

Guidelines
for
Competency Based Training Programme
in
DNB- ORTHOPEDICS



NATIONAL BOARD OF EXAMINATIONS

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PROGRAMME GOAL

Patient care Ability: A postgraduate in orthopedics surgery at the end of its three year course should develop proper clinical acumen to interpret diagnostic results and correlate them with symptoms from history taking and become capable to diagnose the common clinical conditions/ disease in the specialty and to manage them effectively with success without making any serious complications and sincerely to take such accurate decision, for the patient's best interest including making a referral to consultation with a more experienced colleague/professional friend while dealing with any patient with a difficult condition.

Teaching ability: DNB Student also should be able to teach a student about the commonly encountered conditions in orthopedics pertaining to their diagnostic features, basic patho-physiological aspect and the general and basic management strategies.

Research Ability: Should also acquire elementary knowledge about research methodology, including record-keeping methods, and be able to conduct a research inquiry including making a proper analysis and writing a report on its findings. Data analysis and Use of basic statistical methods require for publication.

Team work: Should be capable to work as a team member. He/she should develop general human approach to patient care with communication skills with the patient's relatives especially in emergency situation such as in casualty department while dealing with cancer patients and victims of accident. He/she should also maintain human values with ethical consideration.

PROGRAMME OBJECTIVES

1. *Cognitive knowledge:* Embryology, applied anatomy, physiology, pathology, clinical features, diagnostic procedures and the therapeutics including preventive methods, (medical/surgical) pertaining to musculo-skeletal system.

2. *Clinical decision making ability & management expertise:* Diagnose conditions from history taking, clinical evaluation and investigations and develop expertise to manage medically as well as surgically the commonly encountered, disorders and disease in different areas as follows:

- *Pediatric orthopedics-* The student should be exposed to all aspects of congenital and developmental disorders such as CTEV (club-Foot),

developmental dysplasia of hip, congenital deficiency of limbs, Perthe's disease and infections, and also to acquire adequate knowledge about the principles of management of these disorders.

- *Orthopedic oncology*- The resident is expected to be familiar with the tumors encountered in orthopedic practice. The recent trends towards limb salvage procedures and the advances in chemotherapy need to be familiar to him.
- *Management of Trauma*- Trauma in this country is one of the main causes of morbidity and mortality in our demographic statistics. The student is expected to be fully conversant with trauma in its entirety. In any type of posting after qualification the orthopedic surgeon would be exposed to all varieties of acute trauma. Hence, it is his responsibility to be able to recognize, assess and manage it including the medico legal aspects.
- *Orthopedics Sports Injuries*- A lot of importance is being given to orthopedics sports injuries especially in view of the susceptibility of the athlete to injury and his failure to tide over them. It not only encompasses diagnostic and therapeutic aspects of athletic injuries but also their prevention, training schedules of personnel & their selection.
- *Physical Medicine and Rehabilitation*- The student is expected to be familiar with this in all its aspects. Adequate exposure in the workshop manufacturing orthotics and prosthetics is mandatory, as is the assessment of the orthopedically handicapped.
- *Orthopedic Neurology*- The student should be exposed to all kinds of nerve injuries as regards their recognition & management cerebral palsy and acquired neurologic conditions such as post polio residual paralysis also need to be emphasized in their entirety.
- *Spine Surgery*- The student is expected to be familiar with various kinds of spinal disorders such as scoliosis, kypho-scoliosis, spinal trauma, PIVD, infections (tuberculosis and pyogenic), & tumours as regards their clinical presentations and management.
- *Basic sciences in Orthopedics*- This deals with some of the fundamentals in orthopaedics such as the structure and function of bone cartilage etc, and their metabolic process. In addition the student learns about implants in orthopaedics and their metallurgy.
- *Radiology*- Acquire knowledge about radiology/imaging and to interpret different radiological procedures and imaging in musculo-skeletal disorders. There should be collaboration with Radiology department for such activities.

- *Psychologic and social aspect-* Some elementary knowledge in clinical Psychology and social, work management is to be acquired for management of patients, especially those terminally ill and disabled- persons and interacting with their relatives.

3. *Teaching:* Acquire ability to teach an MBBS student in simple and straightforward language about the common orthopedic ailment/disorders especially about their signs/symptoms for diagnosis with their general principles of therapy.

4. *Research:* Develop ability to conduct a research enquiry on clinical materials available in Hospital and in the community.

5. *Patient doctor relation:* Develop ability to communicate with the patient and his/her relatives pertaining to the disease condition, its severity and options available for the treatment/therapy.

6. *Preventive Aspect:* Acquire knowledge about prevention of some conditions especially in children such as poliomyelitis, congenital deformities, cerebral palsy and common orthopedic malignancies.

7. *Identification of a special areas within the subject:* To further develop higher skills within the specialty in a specialized area such as Arthroplasty, Neurology, Arthroscopy oncology, spine surgery, hand surgery and Rheumatology, identify some area of interest during the residency and do fellowship/ senior residency program in one of such areas.

8. *Presentation of Seminar/paper:* Should develop public speaking ability and should be able to make presentation on disease-conditions/research topics to fellow colleagues in a Seminar/meeting/ conference using audiovisual aids.

9. *Research writing:* Should be capable to write case-reports and research papers for publication in scientific journals.

10. *Team work:* Team spirit in patient management, working together in OPD, OT, ward and sharing responsibility with colleagues such as doctor, nurses and other staff are essential. Resident has to develop these attributes through different mechanism of infection

11. *Disaster Management*

12. *Rural community clinic for orthopedics*

ELIGIBILITY CRITERIA FOR ADMISSIONS TO THE PROGRAMME

(A) DNB Orthopedics Course:

1. Any medical graduate with **MBBS** qualification , who has qualified the **Entrance Examination** conducted by NBE and fulfill the eligibility criteria for admission to DNB **Broad Specialty** courses at various NBE accredited Medical Colleges/ institutions/Hospitals in India is eligible to participate in the Centralized counseling for allocation of DNB **Orthopedics** seats purely on merit cum choice basis.
2. Admission to 3 years post MBBS DNB **Orthopedics** course is only through **Entrance Examination** conducted by NBE and Centralized Merit Based Counseling conducted by National Board of Examination as per prescribed guidelines.

(B) DNB (Post diploma) Orthopedics Course:

1. Any medical graduate with MBBS qualification who has successfully completed **DORTHO** (and fulfill the eligibility criteria for admission to DNB (Post Diploma) Broad Specialty courses at various NBE accredited Medical Colleges/ institutions/Hospitals in India is eligible to participate in the Centralized counseling for allocation of DNB (Post Diploma) **Orthopedics** seats purely on merit cum choice basis.
2. Admission to 2 years post diploma DNB **Orthopedics** course is only through PDCET Centralized Merit Based Counseling conducted by National Board of Examination as per prescribed guidelines.

Duration of Course:

For Primary candidates : 3 years
For Secondary Candidates : 2 years

Every candidate admitted to the training programme shall pursue a regular course of study (on whole time basis) in the concerned recognized institution under the guidance of recognized post graduate teacher for assigned period of the course.

TEACHING AND TRAINING ACTIVITIES

The fundamental components of the teaching programme should include:

1. Case presentations & discussion- once a week
2. Seminar – Once a week
3. Journal club- Once a week
4. Grand round presentation (by rotation departments and subspecialties)- once a week
5. Faculty lecture teaching- once a month
6. Clinical Audit-Once a Month
7. A poster and have one oral presentation at least once during their training period in a recognized conference.

The rounds should include bedside sessions, file rounds & documentation of case history and examination, progress notes, round discussions, investigations and management plan) interesting and difficult case unit discussions.

The training program would focus on knowledge, skills and attitudes (behavior), all essential components of education. It is being divided into theoretical, clinical and practical in all aspects of the delivery of the rehabilitative care, including methodology of research and teaching.

Theoretical: The theoretical knowledge would be imparted to the candidates through discussions, journal clubs, symposia and seminars. The students are exposed to recent advances through discussions in journal clubs. These are considered necessary in view of an inadequate exposure to the subject in the undergraduate curriculum.

Symposia: Trainees would be required to present a minimum of 20 topics based on the curriculum in a period of three years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

Clinical: The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice.

Bedside: The trainee would work up cases, learn management of cases by discussion with faculty of the department.

Journal Clubs: This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and limitations, if any, will be highlighted.

Research: The student would carry out the research project and write a thesis/ dissertation in accordance with NBE guidelines. He/ she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

SYLLABUS

Basic Sciences:

- Development of skeleton & mineralization of bone
- Soft tissue anatomy, histology, physiology, injury and repair: meniscus, articular cartilage, muscle, tendon, ligament, nerve
- Bone: histology & histopathology of bone, physiology of fracture healing, delayed and non-union of bones, biophysical properties of bone, bone grafting, bone graft extenders and substitutes
- Biomechanics: gait, hip & knee arthroplasty, cerebral palsy
- Pathological tests for orthopaedic disorders, tissue diagnosis, synovial fluid analysis, molecular diagnostic methods
- Imaging: application of USG, CT scan, MRI, nuclear medicine in orthopaedics

- Ethics in orthopaedics, evidence based practice, outcome assessment, use of biostatistics
- Clinical examination: hip, spine, knee, shoulder, elbow, wrist and hand, ankle and foot, deformity, neurological examination
- Orthoses for orthopaedic disorders
- Surgical approaches
- Electrodiagnosis
- Biomaterials in orthopedics, Plaster of paris and metals
- Minimal access surgery, computer assisted surgery & Navigation
- Peripheral nerve injuries
- Electrodiagnosis
- Vascular Injuries
- Fluid Management & Nutrition in traumatized patient
- Bone Bank
- Wound Healing
- OT Discipline and Ethics

Infections:

- Pyogenic – osteomyelitis- acute and chronic, septic arthritis, infection in presence of implant and prosthesis, Necrotizing fasciitis, Gas gangrene, Toxic shock syndrome, Septic Arthritis and its sequel
- Tuberculosis – spine, hip, knee and other sites, medical, non-operative and operative treatment, paraplegia care with care of bladder, late onset paraplegia;
- Syphilis, mycotic infections, salmonella & brucella osteomyelitis,

Metabolic bone disorders:

- Calcium, phosphate and vitamin D metabolism
- Rickets, osteomalacia, renal bone disease, hyperparathyroidism
- Scurvy
- Osteoporosis
- Osteopetrosis
- Paget's disease
- Various storage disorders

Musculoskeletal oncology:

- Evaluation and staging
- Benign and malignant bone and soft tissue tumors
- Methods and principle of Biopsy
- Principles of surgical treatment, options of limb salvage surgery
- Chemotherapy and radiotherapy
- Metastatic bone disease- diagnosis

Arthritis:

- Osteoarthritis
- Rheumatoid arthritis
- Ankylosing spondylitis
- Non infectious Arthritis
- Sero-negative spondyloarthropathy
- Crystal arthropathy- gout and pseudogout
- Neuropathic joints
- Traumatic arthritis
- Others

Joint reconstruction:

- Corrective Osteotomies around joints like hip, knee, shoulder, elbow etc.
- Arthrodesis: shoulder, hip, knee, elbow, wrist, ankle, subtalar; indications and technique
- Arthroplasty: Tribology, total hip, shoulder & knee replacement, basics of replacement of other joints, partial joint replacement, surface replacement, basics of complications and their treatment

Orthopedics Sports Medicine:

- Clinical Examination of
- Principles of arthroscopy
- Shoulder instability: acute, recurrent, surgical stabilization
- Rotator cuff tear
- Shoulder Impingement
- Lateral and medial epicondylitis, elbow injuries
- Ligament and meniscal injuries of knee, diagnosis and management of ACL and PCL deficient knee
- Multi ligamentous knee injury
- Clinical Examination of various knee, shoulder, ankle, elbow pathologies of joint
- Chondromalacia
- Management of osteochondral defects
- Recurrent patellar dislocation
- Ankle ligament injuries
- Tendo achiles rupture, quadriceps tendon rupture, rupture of muscles
- Tendonitis, displacement of tendons
- Stress fracture

Pediatric Orthopaedics:

- Congenital and developmental disorders of knee, hip, upper limb, spine, ankle and foot

- Connective tissue disorder: osteogenesis imperfecta, Marfan syndrome, Ehler Danlos syndrome etc.
- Genetic disorders: Neurofibromatosis, skeletal dysplasias
- Neuromuscular disorders: Myopathy, Cerebral palsy, myelomeningocele, post-polio residual deformity
- Perthes' disease, slipped capital femoral epiphysis and osteochondritis
- Osteochondritis at various sites
- Angular and rotational deformities of lower limb and deformity correction and LLD Correction
- Juvenile rheumatoid arthritis. Hemophilic arthropathy
- Obstetric palsy of brachial plexus
- Miscellaneous- Battered baby syndrome, Birth injuries, Obstetric palsy etc.

Nontraumatic disorders:

- Muscle contractures: quadriceps, deltoid, gluteus maximus
- Snapping syndromes: hip, knee, scapula, shoulder
- Tendinitis and bursitis
- Synovitis and synovectomy
- Avascular necrosis of femoral head: etiopathology, diagnosis, management & hip sandwich technique procedure
- Transient osteoporosis of hip
- protrusion acetabuli

Traumatology:

- Polytrauma and multiply injured patient care
- Basic splintage and transportation techniques, ATLS
- Complications of fracture: especially compartment syndrome, fat embolism, crush syndrome, neurovascular injury, myositis ossificans, reflex sympathetic dystrophy
- Principles of closed treatment of fractures
- Principles of fracture fixation – external and internal; implants, instruments and prosthesis, plating and nailing
- Open fracture management, common flaps in open tibial fractures
- Pathological fractures
- Amputations and prosthetics
- Fractures and dislocations in children: physeal injuries, operative principles in children, fractures around elbow: supracondylar, medial and lateral condyle capitellum; pulled elbow, forearm and distal radius fractures, fracture of neck, shaft and distal femur, proximal and distal tibial physes
- Fractures in adults: scapulothoracic dissociation, fracture clavicle, fractures of proximal humerus, shaft and distal humerus, Monteggia and

Galleazi fractures, fractures of capitellum, coronoid, olecranon, radial head, forearm, distal radius, scaphoid, metacarpal and phalanges, fracture of neck, intertrochanteric, subtrochanteric, shaft and distal femur, fracture patella, fracture of tibial plateau, shaft and pilon.

- Pelvic, acetabular and sacral fractures
- Management of malunion (especially cubitus varus and valgus, neglected Monteggia injury, distal radius) and nonunion (especially infected nonunion)
- Management of acute dislocation and fracture dislocations: sternoclavicular and acromioclavicular joint, shoulder, elbow, terrible triad, radial head, perilunate, sacroiliac, hip, knee, floating knee injury, patella, ankle.
- Management of chronic unreduced and recurred dislocations: hip, shoulder, elbow, patels etc.
- Principle and practice of destruction Osteohistogenesis

Spine:

- Fractures and dislocations of spine, non-operative and operative treatment
- Various spinal instrumentations
- Management of Pott's spine
- Paraplegia care, bladder rehabilitation
- Congenital anomalies of upper cervical spine, Kippel Feil syndrome
- Scoliosis: infantile, juvenile, adolescent, neuromuscular
- Scheuermann disease
- Spondylolysis, spondylolisthesis
- Low back pain, prolapsed intervertebral disc
- Degenerative cervical and lumbar spine, lumbar canal stenosis
- Spine in ankylosing spondylitis and rheumatoid arthritis
- Tumors of the spine- primary and metastatic

Hand:

- Basics of microsurgery
- Flexor and extensor tendon injuries
- Fracture and dislocation in hand
- Diagnosis and management of peripheral nerve injuries
- Reconstruction of upper limb in nerve injuries: brachial plexus, radial, ulnar and median nerves
- Injuries of wrist: scaphoid fracture and nonunion, perilunar instability
- Disorders of wrist: Keinbock's disease, DRUJ reconstruction, arthritic wrist
- Volkmann ischemic contracture
- Carpal tunnel syndrome and other compression neuropathies
- Rheumatoid hand management

- Dupuytren's disease
- Tenosynovitis, DeQuervian disease, trigger finger
- Hand infections
- Tumor and tumor like conditions of hand
- Congenital hand anomalies

Foot and ankle:

- Fractures of calcaneus, talus, Lisfranc's and Copart's fracture dislocations, metatarsal fractures
- Management of sciatic and peroneal nerve injury
- Flat foot, tarsal coalition
- Hallux valgus and other hallux disorders
- Claw toe, hammer toe, mallet toe, bunion, bunionette
- Diabetic foot and other neuropathic foot disorders
- Pes cavus
- Tarsal tunnel syndrome, Morton's metatarsalgia
- Painful heel, plantar fasciitis
- Ingrown toe nail
- Tendonitis: tendo achilles, tibialis anterior and posterior

Rehabilitation:

- Orthosis, prosthesis and reconstruction
- Traction and Splintage

Biostatistics, Research Methodology and Clinical Epidemiology

Ethics

Medico legal aspects relevant to the discipline

Health Policy issues as may be applicable to the discipline

Competencies

CLINICAL PROGRAM:

During first six months of residency, the student is expected to:

- Attend a basic surgical skill laboratory and resuscitation course Basic and Advances (to be organized by the institution)
- Attend a course of research methodology and how to pursue a thesis (to be organized by the institution)
- Learn bedside history taking and clinical examination in ward and emergency; appropriate use of splints and traction, dressing of infected and surgical wounds etc.
- Learn proper record keeping- clinical examination notes, progress notes, neural charts, interdepartmental referral notes, drug prescription, consent form for various surgeries, tabulation of investigations, medico legal documentation, pre-operative preparation orders, post-operative notes in details, discharge slip preparation, resuscitation and death notes etc.
- Be present in ward rounds and grand rounds, also attend call from other departments with senior colleagues
- Learn and perform closed reduction of common fractures and dislocations under supervision, application of plaster slab and cast, and give necessary advice to patients managed on out-patient basis.
- Attend operation theatre, learn to scrub and assist in cases.
- Attend OPD, examine patients and put clinical notes and advise accordingly, under supervision of faculty.
- Be familiar with digital camera, computer and internet; to take clinical and surgical photographs and videos, to make audiovisual presentations, to search references on internet, to keep data and record in digital format and analyze data for research work.
- Participate regularly in academic activities in the department
- Start thesis work under allotted faculty member.

After 6 months till end of 3 years, the student is expected to:

- (i) Attend OPD, operation theatre, ward rounds, emergency duties, specialty clinics as per departmental schedule
- (ii) Attend and / or present seminar, journal club, case conference / difficult case, death and complication meet, surgical – pathological – radiological conference regularly as allotted
- (iii) Get actively involved in diagnosis and treatment of patients in ward and emergency
- (iv) Assist or perform under supervision surgical work wherever necessary

- (v) Attend/ participate / present scientific paper in national/zonal/state conferences
- (vi) Actively participate / help in organization of departmental courses and workshops
- (vii) Maintain log book properly and get it verified time to time
- (viii) Submit thesis progress report six monthly and complete thesis work in time

PRACTICAL TRAINING:

A Junior Resident doctor, pursuing a DNB course is expected to perform major and minor surgical procedures independently as well as under supervision of a faculty member/senior resident.

A. Student should be able to do many major procedures independently

- Closed reduction of fractures
- External fixation of compound fractures
- Debridement of crush injuries
- Amputations
- Internal fixation of common simple fractures
- Polio surgery such as TA lengthening, Steindler's procedure etc
- Intra-articular injections
- Steroid injections for various painful conditions
- Sequestrectomy in chronic osteomyelitis
- Corrective POP casts for club foot & other congenital deformities
- Biopsy from a mass

B. Student should be able to do the complicated surgical procedure under supervision/guidance of senior colleagues/ faculty members

C. Should be assisted

- Joint Replacement
- Spinal Instrumentation
- Arthroscopy
- Limb salvage surgery

D. Humanity/Ethics

E. Lectures on humanity including personality development, team spirit and ethical issues in patient care and human relationship including, public relations, by Psychologist and public relation officers are to be arranged by the department/college.

F. Should be trained to manage and handle mass casualties and natural disaster

METHODS OF TRAINING AND TEACHING:

The following learning methods are to be used for the teaching of the postgraduate students:

- **Journal Club:** One hour duration, once per week. It should cover recent papers published in reputed journals on a particular topic.
- **Seminar:** One hour duration, once per week. The topic should be prepared by the resident under supervision of faculty.
- **Case presentation:** Clinical case presentations by the postgraduate student before faculty. Should preferably involve one long case or two short cases in each class.
- **X-Ray Classes-** Held twice weekly in morning in which the radiological features of various problems are discussed.
- **Surgical- pathological – radiological conference:** Cases with relevant surgical pathology and radiology should be discussed in detail with help of other departments.
- **Death and Complication Meet:** The whole department should organize a death and complication meet at the last working day of every month. All deaths occurred in emergency and wards, all complications occurred during the management process should be discussed in necessary details and the necessary steps to prevent them may be outlined wherever possible.
- **Exposure of Special clinics like Scoliosis Clinic-** Held once a week. Residents work up the cases of spinal deformity and present them to a faculty member and management plan recorded in case file.
Hand Clinic- Held once a week. All the cases of hand disorders are referred to the clinic and discussed in detail.
CTEV Clinic- Held once a week corrective casts are given and the technique learnt by the residents. Surgical management in also planned & recorded in case file.
Polio- Clinic- Held once a week, various braces & Calipers are prescribed and surgical management planned.

- **Combined Round/Grand Round:** These exercises are to be done once or twice per week involving presentation of all inpatient cases. The work up and management plan should be discussed.
- **Post Emergency Day Round:** The resident should collect the overall data of all patients attending to the orthopedic emergency. He should collect relevant radiographs and clinical data of all patients admitted in emergency. Any important patient not admitted should also be included. All these data should be briefed (in necessary details) to the faculty in-charge.
- **Instruments, Orthosis, Prosthesis, walking Aids etc.**
- **Surgical Audit**
- **Preoperative planning for surgical cases to be operated**
- **Clinical teaching:** In OPD, ward rounds, emergency and the operation theatres: the resident should make discussion on clinical diagnosis/surgical procedures/treatment modalities with senior resident or faculty on duty. The resident should get well versed in preoperative planning, postoperative care and subsequent follow up, maintenance of case records and preparation of discharge slip and other necessary paper work. The resident should also interact with physiotherapist pertaining to management of patients.
- **Clinical interaction with physiotherapist:** Clinical interaction with physiotherapist pertaining to management of the patients in post-op mobilization.
- **Research methodology:** A course on research methodology, ethical issues in patient care, biostatistics, evidence based medicine and language proficiency etc are to be arranged by the institute.

THESIS PROTOCOL & THESIS

The candidates are required to submit a thesis at the end of three years of training as per the rules and regulations of NBE.

Guidelines for Submission of Thesis Protocol & Thesis by candidates

Research shall form an integral part of the education programme of all candidates registered for DNB degrees of NBE. The Basic aim of requiring the candidates to write a thesis protocol & thesis/dissertation is to familiarize him/her with research methodology. The members of the faculty guiding the thesis/dissertation work for the candidate shall ensure that the subject matter selected for the thesis/dissertation is **feasible, economical** and **original**.

Guidelines for Thesis Protocol

The protocol for a research proposal (including thesis) is a study plan, designed to describe the background, research question, aim and objectives, and detailed methodology of the study. In other words, the protocol is the 'operating manual' to refer to while conducting a particular study.

The candidate should refer to the NBE Guidelines for preparation and submission of Thesis Protocol before the writing phase commences. The minimum writing requirements are that the language should be clear, concise, precise and consistent without excessive adjectives or adverbs and long sentences. There should not be any redundancy in the presentation.

The development or preparation of the Thesis Protocol by the candidate will help her/him in understanding the ongoing activities in the proposed area of research. Further it helps in creating practical exposure to research and hence it bridges the connectivity between clinical practice and biomedical research. Such research exposure will be helpful in improving problem solving capacity, getting updated with ongoing research and implementing these findings in clinical practice.

Research Ethics: Ethical conduct during the conduct and publication of research is an essential requirement for all candidates and guides, with the primary responsibility of ensuring such conduct being on the thesis guide. Issues like Plagiarism, not maintaining the confidentiality of data, or any other distortion of the research process will be viewed seriously. The readers may refer to standard documents for the purpose.

The NBE reserves the right to check the submitted protocol for plagiarism, and will reject those having substantial duplication with published literature.

PROTOCOL REQUIREMENTS

1. All of the following will have to be entered in the online template. The thesis protocol should be restricted to the following word limits.
 - Title : 120 characters (with spacing) page
 - Synopsis [structured] : 250-300
 - Introduction : 300-500
 - Review of literature : 800-1000
 - Aim and Objectives : Up to 200
 - Material and Methods : 1200-1600
 - 10-25 References [ICMJE style]

2. It is mandatory to have ethics committee approval before initiation of the research work. The researcher should submit an appropriate application to the ethics committee in the prescribed format of the ethics committee concerned.

Guidelines for Thesis

1. The proposed study must be approved by the institutional ethics committee and the protocol of thesis should have been approved by NBE.
2. The thesis should be restricted to the size of 80 pages (maximum). This includes the text, figures, references, annexures, and certificates etc. It should be printed on both sides of the paper; and every page has to be numbered. Do not leave any page blank. To achieve this, following points may be kept in view:
 - a. The thesis should be typed in 1.5 space using Times New Roman/Arial/ Garamond size 12 font, 1" margins should be left on all four sides. Major sections viz., Introduction, Review of Literature, Aim & Objectives, Material and Methods, Results, Discussion, References, and Appendices should start from a new page. Study proforma (Case record form), informed consent form, and patient information sheet may be printed in single space.
 - b. Only contemporary and relevant literature may be reviewed. Restrict the introduction to 2 pages, Review of literature to 10-12 pages, and Discussion to 8-10 pages.
 - c. The techniques may not be described in detail unless any modification/innovations of the standard techniques are used and reference(s) may be given.
 - d. Illustrative material may be restricted. It should be printed on paper only. There is no need to paste photographs separately.
3. Since most of the difficulties faced by the residents relate to the work in clinical subject or clinically-oriented laboratory subjects, the following steps are suggested:
 - a. The number of cases should be such that adequate material, judged from the hospital attendance/records, will be available and the candidate will be able to collect case material within the period of data collection, i.e., around 6-12 months so that he/she is in a position to complete the work within the stipulated time.
 - b. The aim and objectives of the study should be well defined.
 - c. As far as possible, only clinical/laboratory data of investigations of patients or such other material easily accessible in the existing facilities should be used for the study.

- d. Technical assistance, wherever necessary, may be provided by the department concerned. The resident of one specialty taking up some problem related to some other specialty should have some basic knowledge about the subject and he/she should be able to perform the investigations independently, wherever some specialized laboratory investigations are required a co-guide may be co-opted from the concerned investigative department, the quantum of laboratory work to be carried out by the candidate should be decided by the guide & co-guide by mutual consultation.
4. The clinical residents are not ordinarily expected to undertake experimental work or clinical work involving new techniques, not hitherto perfected OR the use of chemicals or radioisotopes not readily available. They should; however, be free to enlarge the scope of their studies or undertake experimental work on their own initiative but all such studies should be feasible within the existing facilities.
5. The DNB residents should be able to freely use the surgical pathology/autopsy data if it is restricted to diagnosis only, if however, detailed historic data are required the resident will have to study the cases himself with the help of the guide/co-guide. The same will apply in case of clinical data.
6. Statistical methods used for analysis should be described specifically for each objective, and name of the statistical program used mentioned.

General Layout of a DNB Thesis:

- **Title-** A good title should be brief, clear, and focus on the central theme of the topic; it should avoid abbreviations. The Title should effectively summarize the proposed research and should contain the PICO elements.
- **Introduction-** It should be focused on the research question and should be directly relevant to the objectives of your study.
- **Review of Literature** - The Review should include a description of the most relevant and recent studies published on the subject.
- **Aim and Objectives** - The 'Aim' refers to what would be broadly achieved by this study or how this study would address a bigger question / issue. The 'Objectives' of the research stem from the research question formulated and should at least include participants, intervention, evaluation, design.
- **Material and Methods-** This section should include the following 10 elements: Study setting (area), Study duration; Study design (descriptive,

case-control, cohort, diagnostic accuracy, experimental (randomized/non-randomized)); Study sample (inclusion/exclusion criteria, method of selection), Intervention, if any, Data collection, Outcome measures (primary and secondary), Sample size, Data management and Statistical analysis, and Ethical issues (Ethical clearance, Informed consent, trial registration).

- **Results-** Results should be organized in readily identifiable sections having correct analysis of data and presented in appropriate charts, tables, graphs and diagram etc.
- **Discussion**—It should start by summarizing the results for primary and secondary objectives in text form (without giving data). This should be followed by a comparison of your results on the outcome variables (both primary and secondary) with those of earlier research studies.
- **Summary and Conclusion-** This should be a précis of the findings of the thesis, arranged in four paragraphs: (a) background and objectives; (b) methods; (c) results; and (d) conclusions. The conclusions should strictly pertain to the findings of the thesis and not outside its domain.
- **References-** Relevant References should be cited in the text of the protocol (in superscripts).
- **Appendices** -The tools used for data collection such as questionnaire, interview schedules, observation checklists, informed consent form (ICF), and participant information sheet (PIS) should be attached as appendices. Do not attach the master chart.

Thesis Protocol Submission to NBE

1. DNB candidates are required to submit their thesis protocol within 90 days of their joining DNB training.
2. Enclosures to be submitted along with protocol submission form:
 - a) Form for Thesis Protocol Submission properly filled.
 - b) Thesis Protocol duly signed.
 - c) Approval letter of institutional Ethical committee. (*Mandatory, non receivable of any one is liable for rejection*)

Thesis Submission to NBE

1. As per NBE norms, writing a thesis is essential for all DNB candidates towards partial fulfillment of eligibility for award of DNB degree.
2. DNB candidates are required to submit the thesis before the cut-off date which shall be 30th June of the same year for candidates appearing for their scheduled December final theory examination. Similarly, candidates who are appearing in their scheduled June DNB final examination shall be required to submit their thesis by 31st December of preceding year.
3. Candidates who fail to submit their thesis by the prescribed cutoff date shall NOT be allowed to appear in DNB final examination.
4. Fee to be submitted for assessment (In INR): 3500/-
5. Fee can be deposited ONLY through pay-in-slip/challan at any of the Indian bank branch across India. The challan can be downloaded from NBE website www.natboard.edu.in
6. Thesis should be bound and the front cover page should be printed in the standard format. A bound thesis should be accompanied with:
 - a. A Synopsis of thesis.
 - b. Form for submission of thesis, duly completed
 - c. NBE copy of challan (in original) towards payment of fee as may be applicable.
 - d. Soft copy of thesis in a CD duly labeled.
 - e. Copy of letter of registration with NBE.
7. A declaration of thesis work being bonafide in nature and done by the candidate himself/herself at the institute of DNB training need to be submitted bound with thesis. It must be signed by the candidate himself/herself, the thesis guide and head of the institution, failing which thesis shall not be considered.

The detailed guidelines and forms for submission of Thesis

Protocol & Thesis are available at

www.natboard.edu.in.thesis.php

LOG BOOK

A candidate shall maintain a log book of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant.

This log book shall be made available to the board of examiners for their perusal at the time of the final examination.

The log book should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s)) The candidate will maintain the record of all academic activities undertaken by him/her in log book .

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories
4. Procedures learnt
5. Record of case Demonstration/Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.
7. In the absence of production of log book, the result will not be declared.

Leave Rules

1. DNB Trainees are entitled to leave during the course of DNB training as per the Leave Rules prescribed by NBE.
2. A DNB candidate can avail a maximum of 20 days of leave in a year excluding regular duty off/ Gazetted holidays as per hospital/institute calendar/policy.
3. MATERNITYLEAVE:
 - a. A female candidate is permitted a maternity leave of 90 days once during the entire duration of DNB course.
 - b. The expected date of delivery (EDD) should fall within the duration of maternity leave.
 - c. Extension of maternity leave is permissible only for genuine medical reasons and after prior approval of NBE. The supporting medical documents have to be certified by the Head of the Institute/hospital where the candidate is undergoing DNB training. NBE reserves its rights to take a final decision in such matters.
 - d. The training of the candidate shall be extended accordingly in case of any extension of maternity leave being granted to the candidate.
 - e. Candidate shall be paid stipend during the period of maternity leave. No stipend shall be paid for the period of extension of leave.
4. Male DNB candidates are entitled for paternity leave of maximum of one week during the entire period of DNB training.
5. No kind of study leave is permissible to DNB candidates. However, candidates may be allowed an academic leave as under across the entire duration of training program to attend the conferences/CMEs/Academic programs/Examination purposes.

DNB COURSE	NO. OF ACADEMIC LEAVE
DNB 3 years Course (Broad & Super Specialty)	14 Days
DNB 2 years Course (Post Diploma)	10 Days
DNB Direct 6 years Course	28 days

6. Under normal circumstances leave of one year should not be carried forward to the next year. However, in exceptional cases such as prolonged illness the leave across the DNB training program may be clubbed together with prior approval of NBE.
7. Any other leave which is beyond the above stated leave is not permissible and shall lead to extension/cancellation of DNB course.
8. Any extension of DNB training for more than 2 months beyond the scheduled completion date of training is permissible only under extraordinary circumstances with prior approval of NBE. Such extension is neither automatic nor shall be granted as a matter of routine. NBE shall consider such requests on merit provided the seat is not carried over and compromise with training of existing trainees in the Department.
9. Unauthorized absence from DNB training for more than 7 days may lead to cancellation of registration and discontinuation of the DNB training and rejoining shall not be permitted.

10. Medical Leave

- a. Leave on medical grounds is permissible only for genuine medical reasons and NBE should be informed by the concerned institute/hospital about the same immediately after the candidate proceeds on leave on medical grounds.
- b. The supporting medical documents have to be certified by the Head of the Institute/hospital where the candidate is undergoing DNB training and have to be sent to NBE.
- c. The medical treatment should be taken from the institute/ hospital where the candidate is undergoing DNB training. Any deviation from this shall be supported with valid grounds and documentation.
- d. In case of medical treatment being sought from some other institute/hospital, the medical documents have to be certified by the Head of the institute/hospital where the candidate is undergoing DNB training.

- e. NBE reserves its rights to verify the authenticity of the documents furnished by the candidate and the institute/hospital regarding Medical illness of the candidate and to take a final decision in such matters.

11.

- a. Total leave period which can be availed by DNB candidates is $120+28 = 148$ days for 6 years course, $60+14=74$ days for 3 years course and $40+10 = 50$ days for 2 years course. This includes all kinds of eligible leave including academic leave. Maternity / Paternity leave can be availed separately by eligible candidates. Any kind of leave including medical leave exceeding the aforementioned limit shall lead to extension of DNB training. It is clarified that prior approval of NBE is necessary for availing any such leave.
- b. The eligibility for DNB Final Examination shall be determined strictly in accordance with the criteria prescribed in the respective information bulletin.

EXAMINATION

FORMATIVE ASSESSMENT

Formative assessment includes various formal and informal assessment procedures by which evaluation of student's learning, comprehension, and academic progress is done by the teachers/ faculty to improve student attainment. Formative assessment test (FAT) is called as "Formative" as it informs the in process teaching and learning modifications. FAT is an integral part of the effective teaching. The goal of the FAT is to collect information which can be used to improve the student learning process.

Formative assessment is essentially positive in intent, directed towards promoting learning; it is therefore part of teaching. Validity and usefulness are paramount in formative assessment and should take precedence over concerns for reliability. The assessment scheme consists of Three Parts which has to be essentially completed by the candidates.

The scheme includes:-

Part I:- Conduction of theory examination

Part-II :- Feedback session on the theory performance

Part-III :- Work place based clinical assessment

Scheme of Formative assessment

PART – I	CONDUCT OF THEORY EXAMINATION	Candidate has to appear for Theory Exam and it will be held for One day.
PART – II	FEEDBACK SESSION ON THE THEORY PERFORMANCE	Candidate has to appear for his/her Theory Exam Assessment Workshop.
PART – III	WORK PLACE BASED CLINICAL ASSESSMENT	After Theory Examination, Candidate has to appear for Clinical Assessment.

The performance of the resident during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student

1. Personal attributes:

- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
- **Motivation and Initiative:** Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.

- **Honesty and Integrity:** Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Clinical Work:

- **Availability:** Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
- **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.
- **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- **Clinical Performance:** Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.

3. Academic Activity: Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

FINAL EXAMINATION

The summative assessment of competence will be done in the form of DNB Final Examination leading to the award of the degree of Diplomate of National Board in Orthopedics. The DNB final is a two-stage examination comprising the theory and practical part. An eligible candidate who has qualified the theory exam is permitted to appear in the practical examination.

Theory Examination

1. The theory examination comprises of **Three/ Four** papers, maximum marks 100 each.
2. There are 10 short notes of 10 marks each, in each of the papers. The number of short notes and their respective marks weightage may vary in some subjects/some papers.
3. Maximum time permitted is 3 hours.
4. Candidate must score at least 50% in the aggregate of **Three/ Four** papers to qualify the theory examination.

5. Candidates who have qualified the theory examination are permitted to take up the practical examination.
6. The paper wise distribution of the Theory Examination shall be as follows:

Paper I: Basic Sciences related to Orthopedics
Paper II: Principles and Practices of orthopedics
Paper III: General Surgical Principles & allied specialties
Paper IV: Recent advances in orthopedics & trauma surgery

a) Practical Examination:

1. Maximum Marks: 300.
2. Comprises of Clinical Examination and Viva.
3. Candidate must obtain a minimum of 50% marks in the Clinical Examination (including Viva) to qualify for the Practical Examination.
4. There are a maximum of three attempts that can be availed by a candidate for Practical Examination.
5. First attempt is the practical examination following immediately after the declaration of theory results.
6. Second and Third attempt in practical examination shall be permitted out of the next three sessions of practical examinations placed alongwith the next three successive theory examination sessions; after payment of full examination fees as may be prescribed by NBE.
7. Absentation from Practical Examination is counted as an attempt.
8. Appearance in first practical examination is compulsory;
9. Requests for Change in center of examination are not entertained, as the same is not permissible.
10. Candidates are required not to canvass with NBE for above.

Declaration of DNB Final Results

1. DNB final is a qualifying examination.
2. Results of DNB final examinations (theory & practical) are declared as PASS/FAIL.
3. DNB degree is awarded to a DNB trainee in the convocation of NBE.

RECOMMENDED TEXT BOOKS AND JOURNALS

Title of the book	Author	Publisher
Apley's System of Orthopedics and Fracture	Apley	Butterworth Heinemann
Turek's Orthopedics Principles and application		
Watson Jones-Fractures And Joint Injuries	J.N. Wilson	Churchill Livingstone
Fractures in Adults and Children	Rockwood and Green's	
Outlines of Fractures	Crawford Adams	Churchill Livingstone
Closed Treatment of Fractures	H. John Charnley	Churchill Livingstone
Outlines of Orthopaedics	Crawford Adams	Churchill Livingstone
Mercer's Orthopaedics Surgery	Duthie	Edward Arnold
Fundamentals of Orthopaedic Surgery	Philip Wiles	Churchill Livingstone
Paediatric Orthopaedic And Fractures	Tachdjian	Mosby
Orthopaedic Diseases	Aegerter and Kirkpatrick	Saunders
Tumours and Tumourous Conditions of Bone and Joints	Jaffe	Lea Febiger
Campbell's Operative Orthopaedics	A H Crenshaw	C V Mosby
Evidence Based Orthopedics	Mohit Bhandari	
Tuberculosis of the Skeletal System	S M Tuli	
Surgical Handicraft	Pai	
Tractions and Splintage	Stewart	
Clinical Methods	S Das	
Hand book of Physical Medicine	Krusen	Kottae Ellwood
Rehabilitation Medicine	Howard & Rusk	
Electrodiagnosis	Sidney Licht	
Kinesiology	Rach & Bruke	
Basic & Advances Biostatistics	Manju Pandey	
Oxford Handbook of Medical Biostatistics		

JOURNALS

- Indian Journal of Orthopaedics.
- Journal of Bone and Joint Surgery (British & American Volumes).
- Orthopaedic Clinics of North America.

- Clinical Orthopedics and Related Research
- Yearbook of Orthopaedics.
- British journal of Rheumatology and Physical Medicine.
- Journal of rehabilitation, Bombay.
