

GUIDELINES FOR COMPETENCY BASED TRAINING PROGRAMME FOR DIPLOMA 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 the Diploma in Orthopaedics programme 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 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

Subject specific learning objectives will be described under the following headings:

- Theoretical knowledge (Cognitive domain)
- Practical and clinical skills (psychomotor domain)
- Attitudes including communication skills (Affective domain)
- Professionalism
- Teaching skills

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive domain

At the end of the Diploma in Orthopaedics programme, the learner 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, clinical presentation, plan and interpret the appropriate investigations, and institute the management of musculoskeletally injured patient.
3. Define and describe the pathophysiology of shock
4. Describe the principles and stages of bone and soft tissue healing

5. Understand and describe the metabolic, nutritional, endocrine, social impacts of trauma and critical illness.
6. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.
7. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage.
8. Describe the coagulation cascade and its abnormalities.
9. Describe the pharmacokinetics and pharmacodynamics of drug metabolism, excretion of analgesics, anti-inflammatory, antibiotics, disease modifying agents and chemotherapeutic agents in bone and soft tissue tumours.
10. Describe the principles of internal and external fixation or stabilization of bone and joint injuries
11. 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
12. 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
13. 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
14. Understand the basics of research and biostatistics.
15. Describe the aetiopathogenesis, identify, plan and interpret investigation and institute the management of osteonecrosis of bones.
16. Identify situations requiring rehabilitation services and prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care
17. Identify and manage emergency situation in disorders of musculoskeletal system
18. Understanding 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
19. Describe the aetiopathogenesis, clinical presentation, Identification, Plan investigation and institute treatment for oncologic problems of musculoskeletal system both benign and malignancies, primary and secondary.
 20. 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 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

I. At the end of first year of Diploma in 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 colles fracture, supracondylar fracture.

II. At the end of the second year of D.Ortho 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. Assist in the surgical management of polytrauma patient
15. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle
16. Assist in spinal decompressions and spinal stabilizations
17. Assist in operative arthroscopy of various joints
18. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow
19. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes
20. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
21. Assist in open reduction and internal fixations of complex fractures of acetabular, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand
22. Assist in spinal deformity corrections
23. Independently perform closed/open reduction and internal fixation with DCP, LCP, intramedullary nailing, LRS
24. Assist in limb lengthening procedures
25. Assist in Revision surgeries
26. Provide pre and post OP care
27. 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

1. General considerations
2. Definitions, types, grades, patterns and complications
3. Pathology of fractures and fracture healing
4. Clinical and Radiological features of fractures and dislocations
5. General principles of fracture treatment
6. Recent advances in internal fixation of fractures
7. Locking plate osteosyntheses
8. Less Invasive Stabilisation System (LISS)
9. Ilizarov technique
10. Bone grafting and bone graft substitutes
11. Open fractures and soft tissue coverage in the lower extremity
12. Compartment syndrome
13. Fractures of the upper extremity and shoulder girdle
14. Fractures of the lower extremity
15. Fractures of the hip and pelvis
16. Malunited fractures
17. Delayed union and non union of fractures
18. 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

- Rehabilitation of paraplegics/quadruplegics
- Management of a paralyzed bladder
- Prevention of bed sores and management of established bed sores
- Exercise programme and Activities of Daily Living (ADL)
- Psychosexual counseling

b) **Degenerative disorders of the spine**

- Prolapsed Inter Vertebral Disc (PIVD)
- Lumbar Canal Stenosis (LCS)
- Spondylolysis/Spondylolisthesis
- Lumbar Spondylosis
- Ankylosing Spondylitis
- 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

Note: The emphasis during the training for diploma should be more on clinical diagnosis and basic management rather than advanced surgical skills.

TEACHING AND LEARNING METHODS

- Emphasis should be given to various small group teachings rather than didactic lectures.
- **CASE PRESENTATION** once a week in the ward, in the outpatient department and special clinics.
- Seminars / Symposia – Twice a month; Theme based student centered
- Journal club/ Review : Twice a month
- Academic grand ward rounds: Twice a month presentation of cases by post graduate students and clinically applicable discussions.
- **ORTHO RADIOLOGY MEETS:** Twice a month discussions amongst Ortho & Radiology Residents under facilitation of faculty on various imaging modalities used and its interpretation
- **ORTHO SURGICAL PATHOLOGICAL MEET:** Special emphasis on the surgical pathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presenting the clinical details of the case, the radiology PG student describes the radiological findings and its interpretation and the pathology PG student describes the morbid anatomy and histopathology of the same case.
- **SKILLS LAB SESSIONS:** Once a fortnight for two years.
- **Clinical teaching** in the OPD, Emergency room, ICU, OR as per the situation.
- **Mortality & Morbidity meetings with SURGICAL AUDIT:** Once a month
- Maintenance of **log book:** to be signed by the faculty in charge
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- The PG student should attend at least two conferences/CMEs/Workshops.
- Department should encourage e-learning activities.
- **Rotations:**
 1. **Clinical postings**

A major portion of posting should be in Orthopaedics department. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.

Rotation of posting

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

Log book: Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive and objective assessing the competencies stated in the course. The assessment is both formative and summative. Formative is spread over the entire duration of the programme and the summative is as per university examination pattern.

FORMATIVE ASSESSMENT, during the training,

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the Diploma training should be based on following educational activities:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, at the end of training

Post Graduate Examination

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000**.

The Diploma examination shall be in two parts: -

1. Theory:

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for Diploma shall be held at the end of 2nd academic year. An academic term shall mean six month's training period.

There shall be four theory papers as follows:

- Paper I:** Basic Sciences as applied to Orthopaedics
Paper II: Traumatology and Rehabilitation
Paper III: Orthopaedic diseases

2. Practical/Clinical Examination: The practical examination should consist of the following and should be spread over two days, if the number of post graduate students appearing is more than five.

1. One long case: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
2. Short cases from various sections of the speciality (two)

3. Oral/Viva-voce Examination

- Surgical Anatomy including Osteology
- Instruments
- Radiology
- Surgical Pathology
- Orthotics and prosthetics

Recommended Reading

Books (latest edition)

1. Campbell's Operative Orthopaedics, Vols 1,2, 3 & 4

2. Mercer's Orthopaedic Surgery
3. Rockwood And Greens – Fractures In Adults, Vol 1& 2
4. Fractures In Children – Rockwood & Wilkins
5. Physiological Basis Of Medical Practice – Best And Taylor's
6. Arthroscopic Surgery Of The Knee – Johannes
7. Paediatric Orthopaedics – Tachidjian, Vol 4
8. Concise System Of Orthopaedics and Fractures – Graham Apley
9. Orthopaedics And Traumatology – Natarajan
10. Outline Of Fractures Adams - Hamblen
11. Textbook Of Orthopaedics And Trauma – Kulkarni, Vol 1
12. B.D. Chaurasia's Human Anatomy, Vol1, Vol 2, Vol 3
13. Pharmacology and Pharmacotherapeutics – Satoskar
14. Orthopaedics Anatomy and Surgical Approaches - Frederick Wreckling
15. The Art Of Aesthetic Plastic Surgery – John R Levis, Vol 1
16. Current Concepts In Orthopaedics - Dr. D. K. Tareja
17. Custom Mega Prosthesis & Limb Salvage Surgery - Dr. Mayilvahanan
18. Advances In Operative Orthopaedics
19. Green's Operative Hand Surgery-Vol. 1, Vol. 2 - Green, David P; Hotchkiss, Robert N
20. Tachdjian's Pediatric Orthopaedics-Vol. 1, Vol 2, Vol 3 - Herring, John Anthony
21. Surgical Exposures In Orthopedics: The Anatomic Approach - Hoppenfeld, Stanley; De Boer, Piet
22. Adams's Outline Of Orthopaedics - Hamblen, David L; Simpson, Hamish R
23. Text Book Of Ilizarov Surgical Techniques Bone Correction and Lengthening - Golyakhovsky, Vladimir; Frankel, Victor H
24. Current Techniques In Total Knee Arthroplasty - Sawhney G S
25. Applied Orthopaedic Biomechanics - Dutta, Santosh; Datta, Debasis
26. Essential Orthopaedics And Trauma - Dandy, David J; Edwards, Dennis J
27. Adams's Outlines Of Fractures; Including Joint Injuries - Hamblen, David L; Simpson, A Hamish R W
28. Orthopedic Physical Assessment - Magee, David J
29. Turek's Textbook Of Orthopaedics Vol 1 & 2, Turek's
30. Orthopaedics Surgical Approach - Miller

Journals

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks*

***REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD