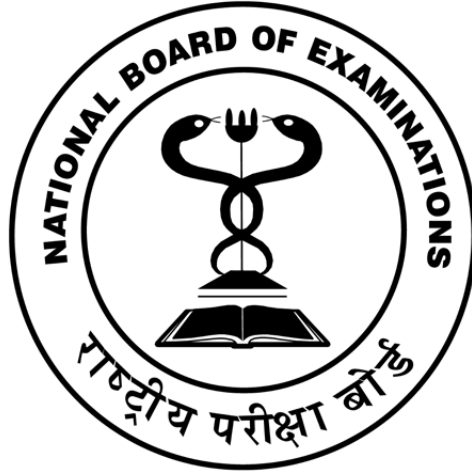


Guidelines
For
Competency Based Training Programme
In
DNB- Thoracic Surgery



NATIONAL BOARD OF EXAMINATIONS

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INTRODUCTION

Thoracic surgery encompasses the operative, peri-operative, and critical care of patients with pathologic conditions within the chest. This includes the surgical care of: coronary artery disease; diseases of the trachea, lungs, esophagus, and chest wall; abnormalities of the great vessels and heart valves; congenital anomalies of the chest and heart; tumors of the mediastinum; diseases of the diaphragm; and management of chest injuries.

OBJECTIVES OF THE PROGRAMME

Patient Care and Procedural Skills:

- 1) Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.
- 2) Residents must be able to competently perform all medical, diagnostic, and surgical procedures considered essential for the area of practice.

Residents:

- a) Must demonstrate competence in the development and execution of patient care plans;
- b) Must demonstrate competence in technical ability, and use information technology as they pertain to patient care;
- c) Must demonstrate competence in evaluation of diagnostic studies;
- d) Must demonstrate competence, under supervision of members of the thoracic surgery faculty:
 - (i) Providing pre-operative management, including the selection and timing of Operative intervention and the selection of appropriate operative procedures;
 - (ii) Providing post-operative management of thoracic and cardiovascular patients;
 - (iii) Providing critical care of patients with thoracic and cardiovascular surgical disorders, including trauma patients, whether or not operative intervention is required;
 - (iv) Correlating the pathologic and diagnostic aspects of cardiothoracic disorders, demonstrating skill in diagnostic procedures (e.g., bronchoscopy and esophagoscopy), and interpreting appropriate imaging studies (e.g., ultrasound, computed tomography, roentgenographic, radionuclide, cardiac catheterization, pulmonary function, and esophageal function studies).

Medical Knowledge

Residents must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social behavioral sciences, as well as the application of this knowledge to patient care.

Residents:

- 1) Must demonstrate knowledge of current medical information, and critically evaluate scientific information;
- 2) Must demonstrate knowledge in the use of cardiac and respiratory support devices.

Practice-based Learning and Improvement

Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning.

Residents are expected to develop skills and habits to be able to meet the following goals:

- 1) identify strengths, deficiencies, and limits in one's Thoracic Surgery knowledge and expertise;
- 2) Set learning and improvement goals;
- 3) Identify and perform appropriate learning activities;
- 4) Systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement;
- 5) incorporate formative evaluation feedback into daily practice;
- 6) locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems;
- 7) use information technology to optimize learning;
- 8) participate in the education of patients, families, students, residents and other health professionals;
- 9) demonstrate the ability to practice lifelong learning, analyze personal practice outcomes, and use information technology to optimize patient care.

Interpersonal and Communication Skills

Residents must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals.

Residents are expected to:

- 1) Communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds;
- 2) Communicate effectively with physicians, other health professionals, and health related agencies;
- 3) Work effectively as a member or leader of a health care team or other professional group;
- 4) Act in a consultative role to other physicians and health professionals; and, Thoracic Surgery
- 5) Maintain comprehensive, timely, and legible medical records, if applicable.

e) Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.

Residents are expected to demonstrate:

- 1) compassion, integrity, and respect for others;
- 2) responsiveness to patient needs that supersedes selfinterest;
- 3) respect for patient privacy and autonomy;
- 4) accountability to patients, society and the profession;
- 5) sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation;
- 6) high standards of ethical behavior; demonstrate continuity of care (pre-operative, operative, and post-operative); demonstrate sensitivity to age, gender, culture, and other differences; and demonstrate honesty, dependability, and commitment.

Systems-based Practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.

Residents are expected to:

- 1) Work effectively in various health care delivery settings and systems relevant to their clinical specialty;
- 2) Coordinate patient care within the health care system relevant to their clinical specialty;
- 3) Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population based care as appropriate;
- 4) advocate for quality patient care and optimal patient care systems;
- 5) Work in interprofessional teams to enhance patient safety and improve patient care quality;
- 6) Participate in identifying system errors and implementing potential systems solutions;
- 7) Practice cost-effective care without compromising quality, promote disease prevention, demonstrate risk-benefit analysis, and know how different practice systems operate to deliver care.

ELIGIBILITY CRITERIA FOR ADMISSIONS TO THE PROGRAMME

(A) DNB Thoracic Surgery Course:

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

Duration of Course:

3 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

The curriculum includes both clinical teaching (in the operating room, on the wards, and in the outpatient clinic), and classroom teaching (lectures, small group discussions, and simulation).

Basic Knowledge

TOPIC	CORE SURGICAL FOUNDATION	GENERAL THORACIC SURGERY	ADULT CARDIAC SURGERY	CONGENITAL SURGERY
Anatomy Gross, surface and imaging anatomy of:	Thorax Abdomen Pelvis Limbs Head and neck Spine	Tracheobronchial tree and lungs Thoracic inlet, neck and mediastinum Esophagus and upper GI tract Chest wall and diaphragm Pleura	See Core Surgical Foundation Heart, pericardium and great vessels Coronary anatomy Valvular anatomy Anatomy of the peripheral vascular system Anatomy of cardiac innervations	Basic embryology of the heart, lungs, great vessels Coronary anatomy and variants Location and course of the conduction system in congenital heart disease Anatomy as it pertains to vascular conduits including aortopulmonary shunts
Physiology	Homeostasis Thermoregulation Metabolic pathways and abnormalities Blood loss and hypovolemic shock Sepsis and	See Core Surgical Foundation	See Core Surgical Foundation Myocardial cellular physiology Electrophysiology Physiology of congestive	Fetal circulation & circulatory changes at birth Relevant general physiology of childhood Hemodynamics, physiology

	septic shock Fluid balance and fluid replacement therapy Acid base balance Bleeding and coagulation Nutrition Pulmonary physiology, ventilation and gas exchange Metabolic response to trauma Digestive, renal and hepatic physiology Cardiac arrhythmia		heart failure	and measurement including shunt calculations, PVR, SVR Physiology of pulmonary vasculature Immature myocardial cell physiology Electrophysiology, including conduction disorders Acid base balance (including Ph and alpha stat CPB mgmt) Physiology of pediatric cardiopulmonary bypass including low-flow and circulatory arrest.
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Pharmacology	Analgesics Antibiotics Anesthetics Cardiovascular drugs (inotropes, vasodilators and vasoconstrictors, antiarrhythmic drugs, nitric oxide antagonists) Antiplatelet, anticoagulant and	See Core Surgical Foundation Bronchodilators	See Core Surgical Foundation Drugs used in the treatment of hypertension, heart failure and angina Inotropes, vasodilators and vasoconstrictors	Specific drugs used in the treatment of congenital heart disease (beta blockers, ACE inhibitors, Digoxin, Diuretics, PGE1) Specific dosing and application of inotropes, anti-arrhythmic drugs, hemostatic drugs,
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	thromolytic drugs Hemostatic drugs Respiratory drugs Drugs used for management of endocrine disorders (including diabetes) Familiarity with drugs used in the treatment of common malignancies Bronchodilators H2 antagonists and proton pump inhibitors Drugs used in transplantation Antilipid agents Steroids			antiplatelet, anticoagulant and thromolytic drugs, analgesics, antibiotics, anesthetic agents, and vasodilators (systemic and pulmonary) in the pediatric population
Pathology <i>General pathological principles including:</i>	Inflammation Wound healing Cellular injury Tissue death including necrosis and apoptosis ARDS Systemic inflammatory response Bleeding disorders and HIT Vascular disorders (including atherosclerosis) Disorders of	See Core Surgical Foundation	See Core Surgical Foundation Atheroma, medial necrosis Myocardial infarction and complications Endocarditis Pericarditis Tumors of the heart	Effect of growth and pregnancy

	<p>growth, differentiation and morphogenesis</p> <p>Surgical immunology</p> <p>Pathology of neoplasia</p> <p>Tumor classification and biology</p> <p>Cancer staging and grading</p> <p>Principles of cancer therapy including surgery, radiotherapy (and radiation safety), chemotherapy and hormone therapy</p> <p>Principles of cancer screening</p>			
Microbiology	<p>Bronchopulmonary infections including TB</p> <p>Blood borne organisms and viruses</p> <p>Wound and soft tissue infections</p> <p>Sources of postop infections</p> <p>Principles of disinfection and sterilization</p> <p>Antibiotics including prophylaxis and resistance</p>	<p>See Core Surgical Foundation</p> <p>Intrapleural sepsis</p>	<p>See Core Surgical Foundation</p> <p>Antibiotic prophylaxis for cardiac surgery</p>	

	Hospital acquired infections			
Imaging <i>Principles and indications for diagnostic and interventional imaging including:</i>	Plain film xrays CT MRI/MRA PET/CT Echocardiography Ultrasonography	See Core Surgical Foundation PET/CT Quantitative V/Q scanning Sestamibi scanning	ECHO Cardiac catheterization	

History of Thoracic Surgery

Preoperative Evaluation

1. Introduction
2. Estimation of Cardiac Risk
3. Predicted Postoperative Forced Expiratory Volume in the First Second
4. Diffusing Capacity of the Lung for Carbon Monoxide
5. Exercise Testing

Perioperative Management

1. Introduction
2. Preparation for Surgery
3. Airway Management
4. Pain Management
5. Postoperative Monitoring
6. Chest Tube Management
7. Fast track Recovery

Intensive Care after Thoracic Surgery

1. Monitoring of Patient Vital Variables
2. Pain Monitoring and Control
3. Sedation and Muscle Paralysis
4. Fluid Resuscitation and Balance
5. Vascular and Heart Failure
6. Management of Respiratory Failure
7. Sepsis
8. Renal Failure

Postoperative Complications

1. Early Postoperative Complications

2. Delayed Complications in Thoracic Surgery

Clinical Knowledge

- Open versus minimally invasive approaches to thorax and abdomen
- Early and late complications of thoracic incisions, and abdominal incisions

a) Clinical Skills

- History and Examination
 - ❖ System specific and general history and examination, including drug history, identification of comorbidity and functional status
- Data Interpretation
- Patient Management
 - ❖ Risk assessment and stratification
 - ❖ Management of post-thoracic surgical complications
 - ❖ Postoperative management of pain control
 - ❖ Treatment of cardiac arrhythmias
 - ❖ Physiotherapy and rehabilitation
 - ❖ Understanding thoracic-specific ventilatory techniques (e.g., lung isolation)

b) Technical Skills

- Endoscopy
- Bronchoscopy
- Tracheostomy
- Correct positioning of patient for thoracic surgery
- Select, perform and close thoracic incisions, including lateral, anterior, muscle sparing, median sternotomy and VATS incisions

• NEOPLASM OF LUNG

- Knowledge
- Benign and malignant tumors of trachea, bronchus, lung

Strategies for Non small Cell Lung

Cancer Treatment

1. Introduction
2. Early Stage Non small Cell Lung Cancer
3. Locally Advanced Non small Cell Lung Cancer
4. Advanced Non small Cell Lung Cancer
5. Small Cell Lung Cancer

Classification

1. Epidemiology
2. Aetiology and Pathogenesis
3. Clinical Presentation
4. Diagnosis and Staging
5. Treatment
6. Prognosis
7. Prevention

Lung Carcinoid Tumours

1. Definition
2. Incidence
3. Classification
4. Clinical Symptoms
5. Diagnosis
6. Mediastinal Lymph Node Involvement
7. Treatment

Bronchial Gland Tumours

1. Introduction
2. Incidence
3. Clinical Presentation
4. Adenoid Cystic Carcinoma
5. Mucoepidermoid Carcinoma
6. Pleomorphic Adenoma
7. Mucous Gland Adenoma
8. Epithelial- Myoepithelial Carcinoma

Rare Tumours of the Lung

1. Introduction
2. Pleuropulmonary Blastoma
3. Primary Pulmonary Carcinosarcoma
4. Primary Intrapulmonary Thymoma
5. Primary Malignant Melanoma of the Lung
6. Primary Malignant Germ Cell Tumours
7. Primary Sarcoma of the Lung
8. Primary Malignant Lymphoreticular Disorders

- Epidemiology, genetic signatures, presentation, and diagnosis
- Staging including all staging tools (CT, CT/PET, EBUS, EUS, Mediastinoscopy)
- Multimodality management of thoracic malignancy
- Non-resectional techniques (SBRT, RFA, etc)
- Survival and recurrence patterns
- Postop complications (BP fistula, space problems, empyema, prolonged air leak, etc.)

- Surgical palliative techniques (stents, RFA, etc.)
 - Secondary and metastatic neoplasms of the lung
-
- Patient Management/Clinical Skills
 - Clinical assessment to establish clinical stage (radiologic interpretation)
 - Assessment of function and risk
 - Diagnosis and management of non-thoracic metastatic lesions
 - Postop management including complications such as empyema, bronchopleural fistulae, space issues, prolonged air leak, pneumonia, chylothorax, hemorrhage, etc.
-
- Technical Skills
 - Surgery for benign and malignant conditions of the lungs (open and VATS)
 - Wedge resection
 - Lobectomy
 - Segmentectomy
 - Bilobectomy
 - Sleeve lobectomy
 - Resection with chest wall, including reconstruction techniques
 - Pneumonectomy
 - Carinal pneumonectomy
 - Extrapleural pneumonectomy
 - Pancoast tumors
 - Extended resections (SVC, spine, etc.)
 - Repeat resections for benign and malignant conditions of the lung, including completion
 - pneumonectomy
 - Clagett procedure and Eloesser flap
 - Soft tissue flaps for stump coverage

Lung Cancer Screening

Ugo Pastorino

1. Background
2. Early Trials of Lung Cancer Screening
3. Observational Studies With Low Dose Spiral Computed Tomography
4. Randomised Trials With Low Dose Spiral Computed Tomography
5. Critical Issues in Low Dose Computed Tomography Screening Trial

Pulmonary Metastases

1. Introduction
2. Biology of Metastases
3. Question of the Effectiveness of Metastasectomy
4. Clinical Presentation of Pulmonary Metastases
5. Is Imaging Sufficiently Sensitive or Must the Lung Always Be Palpated?

6. Factors Associated With a Good Outcome
7. The Role of Lymph Node Dissection
8. Evolving Criteria for Pulmonary Metastasectomy
9. Evidence on Particular Primary Cancer Types

Principles of the Surgical Treatment of Lung Cancer

1. Introduction
2. Aims of the Surgical Treatment of Lung Cancer
3. Selection of Patients for Lung Cancer Surgery
4. Technique of Lung Cancer Surgery
5. Audit and Outcomes

Principles of Radiation, Chemotherapy and Biological Therapy for Lung Cancer

1. Current Status of Chemotherapy and Radiotherapy in Resected Early Non- small Cell Lung Cancer
2. Neoadjuvant Chemotherapy in Early Stage Non small Cell Lung Cancer
3. Current Status of Radiotherapy in Non small Cell Lung Cancer
4. Genetic Determinants of Prognosis in Resected Early Non small Cell Lung Cancer
5. Gene Expression Signatures and Recurrence free Survival in Early Non small Cell Lung Cancer
6. Prognostic and Predictive Roles of BRCA1
7. Non small Cell Lung Cancer with EGFR Mutations

Non resectional Alternatives in Lung Cancer Treatment

1. Introduction
2. Radiofrequency Ablation
3. Stereotactic Radiosurgery
4. Cryotherapy

BENIGN LUNG CONDITIONS

- a. Bronchiectasis
 - Knowledge
 - ❖ Medical therapy
 - ❖ Role of surgery
 - ❖ Criteria for surgical resection
 - ❖ Diagnostic studies
 - Patient Management/Clinical Skills
 - ❖ Familiarity with medical therapy
 - ❖ Clinical evaluation and assessment for possible surgery

- Technical Skills
 - ❖ Resection

- b. Bacterial Infections
 - Knowledge
 - ❖ Community acquired pneumonias
 - ❖ Nosocomial pneumonias
 - ❖ Aspiration pneumonia

 - Lung Abscess
 - ❖ Pneumonia in the immunocompromised host
 - ❖ Antibiotic therapy

 - Patient Management/Clinical Skills
 - ❖ Clinical assessment
 - ❖ Techniques for culture
 - ❖ Interpretation of imaging
 - ❖ Advanced ventilator management (prone position)
 - ❖ Familiarity with medical therapy
 - ❖ Management of lung abscess

- c. Tuberculosis and Atypical Mycobacteria
 - Knowledge
 - ❖ Epidemiology and screening
 - ❖ Clinical presentation
 - ❖ Medical treatment
 - ❖ Indications for surgery, including complications and outcome

 - Patient Management/Clinical Skills
 - ❖ Familiarity with medical therapy
 - ❖ Management of complications of Tb
 - ❖ Timing and preparation of patients who are candidates for surgery

 - Technical Skills
 - ❖ Resection techniques (open and VATS)
 - ❖ Bronchial stump coverage

- d. Mycotic Infections
 - Knowledge
 - ❖ Epidemiology of various fungal diseases
 - ❖ Diagnosis – cultures/serology
 - ❖ Imaging
 - ❖ Manifestations of:
 - Histoplasmosis

- Aspergillus
 - Coccidioidomycosis
 - Blastomycosis
 - Pulmonary cryptococcus
 - Mucormycosis
- Patient Management/Clinical Skills
 - ❖ Familiarity with medical therapy
 - ❖ Role of Surgery
- e. Parasitic Diseases
- Knowledge
 - ❖ Hydatid disease
 - ❖ Epidemiology
 - ❖ Complications
 - ❖ Laboratory testing
 - ❖ Imaging
 - ❖ Diagnostic techniques
 - ❖ Familiarity with medical therapy
 - ❖ Surgical treatment
- f. Interstitial Lung Disease
- Knowledge
 - ❖ Categorization
 - ❖ Presentation, laboratory and physiological testing, and imaging
 - ❖ Diagnostic options
 - ❖ Role of lung biopsy
 - Patient Management/Clinical Skills
 - ❖ Assessment of surgical risk, probability of effecting treatment change
 - Technical Skills
 - ❖ Open and VATS lung biopsy
- g. Emphysema and Bullae
- Knowledge
 - ❖ Etiology, pathology and physiology of COPD
 - ❖ Smoking cessation measures and outcomes
 - ❖ Imaging and physiological (V-Q scan, pulmonary function, DLCO, etc.) techniques
 - ❖ Surgical techniques and results used in the treatment of nonbullous emphysema and bullae
 - ❖ Lung volume reduction surgery: patient selection, criteria, and surgical techniques

- ❖ Indications for bullectomy
- Patient Management/Clinical Skills
 - ❖ Interpretation of imaging and pulmonary function
 - ❖ Patient selection with assessment of function and risk
 - ❖ Postop management of patients undergoing surgery for emphysema or complications of the disease
- Familiarity with pulmonary rehabilitation
- Technical Skills
 - ❖ Procedures to deal with secondary pneumothorax and bullae by open and VATS techniques
 - ❖ Lung volume reduction surgery, unilaterally and bilaterally, using open and VATS techniques

1. DISORDERS OF THE PLEURA

- Knowledge
 - ❖ Anatomy and physiology of the pleura
 - ❖ Inflammatory, infective and malignant diseases of parietal and visceral pleura
 - ❖ Pneumothorax (spontaneous, secondary, catamenial)
 - ❖ Complex pleural effusion/empyema
 - ❖ Mesothelioma
 - ❖ Hemothorax
 - ❖ Chylothorax
 - ❖ Fibrous tumor of the pleura
- Patient Management/Clinical Skills
 - ❖ Chest drains insertion, management, removal and treatment of complications
 - ❖ Interpretation of imaging of the pleura
 - ❖ Multimodality management of mesothelioma
 - ❖ Medical and surgical management of pleural disease, including radiological, open and VATS techniques
 - ❖ Techniques to deal with failure of primary treatment
- Technical Skills
 - ❖ Open and VATS procedures for uncomplicated pleural problems, (pneumothorax, effusions, hemothorax, etc.) including drainage, biopsy, lytic therapy, and pleurectomy
 - ❖ Open and VATS procedures for empyema, including techniques for decortication
 - ❖ Advanced techniques of pleural space obliteration

- ❖ Surgical options for malignant mesothelioma
- ❖ Resection of other pleural tumors

2. DISORDERS OF THE CHEST WALL

- Knowledge
 - ❖ Anatomy of chest wall
 - ❖ Chest wall tumors
 - ❖ Congenital lesions (e.g. pectus deformities)
 - ❖ Thoracic outlet syndrome
 - ❖ Inflammatory/infectious conditions affecting the chest wall
 - ❖ Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology
 - ❖ Techniques used in the diagnosis of chest wall disease
 - ❖ Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae
 - ❖ Techniques of chest wall reconstruction (prosthetic and muscle flaps)
- Patient Management/Clinical Skills
 - ❖ Interpretation of laboratory, physiological, and imaging techniques
 - ❖ Patient selection for operation
 - ❖ Diagnose and manage patients with thoracic outlet syndrome
- Technical Skills
 - ❖ Chest wall biopsy and choice of appropriate technique (incisional biopsy, excisional biopsy, FNA, core biopsy)
 - ❖ Chest wall resection for benign and malignant diseases, in combination with resection of underlying lung
 - ❖ Selection and insertion of prosthetic materials for reconstruction
 - ❖ Surgery for complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions
 - ❖ Complex chest wall reconstruction (muscle flaps)
 - ❖ Supraclavicular and transaxillary first rib approach to thoracic outlet syndrome
 - ❖ Chest wall deformity repair

3. DISORDERS OF THE DIAPHRAGM

- Knowledge
 - ❖ Anatomy and physiology of the diaphragm
 - ❖ Pathology of the diaphragm
 - ❖ Clinical, physiological and imaging techniques in the assessment of diaphragmatic abnormalities
 - ❖ Physiologic consequences of diaphragmatic herniation or paresis

- ❖ Surgical techniques used to biopsy and resect diaphragmatic tumors
- ❖ Situations in which replacement of the diaphragm is required and reconstructive materials
- Patient Management/Clinical Skills
 - ❖ Interpretation of physiological and imaging techniques
 - ❖ Patient selection
 - ❖ Management of patients after diaphragmatic operation
- Technical Skills
 - ❖ Resection, repair and reconstruction of diaphragm
 - ❖ Diaphragmatic plication
 - ❖ Familiarity with diaphragmatic pacing

4. DISORDERS OF THE MEDIASTINUM

- Knowledge
 - ❖ Anatomy of the mediastinum
 - ❖ Congenital, benign, infectious and malignant (primary and secondary) conditions of the mediastinum
 - ❖ Systemic conditions associated with the mediastinum
 - ❖ Clinical, laboratory and imaging techniques used in the diagnosis and assessment of patients with mediastinal disease
 - ❖ Myasthenia gravis: medical, surgical and periop management
 - ❖ Staging of thymoma
 - ❖ Oncologic treatment of malignant diseases of the mediastinum, including multidisciplinary care (Thymoma, germ cell cancers)
 - ❖ Surgical techniques for the treatment of myasthenia gravis, mediastinal cysts and tumors, complications, and results.
- Patient Management/Clinical Skills
 - ❖ Clinical history and exam
 - ❖ Interpretation of laboratory, physiological and imaging techniques
 - ❖ Patient selection with assessment of function and risk
 - ❖ Postop management and recognition of complications
 - ❖ Selection of appropriate routes for biopsy and excision of mediastinal tumor and cysts
- Technical Skills
 - ❖ Biopsy of mediastinal masses
 - ❖ Thymectomy for myasthenia gravis
 - ❖ Resection of mediastinal tumors, including extended resection of adjacent structures

- ❖ Mediastinal Lymph Node Dissection
- ❖ Hisao Asamura
 - a) Evolution of Lung Cancer Surgery and Mediastinal Lymph Node Dissection
 - b) Definition of Mediastinal Lymph Node Dissection and the Relevant Procedures
 - c) The Lymph Node Map for Lung Cancer
 - d) Relative Advantages and Disadvantages of Mediastinal Lymph Node Dissection

5. ENDOSCOPY

- Knowledge
 - ❖ Endoscopic anatomy of larynx, trachea, bronchi, esophagus, stomach
 - ❖ Thoracic lymph node stations (including foregut)
 - ❖ Role of rigid and flexible bronchoscopy in the investigation of airway and pulmonary disease
 - ❖ Role of rigid and flexible esophagoscopy in the investigation of esophageal disease
 - ❖ Role of mediastinoscopy, Chamberlain procedure or extended mediastinoscopy, endobronchial ultrasonography (EBUS), and endoscopic esophageal ultrasonography (EUS) in the staging of malignant and benign conditions of the thorax
 - ❖ Anesthetic management and ventilating management during rigid and flexible endoscopy
 - ❖ Types of bronchial and esophageal stents
 - ❖ Application of lasers, PDT, cryotherapy, radiofrequency ablation, and endomucosal resection (EMR) in Barrett's or malignant esophageal disease
 - ❖ Nonsurgical ablative airway techniques
- Patient Management/Clinical Skills
 - ❖ Choice of endoscopic techniques to stage thoracic malignancies
 - ❖ Choice of endoscopic techniques to palliate thoracic malignancies
 - ❖ Indications for postop bronchoscopy
- Technical Skills
 - ❖ Rigid and flexible bronchoscopy
 - ❖ Rigid and flexible esophagoscopy
 - ❖ Mediastinoscopy
 - ❖ Chamberlain procedure
 - ❖ Familiarity with EBUS and EUS
 - ❖ Endobronchial and esophageal stenting
 - ❖ Bronchoscopic and esophageal biopsy, including management of complications
 - ❖ VATS approaches for biopsy and resection

- ❖ Endoscopic management of tumors – “core-out,” stents, laser, PDT
- ❖ Techniques of esophageal dilation

6. DISORDERS OF THE AIRWAY

- Knowledge
 - ❖ Anatomy of the larynx, trachea, and bronchus
 - ❖ Inflammatory, infectious, benign and neoplastic diseases of the airways
 - ❖ Symptoms, signs of airway disease
 - ❖ Techniques for surgical resection of the trachea
 - ❖ Bronchoplastic procedures and the limitations of these techniques
 - ❖ Medical and oncologic airway disease treatments
 - ❖ Presentation, investigation, and management of anastomotic complications following airway surgery
 - ❖ Presentation, evaluation, and treatment of fistulas in the aerodigestive tract due to benign, malignant and iatrogenic causes
- Patient Management/Clinical Skills
 - ❖ Interpretation of laboratory and imaging techniques
 - ❖ Diagnosis and assessment of airway obstruction
 - ❖ Patient selection with assessment of function and risk
 - ❖ Postop care of patients after airway surgery
- Technical Skills
 - ❖ Sleeve resection of the trachea for simple benign conditions
 - ❖ Sleeve resection of the main bronchi, including lobectomy
 - ❖ Techniques for the relief of major airway obstruction, including stenting, “core-out,” PDT, dilation, cryotherapy, etc.
 - ❖ Airway resection for tumors and complex benign conditions, and techniques for airway reconstruction, anastomosis, and laryngeal release
 - ❖ Repeat resections for recurrence and complications of prior resection
 - ❖ Management of fistulas in the aerodigestive tract by surgical and endoscopic techniques

7. MANAGEMENT OF BENIGN ESOPHAGEAL DISORDERS

- Knowledge
 - ❖ Esophageal and gastric anatomy
 - ❖ Anatomy of small and large intestine as related to reconstruction
 - ❖ Pathophysiology

- ❖ Motility disorders (esophageal sphincter dysfunction, achalasia, esophageal spasm)
 - ❖ Diverticula (Zenker's, epiphrenic)
 - ❖ GE reflux and types of hiatal hernias – sliding and paraesophageal
 - ❖ Trauma (blunt, penetrating, iatrogenic perforations, radiation-induced, caustic ingestion, drug-induced)
 - ❖ Infection (Candida, herpetic)
 - ❖ Strictures (reflux-induced, caustic, anastomotic)
 - ❖ Tracheoesophageal fistula
 - ❖ Barrett's esophagus
 - ❖ Diagnostic procedures and their interpretation
 - ❖ Imaging: radiography (Barium swallow/UGI series), CT scan, nuclear medicine (gastric emptying, GE reflux)
 - ❖ Esophageal function tests (manometry, pH studies)
 - ❖ Drugs used in the treatment of GE reflux and dysmotility disorders
 - ❖ Treatment options for achalasia (pneumatic dilation, botox, surgery)
- Patient Management
 - ❖ General and specific history and exam, including previous surgery, identification of comorbidity and risk assessment
 - ❖ Non-operative and operative options for treatment
 - ❖ Management of the postop patient
 - ❖ Management of postop complications
- Technical Skills
 - ❖ Open and laparoscopic fundoplication (Belsey, Nissen, Dor, Toupet)
 - ❖ Open and laparoscopic esophagomyotomy
 - ❖ Reoperations (after failed anti-reflux/hiatal hernia surgery or surgery for motility disorders)
 - ❖ Surgical treatment (Stent, Repair, Diversion) of esophageal perforation
 - ❖ Open or minimally invasive resection/esophagomyotomy for diverticula (Zenker's, epiphrenic)

8. MANAGEMENT OF ESOPHAGEAL NEOPLASIA

- Knowledge
 - ❖ Anatomy of the esophagus and its anatomical relationships from cricopharyngeus to cardia, including details of blood supply and lymphatic drainage
 - ❖ Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage
 - ❖ Anatomy of the colon including its blood supply
 - ❖ Etiology and epidemiology of esophageal cancer

- ❖ Metaplasia-dysplasia sequence
- ❖ Role of induction therapy
- ❖ Diagnosis, staging, and treatment options for esophageal cancer
- ❖ Risk assessment of patients undergoing esophageal resection
- ❖ Staging of esophageal cancer
- ❖ Esophageal resection options
- ❖ Palliative procedures (stents, laser, PDT, radiation therapy)
- ❖ Treatment options for high grade dysplasia or very early esophageal cancer Screening and prevention
- Patient Management/Clinical Skills
 - ❖ Interpretation of staging tests
 - ❖ Risk assessment
 - ❖ Management of post-esophagectomy patient
 - ❖ Identification and management of post-resection complications (acute and chronic)
 - ❖ Long-term follow up and management of recurrence
- Technical Skills
 - ❖ Mobilization of esophagus, stomach and colon
 - ❖ Esophageal resection (including different approaches)
 - ❖ Esophageal reconstruction including interposition techniques
 - ❖ Jejunostomy
 - ❖ Management of intraoperative complications

9. LUNG TRANSPLANTATION

- Knowledge
 - ❖ Patient and donor selection criteria
 - ❖ Basic pharmacology of immunosuppression
 - ❖ Reperfusion injury
 - ❖ Results of lung transplantation
- Patient Management/Clinical Skills
 - ❖ History and exam including identification of comorbidity and risk assessment
 - ❖ Management of postop lung transplant patient
 - ❖ Management of acute and chronic complications of lung transplantation
 - ❖ Management of rejection
- Technical Skills
 - ❖ Familiarity with donor retrieval, single and bilateral lung transplant, and management of anastomotic complications

10. CONGENITAL HEART, LUNG AND THORACIC DISEASE

Knowledge Congenital Heart Disease

- Physiology
 - ❖ Hemodynamics; physiology and measurement including shunt calculations, PVR, SVR determinations
 - ❖ Physiology of Left-to-Right shunts and Right-to-Left shunts
 - ❖ Physiology of pulmonary vasculature and changes with development
 - ❖ Basic conduction disorders
 - ❖ Acid base balance (including Ph stat and alpha stat CPB mgmt)
 - ❖ Physiology of pediatric cardiopulmonary bypass including hypothermia, low-flow, and circulatory arrest.
- Anatomy
 - ❖ Basic embryology of the heart, lungs, great vessels
 - ❖ Coronary anatomy and variants
 - ❖ Location and course of the conduction system in congenital heart disease
 - ❖ Anatomy as it pertains to vascular conduits including aortopulmonary shunts
 - ❖ Basic anatomy of atrial septum and ventricular septum
 - ❖ Basic concepts of cardiac position, situs, atrioventricular and ventriculoarterial connections
- Pathophysiology
 - ❖ Basic concepts of volume and pressure overload
- Pharmacology
 - ❖ Specific drugs used in the treatment of congenital heart disease (beta blockers, ACE inhibitors, Digoxin, Diuretics, PGE1, nitric oxide, systemic vasodilators)
 - ❖ Specific dosing and application
 - ❖ General indications and use of inotropes, anti-arrhythmic drugs, hemostatic drugs, antiplatelet, anticoagulant and thrombolytic drugs, analgesics, antibiotics, anesthetic agents, and vasodilators (systemic and pulmonary) in the pediatric population
- Clinical Knowledge
 - ❖ Proficiency with the anatomy, pathophysiology, natural history, management, and results of the following conditions or procedures:
 - Mechanisms of cyanosis
 - Manifestations of congestive heart failure in infants and children
 - ❖ Patent ductus arteriosus

- ❖ Atrial septal defect
 - ❖ Ventricular septal defect
 - ❖ Coarctation
 - ❖ PA banding and shunts
 - ❖ Transposition of the great arteries/arterial switch procedure
 - ❖ Tetralogy of Fallot
 - ❖ Vascular rings
 - ❖ Familiarity with anatomy, pathophysiology, natural history, management, and results of the following congenital conditions or procedures.
 - ❖ Functional single ventricle leading to single ventricle pathway and principles of treatment (Fontan procedure)
 - ❖ Congenital aortic stenosis/insufficiency (Konno, Ross procedure)
 - ❖ Rastelli procedure
 - ❖ Hypoplastic left heart and Norwood procedure
 - ❖ Truncus arteriosus
 - ❖ Double outlet right ventricle
 - ❖ VSD, Pulmonary atresia, and MAPCAs
 - ❖ Pulmonary atresia and intact septum
 - ❖ Partial and complete atrioventricular septal defects
 - ❖ Mitral valve disease
 - ❖ Tricuspid valve disease including Ebstein's anomaly
 - ❖ Interrupted aortic arch
 - ❖ Total anomalous pulmonary venous drainage
 - ❖ Extra Corporeal Membrane Oxygenation
 - ❖ Transplantation – Heart and Lung
 - ❖ Vascular sling (Anomalous origin of LPA from RPA)
- Patient Management/Clinical Skills
 - History and Examination
 - ❖ Cardiovascular system and general history and examination of child or adult with congenital heart disease
 - Data Interpretation
 - ❖ Routine hematology and biochemical investigations
 - ❖ Chest radiograph and ECG
 - ❖ Cardiac catheterization data including interpretation of hemodynamic data, shunt and resistance calculation
 - ❖ Basic congenital heart disease imaging (Echo, MRI, CT) interpretation
 - Patient Management
 - ❖ Diagnosis, assessment, and treatment of common congenital heart disease
 - ❖ Collaborative and complementary role of interventional cardiology
 - ❖ Risk assessment and stratification

- ❖ Basic pediatric intensive care to include ventilator management
 - ❖ Perioperative management of adults and children following congenital heart surgery
 - ❖ Mechanical assist (IABP, VAD, ECMO)
 - ❖ Indications for heart or lung transplantation referral
 - ❖ Management of complications of surgery
 - ❖ Cardiopulmonary resuscitation
 - ❖ Diagnosis and treatment of common congenital cardiac arrhythmias
 - ❖ Wound infection and sternal dehiscence
- Technical Skills
 - ❖ Sternotomy - open and close
 - ❖ Thoracotomy - open and close
 - ❖ Preparation for and management of cardiopulmonary bypass including partial bypass
 - ❖ Basic ECMO techniques, cannulation, and management.
 - ❖ Basic Surgical management of uncomplicated cases:
 - ❖ Patent ductus arteriosus
 - ❖ Atrial septal defect
 - ❖ Coarctation
 - ❖ PA banding and shunts
 - ❖ Ventricular septal defect

Knowledge Congenital Thoracic Disease

- ❖ Familiarity with anatomy, pathophysiology, natural history, management, and results of the following congenital conditions or procedures:
 - Congenital lung disease (cystic adenomatoid malformation, congenital lobar emphysema, sequestration)
 - Foregut duplication cysts
 - Diaphragmatic hernia and eventration
 - Esophageal atresia/fistula
- ❖ Diagnosis, assessment, and treatment of common congenital pulmonary and esophageal disease.

Below is the resulting rotation schedule:

	Year 1			Year 2		
	Adult Cardiac	General Thoracic	Congenital	Adult Cardiac	General Thoracic	Congenital
Cardiothoracic	6 months	3 months	3 months	7 months	3 months	2 months
General Thoracic	8 months	2 months	2 months	4 months	8 months	-

Other areas in which knowledge is to be acquired:

- 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

OPERATIVE SKILLS

Principles of Video assisted

1. Thoracic Surgery
2. Traditional Technical Approach and Instruments
3. Recent Technical Developments

Quality of Care in Thoracic Surgery

1. Introduction
2. Data Collection
3. Selection of Quality Indicators
4. ESTS Risk Models and Composite Score
5. Benchmarking Activity and Clinical Accreditation
6. European Global Quality Initiative: Database, Accreditation and Education

Thoracic Incisions

1. Posterolateral Thoracotomy
2. Anterolateral Thoracotomy
3. Muscle sparing Thoracotomy in the Auscultatory Triangle
4. Median Sternotomy
5. Clamshell Incision
6. Hemiclamshell Approach for Thoracic Surgery
7. Transmanubrial Approach to the Thoracic Inlet

Pleura – operative techniques

1. Pleural Drainage
2. Surgery for Pneumothorax
3. Accelerated Treatment of Post-pneumonectomy Empyema
4. Decortication
5. Post pneumonectomy Bronchopleural Fistula: Transsternal Closure
6. Open window Thoracostomy
7. Post pneumonectomy Bronchopleural Fistula: Omentoplasty
8. Chronic Pleural Empyema: Myoplasty
9. Chronic Pleural Empyema: Thoracoplasty
10. Extrapleural Pneumonectomy for Malignant Pleural Mesothelioma
11. Pleurectomy/Decortication for Malignant Pleural Mesothelioma
12. Thoracic Duct Ligation

Trachea – operative techniques

1. Tracheostomy
2. Bronchoscopic Management of Airway Obstruction
3. Tracheal
4. Subglottic Tracheal Resection

Lung – operative techniques

1. Open Wedge Resection of the
2. Videothoracoscopic Wedge Resection
- 3 Open Segmentectomy
4. Open Lobectomy
5. Bronchial Sleeve Resections
6. Videothoracoscopic Lobectomy and Bilobectomy
7. Videothoracoscopic Segmentectomy
8. Pneumonectomy
9. Transsternal Transpericardial Carinal Resection
10. Left Carinal Pneumonectomy
11. Pulmonary Artery Reconstruction
12. Extended Pulmonary Resection
13. Pancoast Tumour: Cervicothoracic Transmanubrial Approach
- 14 Pancoast Tumour: Posterior Approach
15. Robotic Lung Lobectomy
16. Pulmonary Metastasectomy
17. Open Systematic Mediastinal Lymph Node Dissection
18. Videothoracoscopic Systematic Mediastinal Lymph Node Dissection
19. Lung Volume Reduction Surgery
20. Bronchoscopic Lung Volume Reduction
21. Surgical Technique of Lung Transplantation

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 Thoracic Surgery. 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, investigations and congenital lesions:

1. Basic sciences
 - a) Anatomy of Thorax and Respiratory tract
 - b) Physiology of Respiration and broncho-pulmonary tree
 - c) Embryology of the respiratory system and thoracic structures
2. Pulmonary function testing and their clinical significance in lung diseases and thoracic surgery
3. Bronchoscopy
4. Pleuroscopy
5. Radiological imaging of the Chest
6. Ventilation Perfusion studies and angiography
7. Congenital lesions
8. Abnormalities of the thoracic cage
9. Principles and management of Chest trauma

Paper II: Basic Thoracic Surgery

1. Inflammatory Lung Diseases
2. Pleural Diseases
3. Empyema
4. Mediastinum
5. Mediastinoscopy
6. Pulmonary Tuberculosis
7. Neoplasms of the Chest wall, lung, pleura and mediastinum
8. Lung cancer
9. Esophagus
10. Diaphragm
11. Thoracic outlet Obstruction
12. Tracheal Surgery
13. Terminal care

Paper III: Recent Advances

1. Lung Transplantation
2. Video assisted Thoracic Surgery
3. Robotic assisted thoracic surgery
4. Newer technology like surgical staplers, sealants, adhesives etc.
5. EBUS and interventional bronchoscopy

6. Genetics, lung cancer and thoracic surgery
7. Legal and ethical issues
8. Sleep disorders

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

A. Textbooks

1. General Thoracic Surgery ESTS - European Society of Thoracic Surgeons - Textbook
2. Thoracic surgery - ERS White Book
3. ESTS Textbook of Thoracic Surgery

B. Journals

1. Journal of Pulmonary & Respiratory Medicine
2. International Journal of Cardiovascular Research
3. The Annals of Thoracic Surgery
4. Interactive CardioVasc Thoracic Surgery
5. The Journal of Thoracic and Cardiovascular Surgery
6. Open Journal of Thoracic Surgery