

Paediatric Respiratory Medicine: Training Syllabus

Paediatric Respiratory Medicine has become an important speciality in Malaysia. The increasing incidence and prevalence of chronic respiratory diseases in the community warrant the need for further development of the speciality to improve long term care for these patients.

The scope of Paediatric Respiratory Medicine includes diseases of the respiratory system involving the upper airway, lung parenchyma, chest wall and ventilatory control system. It includes knowledge of lung development and developmental physiology, normal and disordered respiratory anatomy and function, clinical respiratory diseases and specialized diagnostic techniques and procedures.

The outcome of training is to produce a specialist who is able to provide a comprehensive and holistic care to children with respiratory diseases. He/She is able to be a leader in the field and is able to advocate for the patients.

The modules of training covered in these main areas

A. General competencies and skills in inpatient and outpatient management of basic and complex respiratory disorders

B. Specific competencies and skills include

Aerosol Therapy
Flexible bronchoscopy
Lung function measurements in schoolchildren
Non-invasive ventilation
24 hour Oesophageal pH study
Polysomnography
Radio-Imaging of the lung

C. Diagnosis and management of specific disorders

Asthma and the other wheezing disorders of childhood
Allergy and respiratory disorders
Acute and chronic infection
Cystic fibrosis
Congenital malformations
Chronic lung disease of prematurity
Management of technology dependent children
Sleep disordered breathing (SDB)
Suppurative lung disease
Rare and multisystem diseases

Tuberculosis

D. Management and teaching skills

Management and Leadership Teaching
Evidence-based Medicine

E. Research and Audit

F. Training Contents

1. Knowledge of normal and abnormal lung development, respiratory system structure and function

The respiratory system includes respiratory control centres, chemoreceptors, respiratory muscles, airways, lungs, pulmonary vasculature, and chest wall.

Detailed knowledge is required in

- Lung development and growth
- Normal anatomy
- Developmental physiology
- Normal physiology
- Development and aging
- Pharmacology
- Sleep physiology

Some knowledge of the basic sciences (histopathology, molecular biology, immunology and defense mechanisms, genetics, microbiology, chemical pathology) is required to understand the pathogenesis of diseases of the respiratory system

2. Knowledge and skills to assess children presenting with the following respiratory problems:

2.1. Symptoms:

- Tachypnoea
- Cough
- Stridor
- Wheeze
- Choking
- Noisy breathing
- Haemoptysis
- Apnoea and apparent life threatening events
- Snoring
- Sleep disordered breathing
- Dyspnoea

- Chest pain
- Reduced effort tolerance

2.2. Abnormal findings:

- Abnormal physical examinations such as chest wall deformities
- Abnormal investigations
- Abnormal radiology
- Abnormal respiratory function
- Abnormal allergy tests

3. Knowledge on the indications, risks and interpretation of investigations of the respiratory system:

- Lung-function test
- Radio-Imaging
- Nuclear medicine
- Microbiology
- Immunology and allergy
- Pathology
- Polysomnography
- pH study
- Overnight oximetry
- Sweat test

F. Expected outcome of training

At the end of the training the trainee should have developed the clinical skills and acquired the necessary theoretical knowledge to be a competent Paediatric Respiratory Physician.

It is expected that the trainee will be able:

- to investigate and manage children presenting with common respiratory symptoms and signs
- to identify less common respiratory disorders
- to apply and interpret diagnostic investigations commonly used in the management of respiratory conditions
- to describe the indications, benefits, risks and clinical procedure of interventions used in the management of common respiratory conditions and acquire the competency in performing these procedures
- to diagnose and manage a range of respiratory conditions as detailed in the curriculum
- to demonstrate a compassionate, caring attitude to children and their families and possess the skills in communication, especially in conveying bad news and

- guiding the resolution of a conflict situation.
- to behave in a professional and ethical manner
- to be able work with other health professionals and members of the team.
- to manage acute respiratory failure and paediatric medical emergencies

G. Modules

G1. General competencies and skills

- In-patient management which include ambulatory and respiratory care of children in high dependency unit
- Out-patient management involving specialized respiratory outpatient clinics seeing both new referrals and follow-up visits.

H. Specific competencies and skills

H.1. Lung function measurements in school-children

Background

Understanding of

- The underlying developmental physiology - flow-volume curves, measurement of lung volumes, the principles of bronchial lability, and ventilation, perfusion and gas exchange
- Which test(s) are most likely to be useful in different disorders for-different ages.
- Correct selection and use of available reference data.
- Knowledge of the diagnostic accuracy of spirometry for common disorders and repeatability and limitations of various lung function measurements.
- Knowledge of requirements for quality control and quality assurance and risk management of a lung function laboratory.
- Knowledge of the cost of each test and its maintenance.

H1.2. Laboratory skills

- Able to perform, interpret and report on, and recognise technical limitations in spirometry (flow-volume curves) and bronchodilator responsiveness
- Able to interpret and report on, and recognise technical limitations in: Lung Volume measurements, Bronchoprovocation testing (at least one method) and measurements of diffusion
- Able to perform, interpret and report on, recognise technical limitations in body plethysmography.

I. Flexible bronchoscopy

Background

- Knowledge of the indications, contraindications, risks and complications of bronchoscopy in children and ability to explain these to parents.
- Knowledge of the indications, contraindications, risks and complications of other procedures performed during bronchoscopy
- Knowledge of the indications for rigid bronchoscopy and non-bronchoscopic lavage (BAL), including at least one observed procedure of each.
- Knowledge of the maintenance and cleaning of equipment, including risks of cross infection and how to minimize these.
- Knowledge of correlations between bronchoscopic investigations and clinical diagnosis
- Able to perform bronchoscopy, bronchial alveolar lavage (BAL) and bronchial brushing
- Able to interpret bronchoscopic investigations results.

L. Radio-Imaging of the lung

L1. Background

- Knowledge of the indications of, advantages of and limitations of different imaging methods in respiratory disease.
- Knowledge of the comparative radiation burdens of the different chest imaging procedures.

L1.1. Clinical skills

1. Able to interpret chest radiographs, and discuss chest CT scans.
2. Able to interpret the results of CT and MRI scans of the thorax in and to correlate the findings to clinical situation
3. Able to select the appropriate imaging investigations for different clinical scenarios.

K. Aerosol Therapy

K1. Background

- Knowledge of the science of aerosol delivery and its limitations in children
- Knowledge of the differences between dry powder delivery, nebulisation and metered dose inhaler delivery.

K1.2. Clinical skills

- Able to select the most appropriate and effective aerosol therapy for the different age group
- Able to instruct children, parents, nurses and doctors in the use of the different inhalers and devices.

L. Diagnosis and management of specific disorders

- Allergy and respiratory disorders
- Congenital malformations

L1. Background

- Knowledge of the aetiology and genetics of congenital malformations of the lung and chest wall
- Knowledge of the effect of congenital malformations on lung function
- Knowledge of the of medical and surgical management

L1.2. Clinical skills

- Able to diagnose and manage all the major congenital upper and lower respiratory tract abnormalities (see list below).
- Able to select appropriate diagnostic techniques including CT scans, angiography and bronchoscopy.
- The trainee should have been involved in the care of at least one of each of the conditions listed below:
 - Congenital diaphragmatic hernia
 - Congenital lobar emphysema
 - Congenital cystic adenomatoid malformation
 - Craniofacial anomalies eg. Pierre Robin sequence
 - Laryngomalacia
 - Tracheo-oesophageal fistula
 - Tracheomalacia
 - Pulmonary sequestration
 - Vascular ring

M. Asthma and the other wheezing disorders of childhood

M1. Background

- Understand the complexity of the asthma syndrome including the difference

- between allergic and non-allergic asthma and the various types of recurrent wheezing in preschool children.
- Knowledge about the changing patterns of recurrent wheeze and asthma of children across different ages.
 - Knowledge about the pathophysiology of asthma, chronic airway inflammation, airway hyper-responsiveness and airway remodeling.
 - Knowledge of controversies on allergen avoidance measures. Knowledge of the interaction of physical activity, sports and asthma.
 - Understanding of gene-environment interactions, including the role of viral infections and their effect on the airways.
 - Knowledge of the influence of passive smoking and air pollution on respiratory morbidity.
 - Knowledge of the pharmacology of both common and step-up-asthma medications

M1.2 Clinical skills

1. Able to recognize clinical features which suggest an alternative diagnosis
2. Able to outline the management of infants and older children with acute wheezing disorders, including bronchiolitis and acute severe asthma
3. Able to manage chronic infant wheezing and asthma in a clinic setting
4. Able to evaluate difficult asthma, organise the necessary investigations and understand the use of step-up treatments
5. Know the current evidence available for asthma treatments at different ages

N. Chronic lung disease of prematurity (CLD)

N1 Background

Knowledge of:

- The aetiology and pathogenesis of CLD.
- Definition of CLD including old and new BPD
- Co-morbidities affecting the outcome of CLD and their management
- Current strategies and therapies used in the Neonatal intensive Care Units to prevent CLD occurring and the underlying evidences.

N1.2. Clinical skills

- Able to manage the respiratory and nutritional care of babies with CLD. This should include managing the discharge and home care planning process (including ventilatory support, home oxygen therapy, pharmacological treatments and outpatient monitoring of progress) and follow-ups.

- Able to recognise and appropriately manage cases where resolution is complicated by co-morbidities.

O1 Acute and chronic infection

Background

- Understand the epidemiology of common respiratory infections, including TB
- Knowledge of microbiological methods in the diagnosis and various pathogens causing respiratory illness in children
- Knowledge of the pharmacology of antibiotics and antiviral therapy used for respiratory infections in children
- Understanding methods of infection transmission, the risks and prevention of cross-infection

O1.1. Clinical Skills

Able to diagnose and manage common respiratory infections including:

- upper respiratory tract respiratory infections
- croup
- viral bronchiolitis
- all forms of pneumonitis, including lung abscess
- empyema
- bronchiectasis
- bronchiolitis obliterans
- the diagnosis and management of respiratory infections (including opportunistic infections) in high risk children namely cystic fibrosis, underlying immunosuppression and chronic lung diseases.

P. Tuberculosis

P1. Background

- Understand the epidemiology of TB
- Understand the differences between primary, post-primary TB and latent TB.
- Understand the use and limitations of current diagnostic methods
- Knowledge of relevant diagnostic strategies and recommended current management regimes

P1.2. Clinical skills

- Able to perform and interpret tuberculin skin testing
- Able to perform BCG vaccination
- Able to manage children with TB infection and disease

Q. Management of technology dependent children

The trainee should be in a paediatric respiratory centre that is regularly involved in the initiation and management of children requiring long term ventilation support.

Q1. Background

- Understand the pathophysiology of chronic respiratory failure in children.
- Knowledge of the developmental changes in respiratory physiology and understand its impact on the vulnerability of chronic respiratory failure during childhood.
- Knowledge of the methods used in the diagnosis and monitoring of ventilation in children and their limitations.
- Understand the principles of the commonly used noninvasive ventilatory modalities including continuous positive airway pressure (CPAP), Bi-level Support (BIPAP) and Life ventilators.
- Knowledge of the interfaces used in non-invasive ventilation in children
- Understand the use of long term oxygen therapy in children with chronic respiratory failure
- Knowledge of principles and practice of tracheostomy care in children
- Knowledge of current physiotherapy techniques in children with neuromuscular disease

Q1.1. Clinical skills

- Able to diagnose, assess and manage children with chronic respiratory failure specifically children with:
 - neuromuscular disorders
 - ventilatory control disorders
 - severe chronic lung disease
 - severe obstructive sleep apnoea
 - craniofacial anomalies
- Able to initiate and manage long-term ventilatory support in children including the choice and set up of equipment, discharge plan, follow-up and troubleshooting
- Able to prescribe and supervise domiciliary long-term oxygen therapy in children.
- Able to replace a tracheostomy tube in an emergency.

R. Sleep medicine

R1. Background

- Understand the physiology of sleep at different age, sleep stages, their effects on cardiorespiratory status and changes with age.
- Know the medical conditions that are associated with sleep disordered breathing.
- Understand the advantages and disadvantages of polysomnography, cardiopulmonary studies and pulse oximetry.

R1.2 Clinical skills

Able to:

- Take a sleep history
- Set up a PSG
- Score the PSG
- Interpret and report PSG studies and trending overnight oximetry.
- Assess clinical status for intervention

S. Rare and multisystem diseases

S1. Background knowledge of the pathogenesis, diagnosis and management of:

- Obliterative bronchiolitis
- Primary Ciliary Dyskinesia
- Gastro-oesophageal Reflux Lung Disease*
- Interstitial Lung Disease*
- Pulmonary Vascular Disorders including pulmonary hypertension
- Pulmonary haemorrhage
- Cystic fibrosis

S1.2. Clinical Skills

- Able to recognize the presentations of rare lung diseases
- Able to perform and interpret an oesophageal pH study
- Able to assess the indications for lung biopsy

T. Management and Teaching skills

T1. The trainee needs to understand how to work with the hospital audit department to develop specific audits relating to respiratory paediatric diseases.

Present locally. (At least 1 audit completed and presented per year.)

General competencies

- How to manage critical incidents

- How to chair meetings
- How to resolve conflict
- How to handle complaints
- How to manage difficult patients or caregivers

T1.2. Management and Leadership

The trainee should develop competencies to draw up plans for

- Bedside tuition
- Small group/tutorial discussions.
- More formal lectures.
- Participate in the training of medical and allied health trainees

U. Research

U1.The trainee should

Attend a basic research course to give competencies on understanding

- The process
- Basic statistics
- Protocol development
- Research governance

U1.2.Demonstrate involvement in research undertaken in training centre

U2.2.Presentation at least two abstracts in national or international conference.

U2.3. Submission of an original paper for publication is encouraged

Reading recommendations

- Paediatric Respiratory Medicine: Taussig and Landau
- Principles and Practice of Paediatric Sleep Medicine
- Pediatric Flexible Bronchoscopy
- Handbook of Paediatric Respiratory Medicine: ERS
- Board Review in Pediatric Pulmonology : ACCP
- Paediatric Pulmonology: American Academy of Paediatrics

Journals

- European Respiratory Journal
- Thorax
- Chest

- American Journal Respiratory and Critical Care Medicine
- Pediatric Pulmonology
- Pediatric Respiratory Review
- New England Journal Medicine
- Lancet

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