

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR DIPLOMA IN PULMONARY MEDICINE

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 critical care medicine makes it imperative that the post graduates are trained in the basic principles of Pulmonary Medicine as applied to critical care. The person should be abreast with recent advances and developments in the specialty of Pulmonary Medicine. 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 post graduate training in Pulmonary 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 it does not impose any limits to expansion beyond the areas listed.

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

SUBJECT SPECIFIC LEARNING OBJECTIVES

The primary **goal** of the Diploma course in Pulmonary Medicine is to produce post graduate clinicians able to provide health care in the field of pulmonary medicine. It is expected that a physician qualified in Pulmonary Medicine at the end of the course should be able to diagnose and treat pulmonary diseases, take preventive and curative steps for these diseases in the community at all levels of health care and qualify as a consultant and teacher in the subject.

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

1. Theoretical knowledge of different aspects of Pulmonary Medicine including the status in health and disease (Cognitive domain)

2. Professionalism, ethics, communication (Affective domain)
3. Acquire clinical skills (Psychomotor domain)
4. Acquire practical skills (Psychomotor domain)
5. Management of Emergencies including intensive care (Psychomotor domain)

The above domains are to be covered through a well-designed teaching and training programme. It involves patient management in the outpatient, inpatient and emergency situations, case presentations, didactic lectures, seminars, journal reviews, clinico-pathological conferences and mortality review meetings and working in the laboratories. The different areas in Pulmonary Medicine to be covered are described later:

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

At the end of the Diploma course in Pulmonary Medicine, the student should be able to:

1. 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 pulmonary diseases should be acquired.
2. demonstrate comprehensive knowledge of various modes of therapy used in treatment of pulmonary diseases.
3. describe the mode of action of commonly used drugs, their doses, side-effects / toxicity, indications and contra-indications and interactions.
4. describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of management inclusive of National tuberculosis Control Programme.
5. manage common pulmonary emergencies and understand the basic of intensive care in patients with pulmonary diseases.
6. practice the field of pulmonary medicine ethically and assiduously, show empathy and adopt a humane approach towards patients and their families.
7. recognize the national priorities in pulmonary medicine and play an important role in the implementation of National Health Programmes including tuberculosis.
8. demonstrate competence in medical management.

9. should inculcate good reading habits and develop ability to search medical literature and develop basic concept of medical research

B. Affective Domain:

1. 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.
2. 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.
3. The student should develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

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

1. interview the patient, elicit relevant and correct information and describe the history in chronological order.
2. conduct clinical examination, elicit and interpret clinical findings and diagnose common pulmonary disorders and emergencies.
3. perform simple, routine investigative and office procedures required for making the bedside diagnosis, especially sputum collection and examination for etiologic organisms especially Acid Fast Bacilli (AFB), interpretation of the chest x-rays and lung function tests.
4. interpret and manage various blood gases abnormalities in various pulmonary diseases.
5. develop management plans for various pulmonary diseases.
6. assist in the performance of common procedures, like bronchoscopic examination, pleural aspiration and biopsy, pulmonary physiotherapy, endotracheal intubation and pneumo-thoracic drainage / aspiration etc.
7. recognize emergency situations in intensive care, respond to these appropriately and perform basic critical care monitoring and therapeutic procedures.
8. collect, compile, analyse, interpret, discuss and present research data.
9. teach pulmonary medicine to undergraduate and postgraduate students.

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

1. Diagnostic tests: Performance and interpretation

- Sputum and other body fluids examination with ZN stain for AFB, culture methods for pathogenic bacteria, fungi and viruses
- Newer diagnostic techniques for tuberculosis including molecular techniques
- FNAC of lung masses (blind and image-guided)
- Arterial blood gas analysis and pulse oximetry
- Imaging: Interpretation of plain radiography, ultrasound examination, Computed tomogram, PET scan, MRI
- Sputum cytology
- Simple haematological tests
- Immunological and Serological tests
- Polysomnography (full-night and split-night studies) including CPAP titration; evaluation of daytime sleepiness
- Cardiopulmonary exercise testing
- Pulmonary function tests and interpretation (Spirometry, lung volume, diffusions, body plethysmography, other lung function tests)
- Bronchoprovocation tests
- BCG vaccination
- Mantoux testing; interferon gamma release assays
- Bronchoscopy: fiberoptic/rigid, diagnostic and therapeutic
- ECG, 2D and Doppler echocardiography
- Venous Doppler ultrasound
- Skin tests for hypersensitivity
- Sputum induction and non-invasive monitoring of airway inflammation
- Medical thoracoscopy

2. Therapeutic procedures

- Fine needle aspiration and other guided procedures
- Tube thoracostomy
- Cardiopulmonary rehabilitation exercises
- Postural drainage
- Pleural biopsy, lymph node biopsy
- Administration of inhalation therapy
- Administration of oxygen therapy
- Administration of continuous positive airway pressure (CPAP)/Bilevel Positive Airway Pressure (BiPAP)
- Monitoring and emergency procedures in intensive care

Syllabus

Course contents

I. Basic Sciences

A. Anatomy and Histology of the Respiratory System

1. Development and Anatomy of the Respiratory System
2. Applied embryology of lungs, mediastinum and diaphragm
3. Developmental anomalies

B. Physiology and Biochemistry

1. Assessment of pulmonary functions
2. Control of ventilation; pulmonary mechanics
3. Ventilation, pulmonary blood flow, gas exchange and transport
4. Non-respiratory metabolic functions of the lung
5. Principles of electrocardiography
6. Inhalation kinetics and its implication in aerosol therapy, and sputum induction etc.
7. Acid-base and electrolyte balance
8. Physiology of sleep and its disorders
9. Pulmonary innervations and reflexes
10. Pulmonary defence mechanisms
11. Principles of exercise physiology and testing
12. Physiological changes in pregnancy, high altitude, aging
13. Physiological basis of pulmonary symptoms

C. Microbiology

1. Mycobacterium tuberculosis and other mycobacteria
2. Bacteria causing pulmonary diseases
3. Atypical organisms and respiratory tract infections
4. Anaerobes in pleuro-pulmonary infections
5. Laboratory diagnosis of non-tubercular infections of respiratory tract
6. Laboratory diagnosis of TB including staining, culture and drug sensitivity testing
7. Virulence and pathogenicity of mycobacteria
8. Respiratory viruses: Viral diseases of the respiratory system and diagnostic methods
9. Respiratory fungi:
 - (i) Classification of fungal diseases of lung; candidiasis, Actinomycosis, Nocardiosis, Aspergillosis, Blastomycosis etc.
 - (ii) Laboratory diagnostic procedures in pulmonary mycosis
10. Opportunistic infections in immuno-compromised individuals
11. HIV and AIDS: virological aspects, immuno-pathogenesis, diagnosis

12. Parasitic lung diseases

D. Pathology

1. Acute and chronic inflammation: Pathogenetic mechanisms in pulmonary diseases
2. Pathology aspects of Tuberculosis
3. Pathology aspects of Pneumonias and bronchopulmonary suppuration
4. Chronic bronchitis and emphysema, asthma, other airway diseases
5. Occupational lung diseases including Pneumoconiosis
6. Interstitial lung diseases including sarcoidosis, connective tissue diseases, pulmonary vasculitis syndromes, pulmonary eosinophilias
7. Tumours of the lung, mediastinum and pleura

E. Epidemiology

1. Epidemiological terms and their definitions
2. Epidemiological methods
3. Epidemiology of tuberculosis, pneumoconiosis, asthma, lung cancer, Chronic Obstructive Pulmonary Disease (COPD) and other pulmonary diseases
4. National Tuberculosis Control Programme and Revised National TB Control programme (RNTCP); epidemiological aspects of BCG
5. Epidemiological aspects of pollution-related pulmonary diseases
6. Research methodology, statistics and study designs

F. Allergy and Immunology

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

G. Pharmacology

1. Pharmacology of antimicrobial drugs
2. Pharmacology of antitubercular drugs
3. Pharmacology of antineoplastic and immunosuppressant drugs
4. Bronchodilator and anti-inflammatory drugs used in pulmonary diseases
5. Drugs used in viral, fungal and parasitic infections
6. Other drugs pharmacokinetics and drugs interaction of commonly used drugs in pulmonary diseases
7. Pharmacovigilance

II. Clinical Pulmonary Medicine

Clinical pulmonary medicine covers the entire range of pulmonary diseases. All aspects of pulmonary diseases including epidemiology, aetiopathogenesis, pathology, clinical features, investigations, differential diagnosis and management are to be covered.

A. Infections

1. Tuberculosis

- Aetiopathogenesis
- Diagnostic methods
- Differential diagnosis
- Management of pulmonary tuberculosis; RNTCP, DOTS, and DOTS-Plus; International Standards of TB Care
- Complications in tuberculosis
- Tuberculosis in children
- Geriatric tuberculosis
- Pleural and pericardial effusion and empyema
- Mycobacteria other than tuberculosis
- Extrapulmonary tuberculosis
- HIV and TB; interactions of anti-tubercular drugs with anti-retrovirals
- Diabetes mellitus and tuberculosis
- Management of MDR and XDR tuberculosis

2. Non-tuberculous infections of the lungs

- Approach to a patient with pulmonary infection
- Community-acquired pneumonia
- Hospital-associated pneumonia, ventilator-associated pneumonia
- Unusual and atypical pneumonias including bacterial, viral, fungal and parasitic and rickettsial, anaerobic
- Bronchiectasis, lung abscess and other pulmonary suppurations
- Acquired immunodeficiency syndrome and opportunistic infections in immuno-compromised host
- Principles governing use of antibiotics in pulmonary infections
- Other pneumonias and parasitic infections, Zoonosis

B. Non-infectious Lung Diseases

3. Immunological disorders

- Immune defence mechanisms of the lung
- Sarcoidosis
- Hypersensitivity pneumonitis and lung involvement
- Eosinophilic pneumonias and tropical eosinophilia
- Pulmonary vasculitides
- Connective tissue diseases involving the respiratory system
- Interstitial lung disease of other etiologies
- Reactions of the interstitial space to injury, drugs
- Occupational and environmental pulmonary diseases

4. 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 haemorrhagic syndromes
- Other Pulmonary diseases of unknown etiology including PLCH, LAM, PAP, alveolar microlithiasis
- Cystic fibrosis and disorders of ciliary motility
- Obesity-related pulmonary disorders
- Upper airways obstruction syndromes
- Occupational lung diseases and pneumoconiosis
- Air-pollution induced diseases, toxic lung and other inhalational injuries
- Health hazards of smoking
- Drug-induced lung diseases

5. Pulmonary Circulatory disorders

- Pulmonary hypertension and cor pulmonale
- Pulmonary edema
- Pulmonary thromboembolic diseases and infarction
- Cardiac problems in a pulmonary patient and pulmonary complications produced by cardiac diseases

6. Obstructive diseases of the lungs

- Asthma including allergic bronchopulmonary aspergillosis, specific allergen immunotherapy and immuno-modulation

- Chronic obstructive lung disease and diseases of small airways
- Special aspects of management including long-term oxygen therapy, inhalation therapy and pulmonary rehabilitation

7. Tumors of the lungs

- Comprehensive knowledge of neoplastic and non-neoplastic diseases of lung including epidemiology, natural history, staging, and principles of treatment (medical, surgical, and radiation)
- Solitary pulmonary nodule

8. Diseases of the mediastinum

- Non-neoplastic disorders
- Benign and malignant (primary and secondary) neoplasms and cysts

9. Disorders of the pleura

- Pleural dynamics and effusions
- Non-neoplastic and neoplastic pleural diseases
- Pneumothorax
- Pyothorax and broncho-pleural fistula
- Fibrothorax

10. Critical Care Pulmonary Medicine

- Management of emergency problems of different pulmonary diseases
- Adult respiratory distress syndrome
- Respiratory failure in the patient with obstructive airway disease
- Respiratory failure in other pulmonary diseases
- Management of sepsis
- Respiratory and haemodynamic monitoring in acute respiratory failure
- Non-invasive and mechanical ventilation
- Principles of critical care, diagnosis and management of complications; severity of illness scoring systems
- Ethical and end-of-life issues in critical care

11. Extrapulmonary manifestations of pulmonary diseases

12. Sleep-related pulmonary diseases

- Polysomnography
- Sleep apneas
- Other sleep-disordered breathing syndromes

13. Miscellaneous aspects

- Diseases of the diaphragm
- Disorders of chest wall
- Obesity-related pulmonary disorders
- Oxygen therapy
- End-of-life care
- Aerospace Medicine
- Pulmonary problems related to special environments (high altitude, diving, miners)
- Assessment of quality of life using questionnaires
- Health impacts of global warming

14. Preventive Pulmonology

- Principles of smoking cessation and smoking cessation strategies
- Cardiopulmonary rehabilitation
- Preventive aspects of pulmonary diseases
- Vaccination in pulmonary diseases

III. Surgical aspects of Pulmonary Medicine

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

TEACHING AND LEARNING METHODS

Postgraduate teaching programme

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.

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.

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:

- | | |
|-------------------------------------|------------------|
| • Journal club | Once a week |
| • Seminar | Once a fortnight |
| • Case discussions | Once a month |
| • 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, biostatistics, research methodology, teaching methodology, hospital waste management, 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 programme of undergraduate students and interns.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Log book:** During the training period, the post graduate 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.
- Department should encourage e-learning activities.

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

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

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

General Principles

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

Quarterly assessment during the Diploma training should be based on:

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

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

SUMMATIVE ASSESSMENT, ie., at the end of training

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

The Post Graduate Examination shall be in two parts:

1. Theory Examination:

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

There shall be 3 theory papers:

Paper I: General pulmonary medicine and basic sciences;

Paper II: Clinical pulmonary medicine including medical emergencies;

Paper III: Critical care medicine and recent advances in pulmonary medicine

2. Practical/Clinical and Oral/viva voce Examination:

The post graduate students shall examine a minimum of one long and two short cases.

The final qualifying examination should include an assessment of clinical skills in the form of case presentations and discussions.

The oral examination shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures and therapeutic techniques.

Recommended reading:

Books (latest edition)

1. Harrison's Principles of Internal Medicine Ed. Petersdorf
(McGraw Hill)
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 Sharma
(Marcel Dekker)
10. The Normal Lung by Murray
(Saunders)
11. Pulmonary Function Testing by Clausen
(Academic Press)
12. Respiratory Physiology by J.B. West
(Williams & Wilkins)
13. Physiology of Respiration by J.H. Comroe
(Year book Med Pub.)
14. Respiratory Function in disease by Bates et al
(Saunders)

Journals and Annual Reviews

National

1. Journal of Association of Physicians of India
2. Indian Journal of Medical Research

3. National Medical Journal of India
4. Indian Journal of Tuberculosis
5. Indian Journal of Chest diseases and Allied Sciences
6. Lung India
7. Chest (India Edition)

International

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



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

Name of the Department/Unit :

Name of the PG Student :

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

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

Publications

Yes/ No

Remarks* _____

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

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD