

**Guidelines
For
Competency Based Training Programme
In
Diploma – Tuberculosis and Chest Diseases
2021**



NATIONAL BOARD OF EXAMINATIONS IN MEDICAL SCIENCES
Medical Enclave, Ansari Nagar, New Delhi-110029, INDIA
Email: mail@natboard.edu.in Phone: 011 45593000



TABLE OF CONTENTS

Sr. No.	Contents	Page No.
I.	Preamble	3-7
II.	Syllabus	8-10
III.	Core Topics	11-14
IV.	Teaching and Learning Methods	15-16
V.	Recommended Reading: Books (Latest Edition)	17



I. PREAMBLE

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

Evolution of respiratory medicine makes it imperative that the post graduates are trained not only in the basic principles of Respiratory Medicine but are also abreast with recent advances and developments in this specialty. Medical Science is dynamic with a continuous enhancement of knowledge. The process of acquiring knowledge and skills continues even after formal education. The syllabus to be covered during diploma training in Respiratory Medicine given below is designed to develop a sound and scientific foundation. It is intended to serve as a guide to impart basic knowledge and develop skills and is does not impose any limits to expansion beyond the areas listed.

The purpose of this document is to provide an illustrative guideline to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Specialist Board has attempted to formulate a comprehensive curriculum for the two-year Diploma in Tuberculosis and Chest Diseases (DTCD). Attempt has been made to incorporate the necessary domains considered essential at a postgraduate level, and emphasis has been placed on clinical-based skill acquisition rather than simple knowledge assimilation.

1. SUBJECT SPECIFIC LEARNING OBJECTIVES

The primary goal of the Diploma course in Tuberculosis and Chest Diseases is to produce clinicians able to provide good - quality health care in this field. It is expected that a physician at the end of the course should be able to diagnose and treat pulmonary diseases and take preventive and curative steps for these diseases in the community at all levels of health care.

Each student is required to know and cover the following domains during the period of training:

- i. Theoretical knowledge of different aspects of Respiratory Medicine including the status in health and disease
- ii. Acquire clinical skills
- iii. Acquire practical skills, especially respiratory procedures
- iv. Management of Emergencies including intensive care
- v. Imbibe the culture of Professionalism, ethics, and communication

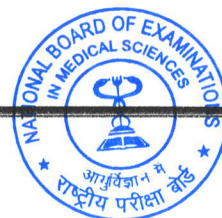


The above domains are to be covered through a well-designed teaching and training program. It involves patient management in the outpatient, inpatient and emergency / critical care situations, competence in various respiratory procedures, case presentations, didactic lectures, seminars, journal reviews, clinic-pathological conferences, and mortality review meetings and working in the laboratories. The different areas in Respiratory Medicine to be covered are described later:

2. SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge, professionalism and skills as given below:

- i. **Knowledge Acquisition:** At the end of the Diploma course in Tuberculosis and Chest Diseases, the student should be able to:
 - a. Demonstrate sound knowledge of common pulmonary diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis. A comprehensive knowledge of epidemiological aspects of respiratory diseases should be acquired.
 - b. Demonstrate comprehensive knowledge of various modes of therapy used in treatment of respiratory diseases.
 - c. Describe the mode of action of commonly used drugs, their doses, side-effects/toxicity, indications and contra-indications and interactions.
 - d. Describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases.
 - e. Manage common respiratory emergencies and understand the basic of intensive care in patients with respiratory diseases.
 - f. Practice the field of respiratory medicine ethically and assiduously, show empathy and adopt a humane approach towards patients and their families.
 - g. Recognize the national priorities in respiratory medicine and play an important role in the implementation of National Health Programs, including tuberculosis.
 - h. Should inculcate good reading habits and develop ability to search medical literature and develop basic concepts of medical research.
- ii. **Ethics and Communication:**
 - a. The student should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.



- b. The student should always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- c. The student should develop communication skills to be able to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

iii. Clinical Skills:

At the end of the course, the student should acquire following clinical skills and be able to:

- a. Interview the patient, elicit relevant and correct information and describe the history in chronological order.
- b. Conduct detailed clinical examination, elicit and interpret the clinical findings and diagnose common pulmonary disorders and emergencies.
- c. Perform simple, routine investigative and office procedures required to formulate a bedside diagnosis. These include but are not limited to sputum collection and examination for microorganisms especially acid-fast bacilli (AFB), interpretation of chest x-rays and lung function tests.
- d. Interpret and manage various blood gases abnormalities in respiratory diseases.
- e. Develop management plans for various respiratory diseases.
- f. Perform or assist in common procedures, like flexible bronchoscopy, pleural aspiration and biopsy with/without ultrasound guidance, pulmonary physiotherapy, endotracheal intubation and insertion of chest tube etc.
- g. Recognize emergency situations in intensive care, respond to these appropriately and perform basic critical care monitoring and therapeutic procedures.
- h. Teach respiratory medicine to undergraduate and postgraduate students.

To acquire the above skills, the student should be exposed to and trained, wherever facilities permit, in the following tests and procedures:

i. Diagnostic and therapeutic procedures: Performance and interpretation Essential:

- a. Examination of sputum and other body fluids with ZN stain for AFB, interpretation of culture methods for pathogenic bacteria, fungi and viruses.



- b. Interpretation of newer diagnostic techniques for tuberculosis and other respiratory disorders, including molecular techniques
 - c. Pleural biopsy and lymph node fine-needle aspiration
 - d. Performing and interpreting arterial blood gas analysis and pulse oximetry
 - e. Imaging:
 - Detailed interpretation of plain Radiography
 - Basic level interpretation of ultrasound and Computed tomogram
 - f. Interpretation of Sputum cytology
 - g. Interpretation of Immunological and Serological tests related to respiratory medicine
 - h. Knowledge about BCG vaccination
 - i. Pulmonary function tests and interpretation (Spirometry and PEFr)
 - j. Performance of Tube thoracotomy
 - k. Administration of inhalation therapy
 - l. Administration of oxygen therapy by nasal prongs, mask, venturi mask, reservoir mask, should understand basics of oxygen therapy.
 - m. Administration of continuous positive airway pressure(CPAP)/Bi-level Positive Airway Pressure(BiPAP)
 - Should understand basics of monitoring in intensive care and indications and complications of emergency procedures like endotracheal intubation.
- ii. **Desirable / Optional:**
- a. PET scan, MRI as pertaining to respiratory medicine and as per local availability
 - b. Pulmonary function tests and interpretation (diffusions, body plethysmography, other lung function tests)
 - c. Should understand basics of tracheostomy, CVP line and arterial lines.
 - d. Should undergo BLS and ACLS course and be certified.
 - e. Polysomnography (full-night and split-night studies) including CPAP titration; evaluation of daytime sleepiness
 - f. Cardiopulmonary exercise testing
 - g. Broncho provocation tests
 - h. Mantoux testing; interferon gamma release assays
 - i. Bronchoscopy: diagnostic procedures (Broncho alveolar lavage, trans bronchial needle aspiration, end bronchial and trans bronchial biopsy)



- j. End bronchial ultrasound guided TBNA
- k. ECG
- l. Venous Doppler ultrasound
- m. Skin tests for hypersensitivity and allergic disorders
- n. Sputum induction and non-invasive monitoring of airway inflammation, e.g.: Fractional exhalation of nitric oxide
- o. FNAC of lung masses (with / without image guidance)
- p. Medical thoraces copy - knowledge of Indications, interpretation and complication of these procedures and methodology of these procedures.



II. SYLLABUS

1. Basic Sciences

i. Anatomy and Histology of the Respiratory System

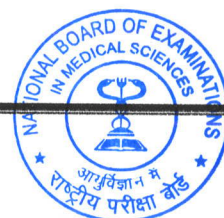
- a. Development and Anatomy of the Respiratory System
- b. Applied embryology of lungs, mediastinum and diaphragm
- c. Developmental anomalies

ii. Physiology and Biochemistry

- a. Assessment of pulmonary functions
- b. Control of ventilation; pulmonary mechanics
- c. Ventilation, pulmonary blood flow, gas exchange and transport
- d. Non-respiratory metabolic functions of the lung
- e. Principles of electrocardiography
- f. Inhalation kinetics and its implication in aerosol therapy, and sputum induction etc.
- g. Acid-base and electrolyte balance
- h. Physiology of sleep and its disorders
- i. Pulmonary innervations and reflexes
- j. Pulmonary defence mechanisms
- k. Principles of exercise physiology and testing
- l. Physiological changes in pregnancy, high altitude, aging
- m. Physiological basis of pulmonary symptoms
- n. Principles of genetic basis of common respiratory diseases

iii. Microbiology

- a. Mycobacterium tuberculosis and other mycobacteria
- b. Bacteria causing pulmonary diseases
- c. Atypical organisms and respiratory tract infections
- d. Anaerobes in pleuro-pulmonary infections
- e. Laboratory diagnosis of non-tubercular infections of respiratory tract
- f. Laboratory diagnosis of TB including staining, culture and drug sensitivity testing



- g. Virulence and pathogenicity of mycobacteria
- h. Respiratory viruses: Viral diseases of the respiratory system and diagnostic methods, including newer viruses and their management
- i. Respiratory fungi:
- j. Classification of fungal diseases of lung; candidiasis, Actinomycosis, Nocardiosis, Aspergillosis, Blastomycosis etc.
- k. Laboratory diagnostic procedures in pulmonary mycosis
- l. Opportunistic infections in immuno-compromised individuals
- m. HIV and AIDS: virological aspects, immuno-pathogenesis, diagnosis
- n. Parasitic lung diseases

iv. Pathology

- a. Acute and chronic inflammation: Pathogenetic mechanisms in pulmonary diseases
- b. Pathology aspects of Tuberculosis
- c. Pathology aspects of Pneumonias and bronchopulmonary suppuration
- d. Chronic bronchitis and emphysema, asthma, other airway diseases
- e. Interstitial lung diseases including sarcoidosis, connective tissue diseases, pulmonary vasculitis syndromes, pulmonary eosinophilias
- f. Tumors of the lung, mediastinum and pleura

v. Epidemiology

- a. Epidemiological terms and their definitions
- b. Epidemiology of tuberculosis, pneumoconiosis, asthma, lung cancer, Chronic Obstructive Pulmonary Disease (COPD) and other pulmonary diseases
- c. In-depth knowledge of the activities of National Tuberculosis Programs

vi. Allergy and Immunology

- a. Various mechanisms of hypersensitivity reactions seen in pulmonary diseases
- b. Diagnostic tests in allergic diseases of lung - in vitro and in vivo tests, bronchial provocation test
- c. Immunology of tuberculosis, Sarcoidosis and other diseases with an immunological basis of pathogenesis

vii. Pharmacology



- a. Pharmacology of anti-microbial drugs
- b. Pharmacology of anti-tubercular drugs
- c. Pharmacology of antineoplastic and immunosuppressant drugs
- d. pharmacology of anti-inflammatory drugs used in pulmonary diseases
- e. Drugs used in viral, fungal and parasitic infections
- f. Pharmacokinetics and drugs interaction of commonly used drugs in pulmonary diseases
- g. Drugs used in medical emergencies

viii. Clinical Respiratory Medicine

Clinical respiratory medicine covers the entire range of pulmonary diseases. All aspects of pulmonary diseases including epidemiology, etiopathogenesis, pathology, clinical features, investigations, differential diagnosis and management are to be covered. In-depth knowledge of few core diseases should be acquired as listed below:



III. CORE TOPICS

A student is expected to have in-depth knowledge of the following Core topics: Obstructive pulmonary diseases (COPD, asthma); Interstitial lung disease (ILD); Tuberculosis; Lung cancer; Pneumonias; Pleural diseases; Acute Respiratory failure, Bronchiectasis, Pulmonary thrombo-embolic disease

Detailed list of topics:

1. Infections

a. Tuberculosis

- Etiopathogenesis
- Diagnostic methods
- Differential diagnosis
- Management of pulmonary tuberculosis;
- NTEP and PMDT
- Complications in tuberculosis
- Tuberculosis in children
- Geriatric tuberculosis
- Pleural and pericardial effusion and empyema
- Mycobacteria other than tuberculosis
- Extra pulmonary tuberculosis
- HIV and TB; interactions of anti-tubercular drugs with anti-retrovirals
- Management of MDR and XDR tuberculosis

b. Non-tuberculous infections of the lungs

- Clinical approach to a patient with pulmonary infection
- Community-acquired pneumonia
- Hospital-associated pneumonia, ventilator-associated pneumonia
- Bronchiectasis, lung abscess and other pulmonary suppurations
- Principles governing use of antibiotics in pulmonary infections

2. Interstitial Lung Diseases

- a. Idiopathic Pulmonary fibrosis
- b. Sarcoidosis



- c. Hypersensitivity pneumonitis
- d. Eosinophilic pneumonias and tropical eosinophilia
- e. Pulmonary vasculitides
- f. Connective tissue diseases involving the respiratory system
- g. Interstitial lung disease of other etiologies
- h. Occupational and environmental pulmonary diseases
- i. Drug induced pulmonary diseases

3. Pulmonary Circulatory disorders

- a. Pulmonary hypertension and cor-pulmonale
- b. Pulmonary edema
- c. Pulmonary thromboembolic diseases and pulmonary infarction

4. Obstructive diseases of the lungs

- a. Asthma, including allergic bronchopulmonary aspergillosis,
- b. Chronic obstructive lung disease and diseases of small airways
- c. Special aspects of management including long-term oxygen therapy, inhalation therapy and pulmonary rehabilitation

5. Tumors of the lungs

- a. Comprehensive knowledge of neoplastic and non-neoplastic diseases of lung including epidemiology, natural history, staging, and principles of treatment (medical, surgical, and radiation)
- b. Knowledge of targeted therapy for lung malignancies
- c. Approach to Solitary pulmonary nodule

6. Disorders of the pleura

- a. Pleural effusion, including diagnostic approach, causes, and management
- b. Non-neoplastic and neoplastic pleural diseases
- c. Pneumothorax
- d. Prothorax and broncho-pleural fistula
- e. Fibro thorax and its management

7. Critical Care Pulmonary Medicine

- a. Management of emergency problems of different pulmonary diseases
- b. Adult respiratory distress syndrome



- c. Acute Respiratory failure
- d. Management of sepsis
- e. Non-invasive and mechanical ventilation

8. Preventive Pulmonology

- a. Principles of smoking cessation and smoking cessation strategies
- b. Cardiopulmonary rehabilitation
- c. Preventive aspects of respiratory diseases
- d. Vaccination in respiratory diseases

9. Optional / Desirable topics

- a. Non-tuberculous infections of the lungs:
 - Unusual and a typical pneumonias including bacterial, viral, fungal and parasitic, rickettsia anaerobic
 - Other pneumonias and parasitic infections, Zoonosis
- b. Other non-infectious disorders of the lungs and airways:
 - Aspiration and inhalational (non-occupational) diseases of the lung
 - Drug induced pulmonary diseases
 - Bullous lung disease
 - Uncommon pulmonary diseases (metabolic, immunological, unknown etiology), pulmonary hemorrhagic syndromes
 - Other Pulmonary diseases of unknown etiology including PLCH, LAM, PAP, alveolarmicrolithiasis
 - Cystic fibrosis and disorders of ciliary motility
 - Occupational lung diseases and pneumoconiosis
 - Air-pollution induced diseases, toxic lung and other inhalational injuries
 - Drug-induced lung diseases
- c. Sleep-related pulmonary disorders:
 - Obstructive sleep apnea
 - Basics of Polysomnography



d. Miscellaneous aspects:

- Diseases of the diaphragm
- Disorders of chest wall
- Oxygen therapy
- End-of-life care
- Aerospace Medicine
- Pulmonary problems related to special environments (high altitude, diving, miners)
- Role of genetics in respiratory medicine

e. Surgical aspects of respiratory medicine:

- Pre - and post- operative evaluation and management of thoracic surgical patients
- Chest trauma/trauma related lung dysfunction
- Lung transplantation



IV. TEACHING AND LEARNING METHODS

1. Postgraduate teaching program

a. General principles:

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self- directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

b. Teaching methodology:

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied departments. The PG student should be given the responsibility of managing and caring for patients in a gradual manner under supervision. Department should encourage e- learning activities.

c. Formal teaching sessions:

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the following sessions:

- | | |
|---------------------------------------|-------------------|
| i. Journal club | Once in two weeks |
| ii. Seminar | Once a fortnight |
| iii. Case discussions | Once a fortnight |
| iv. Interdepartmental case or seminar | Once a month |

(Note: These sessions may be organized as an institutional activity for all postgraduates.)

- Attend accredited scientific meetings (CME, symposia, and conferences). Additional sessions on resuscitation, basic sciences, hospital waste management, infection-control practices, health economics, medical ethics and legal issues related to medical practice are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research.
- The postgraduate students shall be required to participate in the teaching and training program for undergraduate students and interns.



- Log book: During the training period, the Diploma student should maintain a log book indicating the duration of the postings/work done in wards, OPDs and casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The log book shall be checked and assessed periodically by the faculty members imparting the training. The logbook should be examined and marked at the time of interim and final examination.
- Department should encourage e-learning activities.
During the training program, patient safety is of paramount importance; therefore, practical skills should be learnt initially on training or simulation models if available, or performed under close supervision by the supervisor, followed by independent procedures after full competency is achieved.



V. RECOMMENDED READING: BOOKS (LATEST EDITION)

- | | |
|---|------------------------------|
| 1. Harrison's Principles of Internal Medicine | Ed. Petersdorf (McGrawHill) |
| 2. Cecil Text book of Medicine | Ed. Wyngaarden |
| 3. Crofton & Douglas Respiratory Diseases | Ed. Seaton et al (Oxford) |
| 4. Pulmonary diseases disorders | by Fishman (McGraw-Hill) |
| 5. Textbook on Pulmonary disease | by Fraser & Pare |
| 6. Asthma | by Clarke et al |
| 7. Bronchoscopy | by Straddling; |
| 8. Tuberculosis | by SK Sharma |
| 9. Lung diseases in the Tropics | Ed. OP Sharm (Marcel Dekker) |
| 10. The Normal Lung | by Murray (Saunders) |
| 11. Pulmonary Function Testing | by Clausen (Academic Press) |
| 12. Respiratory Physiology | by J.B. |
| West (William & Wilkins) | |
| 13. Physiology of Respiration | by J.H. Comroe |
| 14. Respiratory Function in disease | by Bates et al (Saunders) |

NTEP and PMDT guidelines published by the Central TB Division, Government of India. Latest versions.

Suggested Journals

1. National Medical Journal of India
2. Indian Journal of Medical Research
3. Indian Journal of Tuberculosis
4. Lung India
5. Chest
6. American Journal of Respiratory and Critical Care Medicine
7. New England Journal of Medicine
8. Lancet Respiratory Medicine
9. Thorax

