The Royal Australasian College of Physicians

Sleep Medicine

Advanced Training Curriculum

Paediatrics & Child Health Division

AUSTRALASIAN sleep ASSOCIATION

The Royal Australasian College of Physicians

Physician Readiness for Expert Practice (PREP) Training Program

Paediatric Sleep Medicine Advanced Training Curriculum

TO BE USED IN CONJUNCTION WITH:

Basic Training Curriculum - Paediatrics & Child Health

Professional Qualities Curriculum

ACKNOWLEDGEMENTS

The Royal Australasian College of Physicians (RACP) Fellows, trainees and staff have contributed to the development of this curriculum document.

The College specifically thanks those Fellows and trainees who have generously contributed to the development of these documents, through critical comments drawn from their knowledge, experience and the donation of their time and professional expertise.

The following Fellows, in particular, deserve specific mention for their contribution to this document:

- Dr Carolyn Dakin, FRACP
- Dr Elizabeth Edwards, FRACP
- Dr Gillian Nixon, FRACP
- Dr Anne O'Donnell, FRACP
- Dr Arthur Teng, FRACP
- Dr Jacob Twiss, FRACP
- Dr Andrew Wilson, FRACP

In addition, the following Fellows developed the Paediatric Respiratory Medicine Advanced Training Curriculum and were instrumental in the parallel development of this curriculum:

- A/Prof Adam Jaffe, FRACP
- Dr Brent Masters, FRACP
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- Dr Greg Smith, FRACP
- Dr Andrew Tai, FRACP

The Paediatric Sleep Medicine Curriculum writing group are grateful to the Adult Sleep Medicine Curriculum writing group for their collaboration in developing consistent curricula in adult and paediatric sleep medicine. Development of both curricula was overseen by the curriculum sub-committee of the Australasian Sleep Association. The RACP gratefully acknowledges the contribution of the Australasian Sleep Association to the development of this curriculum.

The process was managed by the Curriculum Development Unit within the College's Education Deanery, who designed the document, drafted content material, organised and facilitated writing workshops, developed resource materials, and formatted the final document.

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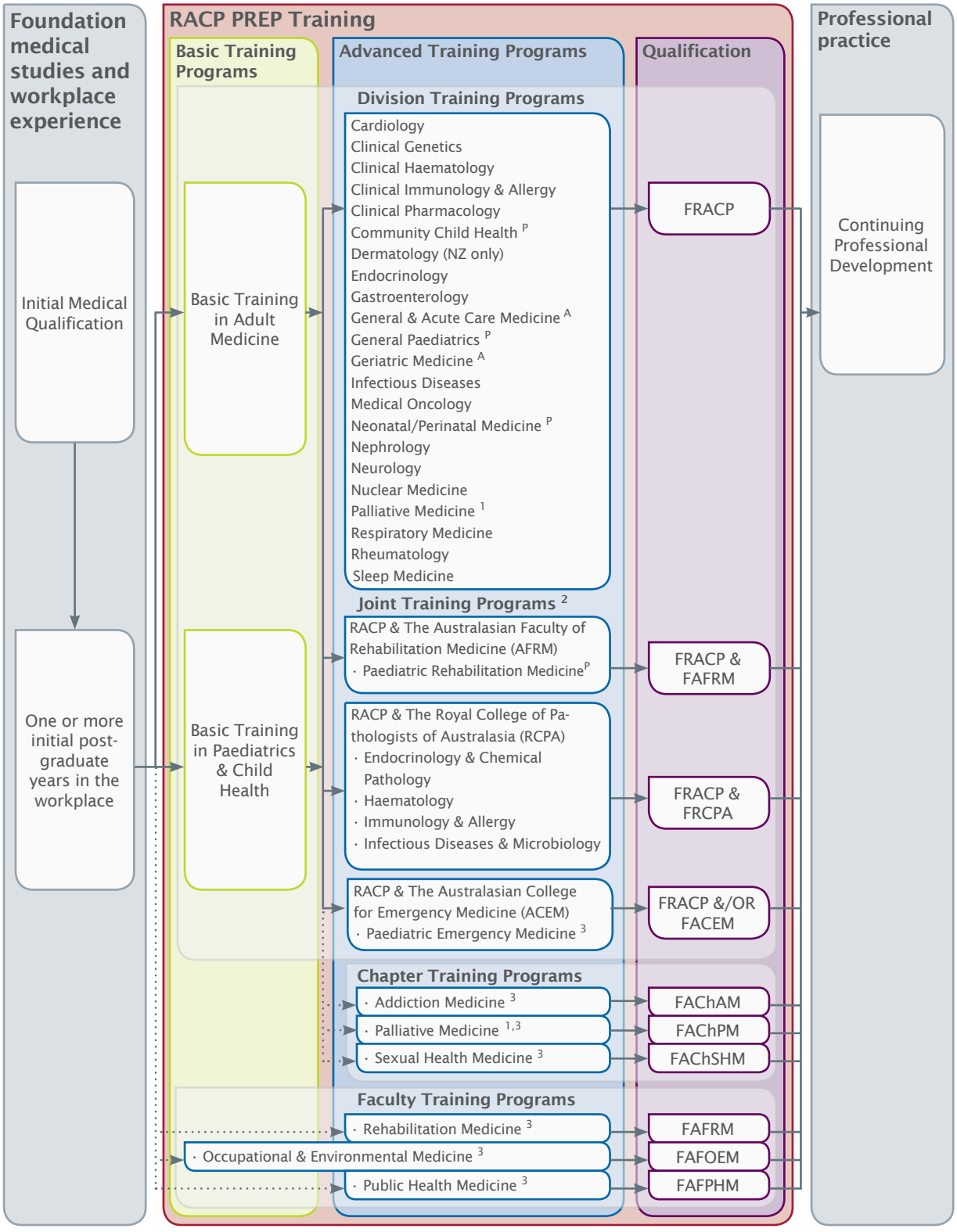
1st edition 2010 (revised 2013).

Please note: No Domains, Themes or Learning Objectives have been updated for this edition; design changes ONLY.

RACP FELLOWSHIP TRAINING PATHWAYS AND THE CONTINUUM OF LEARNING



P Trainees must complete Basic Training in Paediatrics & Child Health to enter this program.
A Trainees must complete Basic Training in Adult Medicine to enter this program.
1 Trainees who have entered Advanced Training in Palliative Medicine via a RACP Basic Training Program will be awarded FRACP upon completion and may subsequently be awarded FAChPM. Trainees who have NOT entered Advanced Training in Palliative Medicine via a RACP Basic Training Program will only be awarded FAChPM upon completion.
2 The Child & Adolescent Psychiatry Joint Training Program with the Royal Australian and New Zealand College of Psychiatrists (RANZCP) is currently under review by the RACP and RANZCP and closed to new entrants at present.
3 Alternative entry requirements exist for these training programs; please see the corresponding PREP Program Requirements Handbook for further information.

NB1: This diagram only depicts training programs that lead to Fellowship. Please see the RACP website for additional RACP training programs.
NB2: For further information on any of the above listed training programs, please see the corresponding PREP Program Requirements Handbook.

OVERVIEW OF THE SPECIALTY

Sleep is a ubiquitous phenomenon in all animal species. Sleep involves recurring partial disengagement from the surrounding environment, reduced sensory input, and generally decreased energy expenditure. In mammals, existence occurs in three states - wakefulness, non-rapid eye movement (NREM) sleep, and rapid eye movement (REM) sleep. Each of these states has its own distinct neuroanatomic, neurophysiologic, and neuropharmacologic mechanisms and behavioural features.

Depending on age, children spend as much as 50 to 65 percent of their lives in sleep. Disorders of sleep are common in children, affecting a quarter of Australian children aged 4.5 to 16.5 years. Insufficient or poor quality sleep in childhood has been demonstrated to have substantial effect on growth, behaviour, and learning. Yet the issues are rarely raised by parents or addressed by GPs and only one or two hours of a typical undergraduate medical curriculum might cover 'sleep'.

The International Classification of Sleep Disorders (ICSD) lists nearly one hundred known sleep disorders. Paediatric sleep disorders range from the common conditions encountered by every paediatrician, such as delayed sleep phase syndrome, to those that are rare and life threatening, such as congenital central hypoventilation syndrome. Effective treatments are available for most sleep disorders but they rely on the accurate identification of the disorder and health professionals who are skilled in their application.

Whilst some sleep disorders are unique to paediatrics, such as central apnoea in infancy, there are a number of areas that cross over with the adult subspecialty. However, many disorders differ significantly in their presentation and treatment in children compared with adults. An example would be obstructive sleep apnoea (OSA) in which excessive daytime sleepiness (EDS), the cardinal symptom in adults, is rare in young children. In fact these children, who are also mostly non-obese, tend to be hyperactive with deficits in learning and attention. Some sleep disorders, such as narcolepsy, are usually diagnosed during adulthood, although a significant proportion of patients diagnosed as adults exhibited symptoms in childhood and often with profound academic and psychosocial impact.

The central importance of sleep and its disorders in paediatric medicine is becoming increasingly recognised. The impact of sleep disorders crosses many different subspecialties, ranging from developmental and behavioural medicine to endocrinology, cardiology and gastroenterology, and more traditionally, neurology and respiratory medicine. The gap between paediatric and adult sleep medicine is closing. Recent evidence suggests that the metabolic and vascular effects of sleep-disordered breathing might have their foundations earlier in life than previously thought. There is also evidence that the circadian and behavioural sleep disorders in childhood often persist into adulthood.

The advances in scientific knowledge about sleep and the increased awareness of sleep disorders have lead to evolution of the new speciality of sleep medicine. This has been recognised by new training programs in the field in North America, Europe, Australia, and Japan. The advent of sleep medicine as a specialty is similar to other non-organ based medical specialties, such as clinical genetics and palliative care. These other areas have developed when either a substantive new body of knowledge has arisen, e.g. clinical genetics, or recognition of cross-disciplinary care enhances patient wellbeing, e.g. palliative care; sleep medicine involves both these features. Sleep research has provided new information on a range of sleep disorders that are not 'owned' by any pre-existing specialty. Compartmentalisation of sleep disorders into organ based specialties, such as respiratory medicine or neurology, can present problems in diagnosing complaints, such as sleepiness or abnormal movement during sleep, where differential diagnoses can cross organ-based areas of competency.

The curriculum in sleep medicine provides a foundation for the development of competency in the diagnosis and management of individuals with sleep disorders. It involves components of knowledge from a range of medical disciplines as well as integrating new advances in sleep research. By providing such a basis for training, it advances the aims of improving patient care by ensuring healthy sleep.

This new discipline, particularly in paediatrics, has a uniquely unifying effect for it is the only discipline that is based not on a specific organ system but a distinct state of normal human existence – a state previously perhaps taken for granted.

Key features of the specialty and its practice

Sleep medicine is a new non-organ based, cross-disciplinary specialty. It is underpinned by a substantial and rapidly expanding scientific knowledge base. Normal childhood development and the maintenance of health across the ages is critically dependant on obtaining adequate sleep. Acute and chronic sleep deprivation is associated with a range of adverse neurobehavioural, endocrine, and cardiovascular outcomes. Numerous specific sleep disorders have been identified which disrupt normal sleep and lead to disorders of respiratory, cardiovascular, or neural function. In addition, many major medical disorders, such as craniofacial disorders, Down syndrome, cerebral palsy, autism spectrum disorders and attention deficit hyperactivity disorder, are known to adversely impact on sleep. Disturbed sleep or sleep-related gas exchange may correspondingly cause further decline in physiological and cognitive functioning and quality of life.

Effective treatments are available for most sleep disorders but they rely on the accurate identification of the disorder and health professionals who are skilled in their application.

Thus, sleep medicine physicians play a central role in delivery of health care to patients with primary and secondary sleep disorders.

The paediatric sleep physician:

- understands the role of sleep in health and disease - particularly how development influences sleep and prevalence of sleep disorders
- understands the effects of sleep disorders on health and daily functioning. This is particularly pertinent to children, in whom normal sleep is critically important for growth and development
- has the skill to appropriately investigate and manage sleep disorders.

Evolving developments and future directions of the speciality of paediatric sleep medicine

There is increasing awareness among specialty areas of medicine of the impact of sleep disorders, especially sleep disordered breathing, on other diseases, e.g. pulmonary hypertension and epilepsy.

The prevalence of obesity is currently on the rise in Australia and New Zealand. A parallel increase in the prevalence of sleep disordered breathing in children is anticipated.

Sleep deprivation in children is becoming as widespread as that in adults, with concerning potential impacts on learning, the development of obesity, and insulin resistance.

There is increasing recognition that sleep disorders in children can cause learning difficulties and neurobehavioural disorders. Even mild levels of sleep disturbance have been shown to cause significant decrements in daytime behaviour and functioning.

There is a high prevalence of sleep disorders, much of which remains undiagnosed. The resultant effect is a significant public health problem in terms of reduced school performance, poor mental health and reduced quality of life of parents and children, and potential long-term health repercussions, particularly on the cardiovascular system

Chronic lung disease in children, such as cystic fibrosis, neuromuscular disease and chronic neonatal lung disease, is a significant cause of sleep-related breathing disorders. The application of non-invasive ventilation in infants and children can present particular technical challenges and ethical dilemmas.

There are insufficient resources for diagnosis and management. This includes inadequate numbers of health professionals with specific training in sleep medicine. There is a need to develop more efficient ways to diagnose and manage sleep disorders.

There are specific challenges in providing sleep services to regional and rural Australia and New Zealand.

There is the need for a much greater level of funding for high quality clinical trials to establish the effectiveness of treatment, the impact of disease at all levels of severity, and the development of diagnostic and management pathways to inform clinical practice.

Increasing use of computer technology and automated approaches to diagnosis of sleep disorders is likely to continue to strongly influence the development of sleep medicine.

Simpler alternatives to full in-laboratory diagnostic polysomnography (PSG) will likely become routine for some groups of patients in the future. The accuracy and most appropriate, cost-effective application of many of these devices in paediatrics is still to be established.

CURRICULUM OVERVIEW

Paediatric Sleep Medicine – Advanced Training Curriculum

This curriculum outlines the broad concepts, related learning objectives and the associated theoretical knowledge, clinical skills, attitudes and behaviours required and commonly used by paediatric sleep medicine physicians within Australia and New Zealand.

The purpose of Advanced Training is for trainees to build on the cognitive and practical skills acquired during Basic Training. At the completion of the Paediatric Sleep Medicine Advanced Training Program, trainees should be able to provide, at consultant level, competent and unsupervised comprehensive medical care in paediatric sleep medicine.

Attaining competency in all aspects of this curriculum is expected to take at least two years of core training in sleep medicine. In addition to sleep medicine training, candidates may wish to undertake dual training in respiratory medicine, neurology or another subspeciality. Training in respiratory medicine and neurology may equip trainees to accomplish the requirements of the sleep curriculum more expeditiously than other internal medicine training backgrounds.

It is expected that all teaching, learning and assessment associated with the Paediatric Sleep Medicine Advanced Training Curriculum will be undertaken within the context of the physician's everyday clinical practice and will accommodate discipline-specific contexts and practices. As such the curriculum will need to be implemented within the reality of current workplace and workforce issues and the needs of health service provision.

There may be learning objectives that overlap with or could easily relate to other domains. However, to avoid repetition, these learning objectives have been assigned to only one area. In practice it is anticipated that within the teaching/learning environment, the progression of each objective would be explored.

Note: The curricula should always be read in conjunction with the relevant College Training Handbook available on the College website.

Professional Qualities Curriculum

The PQC outlines the range of concepts and specific learning objectives required by, and used by, all physicians, regardless of their specialty or area of expertise. It spans both the Basic and Advanced Training Programs and is also used as a key component of the Continuing Professional Development program.

Together with the various Basic and Advanced Training Curricula, the PQC integrates and fully encompasses the diagnostic, clinical, and educative based aspects of the physician's/paediatrician's daily practice.

Each of the concepts and objectives within the PQC will be taught, learnt, and assessed within the context of everyday clinical practice. Thus, it is important that they be aligned with, and fully integrated into, the learning objectives within this curriculum.

EXPECTED OUTCOMES AT THE COMPLETION OF TRAINING

Graduates from this training program will be equipped to function effectively within the current and emerging professional, medical, and societal contexts. At the completion of the Advanced Training Program in paediatric sleep medicine, as defined by this curriculum, it is expected that a new Fellow will have developed the clinical skills and have acquired the theoretical knowledge for competent paediatric sleep medicine practice. It is expected that a new Fellow will be able to:

- investigate and manage children presenting with common sleep symptoms and problems
- identify less common sleep problems
- apply and interpret diagnostic investigations used in the management of sleep disorders
- recognise the indications, benefits, risks, and clinical processes of interventions used in the management of sleep disorders and be proficient in performing these procedures
- diagnose and manage a range of sleep disorders as detailed in the curriculum
- demonstrate a compassionate, caring attitude to children and their families and possess skills in communication, especially in regard to conveying bad news and in conflict resolution
- behave in a professional and ethical manner
- work with other health professionals and within a team where appropriate.

CURRICULUM THEMES AND LEARNING OBJECTIVES

Each of the curriculum documents has been developed using a common format, thereby ensuring a degree of consistency and approach across the spectrum of training.

Themes

The themes identify and link specific aspects of learning into logical or related groups.

Learning Objectives

The learning objectives outline the specific requirements of learning. They provide a focus for identifying and detailing the required knowledge, skills and attitudes. They also provide a context for specifying assessment standards and criteria as well as providing a context for identifying a range of teaching and learning strategies.

LEARNING OBJECTIVES TABLES

Theme 1	**Sleep Physiology** By the end of the training program the trainee will be able to explain the pathophysiology of normal and abnormal sleep
Learning Objectives	
1.1	Explain the features of sleep and circadian neurophysiology
1.2	Explain the physiology of sleep and breathing
1.3	Explain the anatomy and physiology of the upper airway

Theme 2	**Sleep Presentations** By the end of the training program the trainee will be able to diagnose and formulate a basic management plan for all sleep presentations
Learning Objectives	
2.1	Evaluate history and examination information to produce a differential diagnosis and formulate a management plan
2.2	Evaluate the relative contributions of sleep breathing vs. other sleep disorders to the patient's symptoms
2.3	Assess patients who present with complaints of sleep disorders
Theme 3	**Sleep Disorders** By the end of the training program the trainee will be able to investigate, diagnose and manage the broad range of sleep disorders
Learning Objectives	
3.1	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of OSA
3.2	Explain the pathophysiology, epidemiology, public health implications, assessment and management of apnoea in infancy or an apparent life threatening event (ALTE)
3.3	Explain the diagnosis and management of the full range of conditions relating to central sleep apnoea and sleep hypoventilation syndromes
3.4	Explain the indications, benefits, risks, and clinical processes of oxygen therapy
3.5	Evaluate a child with a disorder of initiation and maintenance of sleep
3.6	Evaluate a child with parasomnias, including vocalisation during sleep and/or sleep-wake transition disorders, such as rhythmic movement disorders
3.7	Evaluate a child with a disturbance of circadian rhythm
3.8	Evaluate a child with restless legs syndrome (RLS) and periodic limb movement disorder (PLMD)
3.9	Explain the indications, benefits, and risks of behavioural interventions in children with sleep disorders, including controlled comforting, behavioural modification programs, and relaxation techniques for anxiety/insomnia
3.10	Explain the daytime consequences of sleep disorders in childhood
3.11	Evaluate a child presenting with EDS
3.12	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of narcolepsy and idiopathic hypersomnolence

Theme 4	**Sleep Measurements and Investigations** By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objectives	
4.1	Explain the principles of measurement parameters
4.2	Monitor patients with sleep disorders
4.3	Evaluate the indications for sleep investigations
4.4	Interpret raw data from PSG
4.5	Interpret and formulate an appropriate sleep investigation report
4.6	Interpret and formulate an appropriate report for limited channel sleep studies, types 2-4
4.7	Interpret and formulate a report on tests of sleep propensity
4.8	Explain the indications for and interpretation of sleep diaries
4.9	Explain the indications for and interpretation of actigraphy
4.10	Apply appropriate diagnostic procedures and interpret results related to measurement of respiratory function
4.11	Explain the indications for, the associated risks, and the appropriate interpretation of relevant radiological tests
Theme 5	**Clinical Leadership and Research** By the end of the training program the trainee will be able to demonstrate clinical leadership and undertake research in sleep medicine
Learning Objectives	
5.1	Demonstrate clinical leadership in a sleep laboratory
5.2	Identify and apply methods used in clinical and/or basic research in sleep medicine
5.3	Plan and execute a clinical sleep research project

Theme 1	**Sleep Physiology** By the end of the training program the trainee will be able to explain the pathophysiology of normal and abnormal sleep
Learning Objective 1.1	Explain the features of sleep and circadian neurophysiology

Knowledge	Skills
• describe the circadian, ultradian, and homeostatic processes that underpin sleep • recognise the neurophysiological, physiological and behavioural changes that accompany the onset of sleep • identify the sensory, autonomic, cardiovascular, respiratory, endocrine, and metabolic changes during sleep in children • explain the concept of sleep stages, and the fundamental distinctions between REM and NREM sleep and their functions • describe the current theories regarding the neuroanatomical, neurobiological and neurophysiological basis for sleep and wakefulness and for NREM vs. REM sleep • identify the neuroanatomical and neurophysiological basis for arousal from sleep • describe when sleep stages develop in utero • describe the average total sleep time across different ages • explain how sleep structure changes with age, e.g. daytime naps • explain how sleep architecture changes with age, e.g. percentage of different sleep stages • explain the effects of sleep deprivation in terms of health and daytime functioning • explain how environmental, cultural and social factors, and parent-child interactions impact on wake-sleep transition, sleep patterns and behaviours.	• apply knowledge of normal sleep to interpret sleep complaints • explain the basics of sleep neurophysiology as it relates to a child's presenting problem • analyse and interpret PSG recordings to discern normal and abnormal patterns • recognise normal and abnormal circadian rhythms • teach patients, their families, health professionals and the public about the nature and importance of normal sleep.

Theme 1	**Sleep Physiology** By the end of the training program the trainee will be able to explain the pathophysiology of normal and abnormal sleep
Learning Objective 1.2	Explain the physiology of sleep and breathing

Knowledge	Skills

• describe control of breathing with particular reference to:
  • neuroanatomical and neurophysiologic basis of control of breathing
  • central and peripheral chemoreceptors and hypoxic and hypercapnic ventilatory responses
  • peripheral and central influences on control of breathing
  • the concept of the central pattern generator as the basis for respiratory control
• describe the maturation of control of breathing from fetus to adult and the impact of control of breathing at different ages on symptoms and disease
• describe the mechanics of breathing in an infant, particularly:
  • developmental changes in chest wall compliance
  • developmental strategies
  • Hering-Breuer inflation reflex
  • preferential nasal breathing
  • braking, grunting, and lung protection strategies
  • airway closure and determination of end-expiratory level
• describe the influence of sleep on breathing, specifically:
  • recognise changes in breathing that occur with sleep and in REM vs. NREM sleep
  • describe the maturation of breathing during sleep
  • describe the effect of sleep on breathing in respiratory diseases and neuromuscular disease.
	• recognise normal and abnormal breathing patterns during NREM and REM sleep, at all ages and in those with comorbid conditions.

Theme 1	**Sleep Physiology** By the end of the training program the trainee will be able to explain the pathophysiology of normal and abnormal sleep
Learning Objective 1.3	Explain the anatomy and physiology of the upper airway

Knowledge	Skills
• describe the structure and functions of the upper airway • describe the role of upper airway muscles in the control of breathing, both asleep and awake • describe the effects of craniofacial growth and development on the upper airway • recognise differences in the anatomy and physiology of the upper airway between children and adults • explain the concept that the pharyngeal airway is a collapsible tube • describe the dynamic behaviour of the pharynx during breathing, both awake and asleep, and the concept of critical pressure • explain the effect of nasal resistance on pharyngeal collapsibility.	• determine the most appropriate investigations of upper airway structure and function.

Theme 2	**Sleep Presentations** By the end of the training program the trainee will be able to diagnose and formulate a basic management plan for all sleep presentations
Learning Objective 2.1	Evaluate history and examination information to produce a differential diagnosis and formulate a management plan

Knowledge	Skills
• explain the daytime symptoms and consequences of sleep disorders in a developmental context • explain the night time symptoms and consequences of sleep disorders in a developmental context • identify the physical signs that may be associated with different sleep disorders.	• take a thorough sleep history from the patient, parent(s) and other relevant persons, taking into account the age and development of the child • perform the relevant neurological, airway/ respiratory and general physical examinations • weigh and synthesise history and examination information to produce provisional and differential diagnosis, and formulate and undertake management plan.

Theme 2	Sleep Presentations By the end of the training program the trainee will be able to diagnose and formulate a basic management plan for all sleep presentations
Learning Objective 2.2	Evaluate the relative contributions of sleep breathing vs. other sleep disorders to the patient's symptoms

Knowledge	Skills
• identify the clinical features and differential diagnosis of sleep breathing disorders • describe the varying manifestations of sleep disorders and the contribution each may make to sleep related symptoms, such as EDS or difficulties with initiation, or maintenance of sleep • describe the interaction, overlap and interrelationship of psychiatric and developmental disorders with sleep disorders, such as attention deficit hyperactivity disorder and autism spectrum disorders • recognise the contents of the ICSD.	• take a detailed sleep history and perform a comprehensive examination to elicit both the common and less common clinical features of OSA • determine whether OSA is likely to be the cause of sleep disturbance or daytime symptoms in a child • present a differential diagnosis of EDS in a child who does not snore • take comorbidity into account when assessing a child with a sleep problems and recommending investigation or treatment options • use and interpret ICSD.

Theme 2	Sleep Presentations By the end of the training program the trainee will be able to diagnose and formulate a basic management plan for all sleep presentations
Learning Objective 2.3	Assess patients who present with complaints of sleep disorders

Knowledge	Skills
• describe the normal physiology of sleep patterns and total sleep times in relation to age • identify common causes of hypersomnia, including behavioural and environmental factors and primary sleep disorders • describe the spectrum of extrinsic dyssomnias presenting as a disorder of initiation and maintenance of sleep and their clinical features, including irregular sleep patterns, inappropriate sleep-onset associations, and limit setting sleep disorders • describe the spectrum of REM and NREM parasomnias, including but not limited to confusional arousals, sleepwalking, sleep terrors, rhythmic movement disorder, bruxism, and enuresis	• assess severity of daytime consequences of sleep disorders • take a comprehensive sleep history to assess whether the patient is likely to have a type of sleep phase syndrome, e.g. sleep phase delay or advance. In addition, obtain collaborative reports from school teachers and counsellors where appropriate and permitted • take a comprehensive and developmentally appropriate history related to RLS and PLMD, recognising the difficulties in detecting symptoms of these conditions in children • recognise features which help to differentiate parasomnias from seizures • initiate treatment for insomnia and hypersomnia

Theme 2	Sleep Presentations By the end of the training program the trainee will be able to diagnose and formulate a basic management plan for all sleep presentations
Learning Objective 2.3	Assess patients who present with complaints of sleep disorders

• describe the spectrum and clinical features of epilepsy during sleep • describe the clinical features of delayed and advanced sleep phase syndrome, and free-running rhythms • describe the clinical features of RLS and PLMD in childhood • explain the concept of good sleep hygiene.	• recognise the indications for pharmacological treatment for conditions causing insomnia and hypersomnia in children • deliver comprehensive sleep education to parents and patients • explain factors that promote and disrupt good sleep • recognise when referral to another specialist is indicated • recognise sleep manifestations of common psychiatric disorders and refer appropriately.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.1	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of OSA

Knowledge	Skills
• describe the epidemiology of OSA and the relative importance of aetiological factors such as adenotonsillar hypertrophy, craniofacial disorders, neuromuscular disorders, syndromal disorders and obesity • explain the broad public health implications of OSA, with particular reference to the associated morbidities such as middle ear infections, recurrent upper respiratory infections, school absenteeism and health-related quality of life • identify the common and less common presenting clinical features of OSA • describe the use of PSG and other screening methods to measure and score sleep and/or abnormal sleep-related respiratory events • describe the indications for PSG and how it can determine the timing and nature of intervention for OSA	• take a detailed sleep history and perform a comprehensive examination to elicit the common and less common clinical features of OSA and to exclude other causes of noisy breathing in infants and children • initiate appropriate ancillary investigations, such as radiological investigations, nasendoscopy, laryngobronchoscopy, and allergy testing • explain the nature of PSG and ways to address and minimise the fears and anxieties that might accompany such a test in children • interpret PSG reports in the context of age and maturity and developmental status of the infant or child • interpret screening sleep study reports and recognise the merits and limitations of such studies • explain the nature and health consequences of OSA and PSG findings to patients and parents

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.1	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of OSA

• describe the indications for and likely outcomes of:
  • tonsillectomy and/or adenoidectomy and other ENT procedures, such as epiglottoplasty, tongue reduction, tracheostomy, and uvulopalatopharyngoplasty
  • craniofacial procedures, including mandibular osteotomy, mandibular distraction, midfacial advancement
  • orthodontic procedures including oral appliances, rapid maxillary expansion
  • continuous positive airway pressure treatment.
	• explain the treatment options available for OSA to patients and parents
	• apply the different treatment options for OSA
	• refer for adenotonsillectomy, advise about surgical priority and be involved in peri-operative care of children with OSA having adenotonsillectomy
	• work as part of a multidisciplinary team in the management of children with OSA, including collaboration with ENT, plastic surgery, anaesthetic, dental and ICU teams
	• initiate emergency management of upper airway obstruction, including nasopharyngeal tube, oxygen, and non-invasive respiratory support.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.2	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of apnoea in infancy or an apparent life threatening event (ALTE)

Knowledge	Skills

• describe the anatomy and physiology of the upper airway and central respiratory centre
• describe the differential causes of apnoea in infants and children
• describe the indications for respiratory and non-respiratory investigations including:
  • electrocardiography
  • PSG
  • echocardiography
  • Holter monitoring
  • electroencephalography (EEG)
  • assessments for gastro-oesophageal reflux disease
• describe control of breathing in the first months of life
• describe the modifiable and non-modifiable risk factors for sudden infant death syndrome
	• take a detailed sleep history and examination to elicit the relevant clinical features identifying central apnoea in infancy
	• order PSG and limited channel sleep studies
	• identify infants at risk, including social and family factors
	• explain known sudden infant death syndrome risk factors and emphasise their avoidance
	• plan and initiate appropriate investigations for a child who has had an ALTE
	• explain the use and limitations of home apnoea monitors and demonstrate their operation.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.2	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of apnoea in infancy or an apparent life threatening event (ALTE)

• explain the definition, prevalence, causes, and clinical presentations of ALTEs in infants • describe the evidence for the use of home apnoea monitors • describe the indications for PSG in a child who has had an ALTE.	

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.3	Explain the diagnosis and management of the full range of conditions relating to central sleep apnoea and sleep hypoventilation syndromes

Knowledge	Skills

• describe the prevalence, causes, and clinical presentations of sleep hypoventilation and central sleep apnoea syndromes, including those associated with neuromuscular conditions and congenital central hypoventilation syndrome
• describe the natural history, complications, and range of treatments available for the common neuromuscular disorders underlying chronic respiratory failure
• identify which patient groups are at risk, the associated clinical features and the treatment options and their limitations
• describe the impact of sleep on ventilation in chronic respiratory disorders, such as chronic neonatal lung disease and cystic fibrosis and the role for supplemental oxygen or ventilatory support in these conditions
• explain the role of PSG and limited channel sleep studies in diagnosis with particular reference to techniques used for assessing relative contributions of central vs. obstructive events
	• distinguish between different causes of hypoventilation syndromes
	• perform and interpret basic pulmonary function testing
	• interpret results of complex pulmonary function testing, e.g. maximal inspiratory and expiratory pressures
	• plan investigations for causes of hypoventilation
	• interpret relevant radiology
	• assess the severity of sleep-related ventilation using overnight oximetry in patients with chronic respiratory disorders
	• interpret PSG, including diagnostic and treatment studies
	• initiate and manage non-invasive ventilatory support, including:
	  • selection and application of masks
	  • adjustment of device settings
	  • monitoring patient progress
	  • trouble-shooting treatment problems
	  • use of humidification circuits in non-invasive positive pressure ventilation

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.3	Explain the diagnosis and management of the full range of conditions relating to central sleep apnoea and sleep hypoventilation syndromes

Knowledge	Skills
• describe the indications for arterial blood gas and other tests of ventilatory function • describe the evidence base and indications for ventilatory support for sleep hypoventilation syndromes • describe the indications for non-invasive vs. invasive ventilation for respiratory failure • describe the role of PSG and limited sleep studies in optimising non-invasive ventilator settings, patient-machine synchrony, and mask interface • describe the role of tracheostomy in airway management • describe the role of community, rehabilitation, and palliative care services in the management of patients with chronic respiratory failure.	• interpret PSG findings in patients on ventilatory support and make recommendations about treatment settings • manage the transition from in-hospital to home care, applying knowledge of available support services and home care teams • initiate sensitive discussions with patients and families about the limits of therapy in the context of deteriorating health in patients with increasing dependence on ventilatory support.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.4	Explain the indications, benefits, risks, and clinical processes of oxygen therapy

Knowledge	Skills
• describe the physiology of ventilatory drive and gas exchange • recognise the indications and guidelines for use of oxygen therapy related to sleep breathing disorders • describe the principles of assessment for oxygen therapy and the relevant regulatory body requirements • explain delivery systems available for home use of supplemental oxygen • describe the risks and adverse effects of oxygen therapy • describe the practicalities of supplemental oxygen use in continuous positive airway pressure and non-invasive positive pressure ventilation.	• order tests for measurement of oxygen saturation and interpret results in the clinical context • select and apply oxygen delivery systems, e.g. nasal prongs and masks • prescribe oxygen therapy • apply plans for weaning of home oxygen.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.5	Evaluate a child with a disorder of initiation and maintenance of sleep

Knowledge	Skills
• describe the normal physiology of sleep patterns and total sleep times in relation to age of the child • describe the spectrum of extrinsic dyssomnias that manifest as disorders of initiation or maintenance of sleep (DIMS) in a child • describe the symptoms of DIMS and clinical features, including irregular sleep schedules, inappropriate sleep-onset associations, nocturnal drinking/feeding disorders, and limit setting sleep disorders • explain how sleep disordered breathing, as well as other intrinsic sleep disorders and other medical disorders, e.g. middle ear disease, gastric reflux, reactive airway disease, might produce DIMS symptoms • describe how parental and family factors can precipitate or aggravate DIMS symptoms in infants and children • describe the cross-over between DIMS and psychiatric and developmental problems, particularly attention deficit hyperactive disorder, developmental delay, autism spectrum disorders, and visual impairment • describe the role of investigations, in particular sleep diaries and actigraphy, and the limitations of PSG in this context • describe the role of medication in causing and treating disorders of initiating and maintaining sleep • identify the relevant sections in ICSD.	• take a comprehensive sleep history from the patient and parents. In addition, obtain collaborative reports from school teachers and counsellors where appropriate and permitted • calibrate parental expectations to what is normal physiology and distinguish normal from abnormal sleep patterns and awakenings for different age groups • perform the relevant neurological, airway/ respiratory, and general physical examinations • synthesise history and examination information to produce provisional and differential diagnosis and formulate and undertake management plan • explain the implementation of treatment strategies for DIMS including sleep education and behavioural measures, such as stimulus control, bedtime restriction and cognitive and relaxation strategies • instigate management strategies including both non-pharmacological and pharmacological treatments as indicated • recognise when referral to another specialist is indicated.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.6	Evaluate a child with parasomnias, including vocalisation during sleep and/or sleep-wake transition disorders such as rhythmic movement disorders

Knowledge	Skills
• recognise classification of parasomnias into arousal disorders, sleep-wake transition disorders, and REM parasomnias • describe the clinical features of the parasomnias including features differentiating one diagnosis from another • describe the principles of clinical evaluation of children with parasomnias, including the role of PSG • describe the management options for children with parasomnias, including use of modifications to sleep schedules, safety measures, behavioural treatments, and pharmacological agents • identify specific sleep-related epilepsies, including nocturnal frontal lobe epilepsy: clinical presentation, distinguishing features and management options • describe the presentation of rhythmic movement disorders • describe the presentation, associations and consequences of bruxism during sleep in childhood • describe the definition and principles of management of enuresis in a developmental context • identify the relevant sections in ICSD.	• take a comprehensive sleep history from the parents and other relevant persons to explore the diagnostic possibilities • conduct relevant neurological, airway/respiratory, and general physical examinations • identify findings on PSG suggestive of parasomnias or a seizure disorder • synthesise history and examination or other information, such as home video, to produce provisional and differential diagnosis and formulate and undertake management plan • coordinate appropriate involvement of and referral to other specialists, e.g. psychologist and neurologist • explain non-pharmacological and pharmacological measures for management of parasomnias • manage children with bruxism or enuresis. Refer for management to dentists or specialist incontinence clinics when indicated.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.7	Evaluate a child with a disturbance of circadian rhythm

Knowledge	Skills
• describe normal sleep and circadian physiology • describe the clinical features, evaluation, and management of delayed and advanced sleep phase syndrome, and free-running rhythms • describe the particular problems of children with significant developmental delay, autistic spectrum disorders, other syndromal disorders like Smith-Magenis syndrome, Rett syndrome, and children with visual impairment • recognise the contents of the ICSD.	• take a comprehensive sleep history from the patient and parents. In addition, obtain collaborative reports from school teachers and counsellors where appropriate and permitted • interpret subjective and objective measures of circadian rhythm, including melatonin levels • explain strategies for rapid adjustment to new time zones • explain the management of altered sleep phase, e.g. bedtime scheduling, light therapy and melatonin • advocate for children and collaborate with school towards an optimal academic and behavioural outcome • explain the indications for and give advice about use of pharmacotherapy, in particular melatonin and melatonin agonists.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.8	Evaluate a child with restless legs syndrome (RLS) and periodic limb movement disorder (PLMD)

Knowledge	Skills
• describe the presentation and differential diagnosis of RLS and PLMD in childhood • describe the role of investigations, in particular PSG and screening blood tests • describe role of medication in treating periodic limb movements (PLM) in childhood.	• explain the difficulties in detecting symptoms of RLS and PLMD in childhood and gear history appropriately • apply an investigation plan for suspected PLMD • interpret iron studies in the context of PLMD • interpret relevant aspects of the PSG, in particular the PLM index • prescribe therapy for PLMD and advise on non-pharmacologic therapies.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.9	Explain the indications, benefits, and risks of behavioural interventions in children with sleep disorders, including controlled comforting, behavioural modification programs, and relaxation techniques for anxiety/insomnia

Knowledge	Skills
• describe normal sleep architecture, including the classification of sleep stages, normal arousal patterns and normal sleep movements, and how sleep architecture changes with age • describe how environmental and social factors, and parent-child interactions can impact on wake-sleep transition, sleep patterns, and behaviours • explain the factors that inhibit or promote sleep, and apply these to discussion of modification of sleep schedules • explain the range of behavioural modification techniques.	• diagnose sleep disorders and select patients for behavioural interventions • apply knowledge of the range of behavioural interventions and individualise therapy for each child given the family context.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.10	Explain the daytime consequences of sleep disorders in childhood

Knowledge	Skills

• describe the daytime symptoms and consequences of sleep disorders in a developmental context
• explain the difference between the daytime consequences of OSA in children compared to adults. In particular, explain the different ways in which children express sleepiness and the spectrum of daytime symptoms in children which may relate to a sleep disorder
• describe the magnitude and nature of the neurocognitive and behavioural associations of sleep disorders in childhood.
	• assess the potential daytime effects of sleep disorders, taking into account:
	  • the nature of the disorder
	  • the age of the patient
	  • reports from the patient, parents, and schools
	• assess the likelihood that a sleep disorder is the explanation for a child's daytime problems or difficulties.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.11	Evaluate a child presenting with EDS

Knowledge	Skills

• describe the influence of medications on sleep-wake regulation and EDS, and the underlying neuropharmacology
• describe the important behavioural factors, such as chronic sleep restriction, that influence subjective and objective sleepiness
• describe the common causes of persistent and periodic EDS in children and how the symptoms can sometimes be non-specific
• identify the primary sleep disorders that are associated with EDS, such as narcolepsy
• recognise that children with EDS are often asymptomatic or only exhibit subtle symptoms on initial presentation
• identify other medical conditions that are associated with EDS
• describe the indications for and the interpretation of common tests used in the evaluation of EDS and their limitations in the paediatric population, e.g.:
  • subjective scales – modified Epworth sleepiness scale and paediatric daytime sleepiness scale
  • objective tools – PSG, multiple sleep latency test (MSLT), and maintenance of wakefulness test (MWT)
• describe the limitations of currently available tests for assessment of EDS
• explain the educational, public health, and safety issues associated with EDS, and identify the local licensing requirements for driving, potential for increased examination times, and the need for liaison with educational boards and schools.
	• perform sleep specific assessment and conduct a thorough history and examination in the assessment of EDS
	• synthesise patient symptoms and signs into a comprehensive differential diagnosis and plan further investigation if needed. Recognise that careful and regular planned follow-up is sometimes needed before a firm diagnosis can be confirmed
	• interpret results of investigations with specific regard to EDS and the clinical context of the patient, including the age and developmental level of the child
	• assess if EDS is placing child or others at risk and advise parents and children of their responsibilities and limitations
	• prescribe a range of treatments both pharmacological and non-pharmacological, such as stimulants and other wake-promoting agents, sleep education, and schedule modification recommendations.

Theme 3	Sleep Disorders By the end of the training program the trainee will be able to investigate, diagnose, and manage the broad range of sleep disorders
Learning Objective 3.12	Explain the pathophysiology, epidemiology, public health implications, assessment, and management of narcolepsy and idiopathic hypersomnolence

Knowledge	Skills
• describe the important behavioural factors, e.g. chronic sleep restriction, that influence subjective and objective sleepiness • identify the common causes of EDS in children • describe the genetics, presentation, and treatment of narcolepsy • describe the indications for and the interpretation of tests used in the evaluation of EDS and their limitations in the paediatric population, including questionnaires, PSG, MSLT, and MWT • identify the pharmacology and management of medications that affect sleep-wake regulation, including stimulants.	• synthesise patient symptoms and signs into a comprehensive differential diagnosis and plan further investigation if needed • interpret genetic studies for narcolepsy • determine when a MSLT and MWT might be appropriate • explain investigation options and their relative merits and complications • interpret results of investigations for EDS taking the clinical context into account, including the age and developmental level of the child and interpretation of PSG, MSLT and MWT in children • assess if EDS is placing patient or others at risk and advise parent(s) and patient of their responsibilities and limitations • prescribe a range of treatments both pharmacological and non-pharmacological, such as stimulants and other wake-promoting agents, sleep education, and schedule modification recommendations.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.1	Explain the principles of measurement parameters

Knowledge	Skills
• identify commonly used measurements in PSG, and limited channel sleep studies • describe the measurements used in the staging of sleep • describe the different methods used to measure respiration during sleep • recognise the sensitivity of the different measurements of respiration	• explain procedures of sleep investigations to patients and/or parents • explain the limitations of the common parameters used in sleep investigations • interpret measurements across the range of sleep studies • determine adequacy of recording techniques

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.1	Explain the principles of measurement parameters

- describe additional measurements used in conjunction with positive airway pressure studies
- identify commonly used measurements in PSG, and limited channel sleep studies
- describe the measurements used in the staging of sleep
- describe the different methods used to measure respiration during sleep
- recognise the sensitivity of the different measurements of respiration
- describe additional measurements used in conjunction with positive airway pressure studies
- describe the principles of continuous oximetry and measurements of CO2 in sleep – end-tidal and transcutaneous
- describe how PLMs are measured
- describe other non-routine measurement methods, including diaphragmatic electromyography (EMG) and oesophageal pressure monitoring
- describe the influence of age and disease processes on common measurement parameters, notably developmental changes, obesity, respiratory muscle weakness, and neurological disorders
- recognise the role of video monitoring during sleep studies.
- use video recordings to assist in sleep staging of infants and as a diagnostic tool in older children
- recognise the limitations of PSG in detecting seizures and identify the need for additional EEG channels or a formal EEG
- determine the measurements indicated for further evaluation in the event of a non-diagnostic sleep study in a very symptomatic patient.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.2	Monitor patients with sleep disorders

Knowledge	Skills
• explain and operate sleep monitoring equipment and recording features • identify the hardware and software of the computerised equipment used in a sleep service • explain and operate the sensor devices used to measure physiological variables as part of sleep studies • describe the technical and digital specifications used for routine PSG sleep recording • describe the rules for PSG display and display manipulation • explain the digital analysis techniques used in computerised PSG systems • describe the range of tests available to diagnose and manage sleep disorders • describe the rules for scoring sleep, arousals, cardiac events, movements, and respiratory events • explain the rules for scoring a MSLT and a MWT • explain infection control and prevention of cross infection.	• explain sensors, filters, gain, sampling times (frequencies) and linearity of the equipment used in the sleep laboratory to technical and other staff • apply and locate sensors for monitoring sleep disorders • assess when the raw data and technical scoring of raw data is below accepted standards • interpret measurements in positive airway pressure treatment studies and determine adequacy of treatment settings • justify and report interpretations of a MSLT and MWT • interpret video and EEG during a paroxysmal event at night and report differential diagnosis • determine the requirement for further evaluation in the event of a normal diagnostic sleep study.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.3	Evaluate the indications for sleep investigations

Knowledge	Skills
• describe aetiology and physiology, clinical features and specific measurements of common sleep disorders • describe appropriate indications for investigation with the range of sleep investigations available (from single channel to full PSG), especially with regard to the age of the subject and the suspected sleep disorder • recognise the indications and utility of tests of sleep propensity at different ages	• perform a thorough history and examination • appraise the nature and level of sleep investigations required • use and interpret appropriate questionnaire measurements for sleepiness and sleep disorders • determine the appropriateness of performing sleep investigations based on the clinical features of each case

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.3	Evaluate the indications for sleep investigations

• describe the common questionnaire measurements of sleepiness and know the limitations of these measurements • describe the effects of medications and lifestyle on sleep wake patterns and how these factors can affect measurements of sleepiness.	• evaluate whether the clinical situation necessitates repeat investigations.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.4	Interpret raw data from PSG

Knowledge	Skills

• describe normal sleep stage distribution and proportions according to age
• define respiratory events – central, obstructive, and mixed apnoeas and hypopnoeas
• define arousals
• define PLMs
• describe paediatric scoring criteria, recognise how different scoring criteria may alter results of PSG
• interpret raw data from sleep studies, including the following parameters:
  • electro-oculogram
  • chin EMG
  • leg EMG derivations
  • airflow parameters
  • respiratory effort parameters
  • oxygen saturation
  • body position
  • airway pressures
  • measures of CO2 – end-tidal and transcutaneous
  • ECG.
	• recognise sleep stages from EEG, electro-oculogram and EMG channels, including in infants
	• recognise abnormal sleep EEG patterns
	• recognise arousals
	• recognise apnoeas and hypopnoeas – central, obstructive, and mixed
	• recognise PLMs
	• identify abnormalities in sleep architecture, respiration and body movements
	• determine optimal settings for ventilatory support (continuous positive airway pressure or non-invasive ventilation) from treatment sleep study parameters.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.5	Interpret and formulate an appropriate sleep investigation report

Knowledge	Skills

• describe the essential features of a sleep study report used in clinical decision making
• recognise normative data for:
  • sleep architecture
  • respiratory events during sleep
  • oxygenation/ventilation
  • PLMs during sleep
• describe the criteria for defining the severity of sleep disordered breathing.
	• generate a report for a diagnostic sleep study
	• generate a report for a treatment sleep study
	• interpret results and formulate a management plan.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.6	Interpret and formulate a report for limited channel sleep studies, types 2-4

Knowledge	Skills

• explain the clinical context in which limited channel sleep studies might be useful, including tests performed in the home
• describe the range of limited channel sleep studies available.
	• recognise the limitations and clinical applicability of various types of limited channel sleep studies, including overnight oximetry, cardio-respiratory sleep studies, and limited channel PSG studies
	• interpret data from limited channel sleep studies, including demonstrate ability to:
	  • review raw data to determine signal quality
	  • score sleep and respiratory parameters
	• generate a report for a limited channel sleep study, including pertinent data and interpretation
	• determine the requirement for further evaluation in the event of an indeterminate limited channel sleep study.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.7	Interpret and formulate a report on tests of sleep propensity

Knowledge	Skills
• describe the essential features of reports on tests of sleep propensity used in clinical decision making • recognise the clinical context in which the MSLT and MWT are indicated • explain the nature of the above tests, including details of how they are carried out • recognise normative data for MSLT and MWT, taking into account the patient's age • describe the criteria for defining the severity of hypersomnolence or inability to maintain wakefulness • explain the impact of MSLT and MWT findings on driving.	• determine when a MSLT and MWT might be appropriate • explain treatment options and their relative merits and complications • generate reports of tests of sleep propensity • identify pathological hypersomnolence or inability to maintain wakefulness based on tests of sleep propensity.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.8	Explain the indications for and interpretation of sleep diaries

Knowledge	Skills
• describe normal sleep duration and timing and influence of age on these factors • describe circadian effects on sleep duration and timing.	• recognise the indications for completion of a sleep diary • explain the completion of a sleep diary to parent(s) and child • interpret sleep diaries applying knowledge of normal sleep duration and timing according to age • use sleep diary information to inform treatment decisions.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.9	Explain the indications for and interpretation of actigraphy

Knowledge	Skills
• describe normal sleep duration and timing, and influence of age • describe circadian effects on sleep duration and timing.	• recognise the indications for actigraphy in the clinical context • explain carrying out actigraphy to parent(s) and child • interpret actigraphy results applying knowledge of normal sleep duration and timing according to age • use actigraphy information to inform treatment decisions.

Theme 4	Sleep Measurements and Investigations By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.10	Apply appropriate diagnostic procedures and interpret results related to measurement of respiratory function

Knowledge	Skills

• describe the physiology related to respiratory function tests used in the assessment of sleep breathing disorders, including:
  • spirometry
  • lung volumes
  • gas transfer
  • tests of respiratory muscle strength
  • arterial blood gases
  • oximetry
• identify reference standards for respiratory function tests
• describe the technical aspects of each test, including limitations, especially operator-dependant issues
• identify standards for acceptable measurement appropriate for the age of the subject
• recognise normative data for common respiratory function tests
• explain infection control and prevention of cross-infection.
	• select and interpret appropriate respiratory function tests to investigate sleep breathing disorders
	• interpret respiratory function tests in clinical settings
	• perform spirometry
	• use oximetry in the management of children with acute and chronic sleep breathing disorders.

Theme 4	**Sleep Measurements and Investigations** By the end of the training program the trainee will be able to initiate, interpret, and report sleep investigations
Learning Objective 4.11	Explain the indications for, the associated risks, and the appropriate and interpretation of relevant radiological tests

Knowledge	Skills

• describe the indications for and limitations and risks of:
  • chest x-rays
  • lateral neck x-rays
  • cephalometry
  • brain CT scan
  • MRI scan.
	• select appropriate radiological investigations
	• interpret chest x-rays and lateral neck x-rays
	• recognise the principles and clinical use of cephalometry
	• interpret the clinical implications of cerebral CT and MRI scans.

Theme 5	**Clinical Leadership and Research** By the end of the training program the trainee will be able to demonstrate clinical leadership and undertake research in sleep medicine
Learning Objective 5.1	Demonstrate clinical leadership in a sleep laboratory

Knowledge	Skills
• describe the components of a quality assurance program for a sleep laboratory • identify how to implement an outcomes-based sleep service review program • identify the skills required to provide clinical leadership to a sleep laboratory.	• implement quality assurance programs for a sleep laboratory • devise strategies to solve issues regarding scoring of raw data, calibration of equipment, and storage of raw and reported data • develop protocols for the sleep laboratory • implement an evidence-based outcome analysis for the sleep laboratory • demonstrate leadership skills to facilitate efficient running of a sleep laboratory.

Theme 5	Clinical Leadership and Research By the end of the training program the trainee will be able to demonstrate clinical leadership and undertake research in sleep medicine
Learning Objective 5.2	Identify and apply methods used in clinical and/or basic research in sleep medicine

Knowledge	Skills
• identify methods used in clinical and/or basic research in sleep medicine, particularly the strengths and weaknesses of different types of study design and statistical methods • identify components involved in conducting clinical and/or basic research, including study design, data analysis, and interpretation of research • describe the strengths and weaknesses of the various tools used in sleep research • identify the major journals which publish sleep related research • describe clinical audit and its role in quality improvement.	• apply research methods, using the various tools employed in sleep research • apply knowledge of the components of research to evaluate the current literature in sleep medicine • critically appraise the medical literature as it applies to paediatric sleep medicine • critically evaluate sleep research in clinical journal clubs • appraise relevance of sleep research to clinical practice.

Theme 5	Clinical Leadership and Research By the end of the training program the trainee will be able to demonstrate clinical leadership and undertake research in sleep medicine
Learning Objective 5.3	Plan and execute a clinical sleep research project

Knowledge	Skills
• identify the types of study design • describe the ethical implications of sleep research and requirements to submit research projects for ethical approval • describe statistical analysis methods, including issues related to sample size and statistical power • describe measurement techniques • describe the methods of literature review • describe the requirements for publication of research projects.	• formulate a hypothesis • design a basic research protocol • critically evaluate published research studies and summarise relevant findings in a literature review • collect and analyse research data • construct and write an abstract containing data from a research study • prepare research findings for presentation to a professional audience in the form of an abstract to a national or international meeting, oral or poster presentation • write a manuscript for publication in a peer review journal.

ACRONYMS AND INITIALISMS

ALTE	apparent life threatening event
DIMS	disorders of initiation or maintenance of sleep
ECG	electrocardiogram
EDS	excessive daytime sleepiness
EEG	electroencephalography
EMG	electromyography
ENT	ear, nose and throat
ICSD	International Classification of Sleep Disorders
ICU	intensive care unit
MSLT	multiple sleep latency test
MWT	maintenance of wakefulness test
NREM	non-rapid eye movement
OSA	obstructive sleep apnoea
PLM	periodic limb movement
PLMD	periodic limb movement disorder
PSG	polysomnography
REM	rapid eye movement
RLS	restless legs syndrome