal fixations of complex fractures of acetabular, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand
9. Assist in spinal deformity corrections
10. Independently perform closed/open reduction and internal fixation with DCP, LCP, intramedullary nailing, LRS
11. Assist in limb lengthening procedures
12. Assist in Revision surgeries
13. Provide pre and post OP care
14. Perform all clinical skills as related to the speciality.

# *Syllabus*

## **Course contents:**

### **1. Basic Sciences**

- Anatomy and function of joints
- Bone structure and function
- Growth factors and fracture healing
- Cartilage structure and function
- Structure and function of muscles and tendons
- Tendon structure and function
- Metallurgy in Orthopaedics
- Stem Cells in Orthopaedic Surgery
- Gene Therapy in Orthopaedics

### **2. Diagnostic Imaging in Orthopaedics**

**(Should know the interpretation and Clinical Correlation of the following): -**

- Digital Subtraction Angiography (DSA)
- MRI and CT in Orthopaedics
- Musculoskeletal USG
- PET Scan
- Radio-isotope bone scan

### **3. Metabolic Bone Diseases**

- Rickets and Osteomalacia
- Osteoporosis
- Scurvy
- Mucopolysaccharoidoses
- Fluorosis
- Osteopetrosis

### **4. Endocrine Disorders**

- Hyperparathyroidism
- Gigantism, Acromegaly

### **5. Bone and Joint Infections**

- Pyogenic Haematogenous Osteomyelitis - Acute and Chronic
- Septic arthritis
- Fungal infections
- Miscellaneous infections
- Gonococcal arthritis

- Bone and joint brucellosis
- AIDS and the Orthopaedic Surgeon (universal precautions)
- Musculoskeletal Manifestations of AIDS
- Pott's spine
- Tubercular synovitis and arthritis of all major joints

## **6. Poliomyelitis**

- General considerations
- Polio Lower limb and spine
- Management of Post Polio Residual Palsy (PPRP)

## **7. Orthopaedic Neurology**

- Cerebral Palsy
- Myopathies

## **8. Peripheral Nerve Injuries**

- Traumatic
- Entrapment Neuropathies

## **9. Diseases of Joints**

- Osteoarthritis
- Calcium Pyrophosphate Dihydrate (CPPD), Gout
- Collagen diseases

## **10. Systemic Complications in Orthopaedics**

- Shock
- Crush syndrome
- Disseminated Intravascular Coagulation (DIC)
- Acute Respiratory Distress Syndrome (ARDS)

## **11. Bone Tumors**

- Benign bone tumors
- Malignant bone tumors
- Tumor like conditions
- Metastatic bone Tumors

## **12. Miscellaneous Diseases**

- Diseases of muscles
- Fibrous Dysplasia
- Unclassified diseases of bone
- Paget's disease

- Peripheral vascular disease
- Orthopaedic manifestations of bleeding disorders

### **13. Regional Orthopaedic Conditions of Adults and Children**

- The spine
- The shoulder
- The elbow
- The hand
- The wrist
- The hip
- The knee
- The foot and ankle
- The pelvis

### **14. Biomaterials**

- Orthopaedic metallurgy
- Bio-degradable implants in Orthopaedics
- Bone substitutes
- Bone Banking

### **15. Fracture and Fracture-Dislocations**

General considerations

- Definitions, types, grades, patterns and complications
- Pathology of fractures and fracture healing
- Clinical and Radiological features of fractures and dislocations
- General principles of fracture treatment
- Recent advances in internal fixation of fractures
- Locking plate osteosyntheses
- Less Invasive Stabilisation System (LISS)
- Ilizarov technique
- Bone grafting and bone graft substitutes
- Open fractures and soft tissue coverage in the lower extremity
- Compartment syndrome
- Fractures of the upper extremity and shoulder girdle
- Fractures of the lower extremity
- Fractures of the hip and pelvis
- Malunited fractures
- Delayed union and non union of fractures
- Fractures/dislocations and fracture - dislocations of spine

### **16. Dislocations and Subluxations**

- Acute dislocations
- Old unreduced dislocations

- Recurrent dislocations

### **17. Traumatic Disorders of Joints (Sports Injuries)**

- Ankle injuries
- Knee injuries
- Shoulder and elbow injuries
- Wrist and hand injuries

### **18. Arthrodesis**

- Arthrodesis of lower extremity and hip
- Arthrodesis of upper extremity
- Arthrodesis of spine

### **19. Arthroplasty**

- Biomechanics of joints and replacement of the following joints.
- Knee
- Ankle
- Shoulder
- Elbow

### **20. Minimally Invasive Surgery (MIS)**

#### **Arthroscopy**

- General principles of Arthroscopy
- Arthroscopy of knee and ankle
- Arthroscopy of shoulder and elbow

### **21. Amputations and Disarticulations**

- Amputations and disarticulations in the lower limb
- Amputations and disarticulations in the upper limb

### **22. Rehabilitation - Prosthetics and Orthotics**

#### **23. Pediatric orthopaedics:**

- Fractures and dislocations in children
- Perthes' disease
- Slipped capital femoral epiphysis
- Congenital Dislocation of Hip (CDH)
- Neuromuscular disorders

#### **24. Spine**

- a) **Spinal trauma:** diagnosis and management including various types of fixations
  - i. Rehabilitation of paraplegics/quadriplegics
  - ii. Management of a paralyzed bladder
  - iii. Prevention of bed sores and management of established bed sores

- iv. Exercise programme and Activities of Daily Living (ADL)
- v. Psychosexual counseling

**b) Degenerative disorders of the spine**

- i. Prolapsed Inter Vertebral Disc (PIVD)
- ii. Lumbar Canal Stenosis (LCS)
- iii. Spondylolysis/Spondylolisthesis
- iv. Lumbar Spondylosis
- v. Ankylosing Spondylitis
- vi. Spinal fusion: various types and their indications.

**25. Triage, Disaster Management, BTLS and ATLS**

**26. Recent advances in orthopaedics**

- Autologous chondrocyte implantation
- Mosaicplasty
- Video assisted Thoracoscopy (VATS)
- Endoscopic spine surgery
- Metal on metal arthroplasty of hip
- Surface replacements of joints
- Microsurgical techniques in Orthopaedics
- Designing a modern orthopaedic operation theatre
  - Sterilization
  - Theatre Discipline
  - Laminar air flow
  - Modular OTs

**OF CONSULTANT**

**SIGNATURE OF HOD**