



Paediatric HERMES: a European Syllabus in Paediatric Respiratory Medicine

Respiratory diseases remain among the leading causes of morbidity and mortality in children. Yet paediatric respiratory medicine (PRM) is a young subspecialty which only started to develop in the 1940s. Many of the early leaders were physiologists and clinicians with a special interest in the breathing of children, who applied physiological techniques to study lung function in children [1].

With scientific advances, and thus the increasing difficulties of mastering the whole discipline of children's medicine, the need for subspecialisation has become imperative. The subspecialty of PRM has come a long way and in Europe, PRM continues to evolve towards a consolidated and recognised tertiary care subspecialty. Structured programmes for education and training in PRM are now central to the development of the subspecialty and to a longer-term goal of ensuring the best quality of care for all children with respiratory problems. Harmonising education and training at the European level will have a major role in achieving this goal and is thus a priority for all involved in clinical care of children with respiratory diseases.

Working towards this more than 10 years ago, the Long Range Planning Committee of the Paediatric Assembly of the European Respiratory Society (ERS), led by Max Zach, developed the first Training Syllabus for Paediatric Respiratory Medicine as a tertiary care subspecialty. This pioneering syllabus specified both the content of training and curriculum components and has since served as a model for other specialties. However, this first syllabus was developed by a few distinguished European specialists in PRM, and at that stage, there were only limited opportunities for wider consultation. Following the example of the ERS adult HERMES (Harmonised Education in

Respiratory Medicine for European Specialists) Task Force, the Paediatric Assembly voted for an update of the existing syllabus. An application for a Task Force to tackle this task was thus put forward through the ERS School and approved by the ERS Executive Committee.

The paediatric HERMES initiative was therefore launched to develop updated European standards for training in the PRM subspecialty. Aligned with the ERS's mission, and driven by the impetus of the successful adult HERMES, the paediatric HERMES Task Force set to work. The initiative was strongly supported by the ERS School and the Tertiary Care Group of the Paediatric Section of the Union Européenne des Médecins Spécialistes (UEMS) as well as the Forum of European Respiratory Societies (FERS). This project, which will last an estimated 5 years, aims to develop a range of consensus documents and activities for the education and training of paediatric respiratory medicine specialists, including (figure 1):

- 1) a European syllabus;
- 2) a European curriculum;
- 3) a European examination in PRM; and
- 4) development of training networks and training centre accreditation.

This paper describes the completion of phase I of the project and presents the first of these documents, a new and updated European syllabus. It defines the knowledge and skills that a PRM trainee needs to acquire before appointment as a specialist in PRM.

Historical perspective

Between 1996 and 1998, the first syllabus harmonised training programmes in PRM between different European countries, and

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Provenance

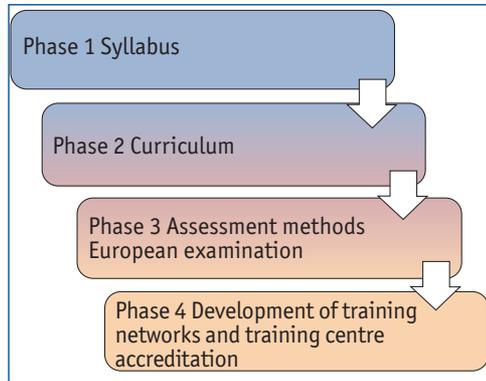
ERS Task Force report

Competing interests

None declared.

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Figure 1
Paediatric HERMES project phases.



established clear standards of knowledge and skills required to practice PRM on a tertiary care level [2]. In cooperation with the UEMS, this syllabus became a model for other tertiary care subspecialties and it aimed to be compatible with existing national programmes. The syllabus was structured as obligatory and desirable modules. In addition to the syllabus, a list of training centres was produced, which had been approved by national paediatric societies [3].

In 2006, 242 of the >750 members of the ERS Paediatric Assembly at that time responded to an online survey which aimed to determine whether the 2002 syllabus needed to be updated [4]. Although a great majority of respondents stated that this syllabus was known and useful, 89% supported the need for updating. Many suggestions were received regarding the syllabus as a whole and its specific modules.

Methodology

After approval of the paediatric HERMES Task Force by the ERS, it was decided to use a formal consensus process, a modified Delphi process, similar to the methodology developed within the adult HERMES project [5]. The project and all its processes were coordinated at the ERS headquarters and funded by the ERS School. The aim of the present publication is to describe the process of developing the updated syllabus and to publish its content.

The Delphi technique is an interactive process designed to lead to a consensus between a panel of pre-selected experts [6–9]. The paediatric HERMES Task Force consisted of 15 experts representing different European regions as well as the Long Range Planning Committee, the Paediatric Assembly and the ERS School. In parallel, European experts from 13 countries were identified as national respondents. Through FERS, national societies nominated and approved their respective national respondents. Thus, 20

European countries were represented in the cohort of experts, which included both the Task Force members and the national respondents. Members of the Paediatric Assembly also participated in the Delphi rounds and 29 trainees in tertiary care centres were identified and contributed to the process.

Through telephone conferences and electronic dialogue in February 2008, the Task Force compared the 2002 PRM syllabus with the 2006 syllabus of the adult HERMES. Some important principles were agreed at the beginning. It was decided to keep the modular format with mandatory and optional modules. The Task Force also agreed unanimously that formal training in PRM requires at least a 3-year training in general paediatrics and should be followed by at least 3 years' training in PRM. Although different definitions may be used, for the purpose of this Task Force it was decided to designate the syllabus as where the content of training is described ("what") while the curriculum to be developed in a second step is understood to describe how the content should be taught ("how").

The issue of levels of competence to be achieved was discussed and it was decided to align with the adult syllabus by adopting levels of competence for each individual module. It was emphasised that the overlying concept is that the target users of the syllabus are tertiary care specialists and trainees in PRM. The following levels of competence were identified: level 1 describes competence which calls for close supervision, level 2 underlies distant supervision and level 3 competence is the level of a tertiary specialist who practices independently. With regard to purely knowledge-based items it was decided that level 1 refers to basic knowledge, level 2 to intermediate and level 3 to in-depth knowledge of the respective item (figure 2).

Guided by the results of the 2006 online

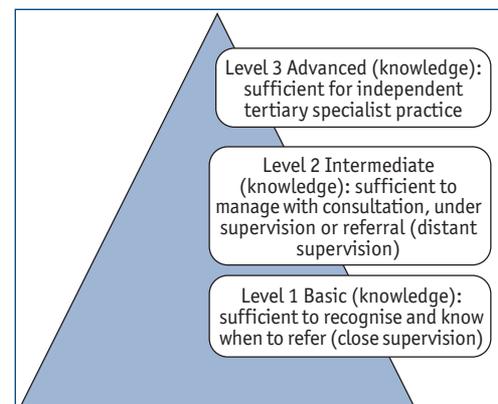


Figure 2
Definitions of levels of competence.

survey of the Paediatric Assembly, the Task Force decided on the modules to be updated and each was allocated to small working groups. In March 2007 in Nice, the Task Force collated the output from these working groups and finalised the first draft syllabus to be submitted for comments through the first Delphi round. This first round aimed to obtain broad feedback from the experts within the Task Force, the national respondents and the Paediatric Assembly. A vote on the proposed list of syllabus items and open comments were requested. The online survey was constructed such that respondents could agree or disagree with each proposed item and for each module being mandatory or optional. Open comments could be added and additional items could be proposed at the end of each module. All responses and comments were considered in depth during the next meeting in July 2008 in Berlin and following this, a second draft syllabus was produced.

An updated version of this draft syllabus was thus put online for comments in July 2008. The second Delphi round was constructed differently and respondents were asked to perform the following tasks: for each new module, to state their agreement or disagreement to it being a mandatory or an optional module; and to state, for each module item included in the syllabus, which level of competence trainees should have acquired by the time they qualify as tertiary care specialists in PRM.

At a plenary session in October 2008, the Task Force members and national respondents discussed those items and issues that remained controversial. Debates and discussions led to clarification and fine-tuning of items. In the light of these discussions and the results of the second survey, the attendees completed a final survey (third Delphi round). The Task Force finally met in November 2008 in Geneva to finalise this document on the basis of the data collected (figure 3).

Results

At its first meeting, the Task Force drafted a syllabus that contained 19 modules with 130 syllabus items. This was used in the first Delphi round. The response rates of different respondent categories during the Delphi process can be seen in figure 4. Following the first Delphi round, 44 out of 265 items were marked as controversial nonconsensual items, with an agreement of <80%. This constituted 16.6% of the total proposed items. Individual syllabus items generated



387 comments from all respondent groups, of which 45% came from experts, 48% from the Paediatric Assembly and 7% from trainees. This feedback provided a basis for the revision and the second draft.

The second draft included five new modules, resulting in 21 mandatory modules and three optional modules with 162 syllabus items. This round also attracted extensive reactions. However, this round was more controversial, with agreement rates ranging from 35.5% to 74.8%, and no topic reached the 80% agreement rate accepted as consensus in the first Delphi round. There were five items with equal or almost equal (with one respondent difference) distribution of opinions between two levels of knowledge. For 28 out of the 162 syllabus items (17.3%) Task

Figure 3
Paediatric HERMES Task Force processes.

Category participation rates	
Delphi Round 1	
Task Force members	92%
National respondents	82%
Trainees	21%
Paediatric Assembly	14%
Delphi Round 2	
Task Force members	86%
National respondents	64%
Trainees	16%
Paediatric Assembly	16%
Delphi Round 3	
Task Force members	79%
National respondents	67%

Figure 4
Delphi round participation rates per respondent category. Detailed results of each Delphi round are available on the HERMES website at hermes.ersnet.org/

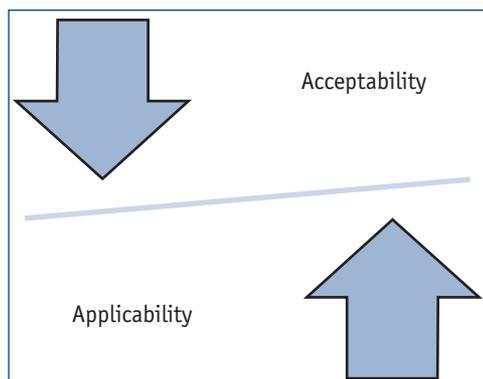
Force members expressed a different opinion from Assembly respondents. The results from the second Delphi round were clarified and discussed in the plenary session, followed by a third and final Delphi round among those present at this meeting. The Task Force finally met in Geneva to discuss the remaining controversial items and proceeded to finalise the updated European Paediatric Respiratory Medicine Syllabus (Appendix 1).

Discussion

When the work of this Task Force began, it had the unique advantage that the update could be based both on an existing working European training syllabus in PRM and the example of the adult HERMES, which used a formal process to increase the acceptability of the final output. The Task Force was well aware that the 2002 syllabus with its list of European training centres has been invaluable for the continuous development of PRM as a recognised subspecialty with the overall aim to improve patient care all over Europe.

However, there are some important aspects and problems that were only partially addressed by this first initiative. Within Europe, countries are in different stages of the development of medical training and some countries do not formally recognise PRM as a subspecialty. This heterogeneity will pose a challenge. Acceptability of the syllabus will differ from country to country. The Task Force has tried to find a balance between making the syllabus both realistic and aspirational. The availability and size of training centres, technologies and other resources will vary from country to country (figure 5). At the same time, the ultimate vision remains that the training as defined by the Task Force will deliver well-trained specialists who will be in a strong position to secure the best care of children with respiratory illnesses.

Figure 5
Acceptability versus applicability.



The Task Force is also conscious of the basic European Union principle of subsidiarity, which means there is no legal standing to the initiative. All that this process produces are recommendations. The Task Force is equally aware of the existence of local or national resistance to the official recognition of PRM. Another important consideration throughout the process is the existence of paediatricians with special interest in PRM at a level below tertiary specialists. It is expected that the syllabus with its modular structure will eventually be adapted to cover the respective needs and interests of secondary and primary care paediatricians with a special interest in respiratory medicine. This has already happened based on the first syllabus in some countries, for example the UK.

Conclusion

The development and publication of the updated European Paediatric Respiratory Medicine Syllabus is an important milestone in the paediatric HERMES project. Future tasks of the project will include development of the curriculum, introduction of the European examination and development of training networks and accreditation of training centres. Up to now, Board examinations and accreditations have been organised on a national level only. As PRM is a tertiary-level paediatric subspecialty, numbers of trainees in any one country are relatively small and most will agree that it is desirable to organise training on a pan-European level. Conversely, the paediatric respiratory community is growing, as evidenced by the growing number of members of the Paediatric Assembly. In contrast to the well-established specialty of adult respiratory medicine in Europe, PRM is still evolving. Existing national training concepts are heterogeneous and pose both a challenge and an opportunity. Provoking change in a developing and evolving system is easier than aiming to influence an established one.

The curriculum phase, which seeks to operationalise the syllabus, is already far advanced. The curriculum will describe the methods and procedures of training as well as proposing validated assessment tools. In other words, the curriculum will describe how competences in the syllabus should be taught, learned and assessed. It remains to be negotiated how these assessments can be implemented on the European level.

Alongside all these, groundwork for the voluntary European examination in PRM has begun

with the syllabus as its blueprint. The inaugural examination is expected to take place in 2010 at the ERS Annual Congress in Barcelona. For the future, the Task Force looks ahead to developing training networks throughout Europe as well as comprehensive educational materials such as e-learning resources, postgraduate courses and seminars.

This global project aspires to facilitate the mutual unrestricted acceptance and ratification of individual qualifications and to enable free movement of trainees and thus, serve to reach the goal of a harmonised European subspecialty of PRM. The main aim, however, is of course to deliver the best possible training to the next generation, in order that they can outdo their mentors and deliver the very best care to children with respiratory disease.



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(UK), A. Barbato (Italy), M. Brezina (Slovakia), I. Chkhaidze (Georgia), J-C. Dubus (France), A. Gimeno (Spain), G. Hedlin (Sweden), B. Karadag (Turkey), A. Malfroot (Belgium), F. Riedel (Germany), A. Valiulis (Lithuania), M. Vasar (Estonia)

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Appendix 1. The European Paediatric Respiratory Medicine Syllabus

	Level 1	Level 2	Level 3
Evaluation of respiratory symptoms and signs MANDATORY			
1			●
2			●
3			●
4			●
5			●
6			●
Related modules			
All			
Pulmonary function testing MANDATORY			
1			●
2			●
3			●
4			●
5			●
6			●
7			●
8			●
9			●
10			●
11			●
12			●
13			●
Related modules			
All			
Airway endoscopy MANDATORY			
1			●
2			●
3			●
4			●
5			●
6			●
7		●	
8			●
9			●
10		●	
Related modules			
All			
Imaging MANDATORY			
1			●
2			●
3		●	
4			●
Related modules			
All			
Acute and chronic lung infection MANDATORY			
1			●
2			●
3			●

	Level 1	Level 2	Level 3
4 Diagnosis and management of bronchiectasis			●
5 Immunisations for respiratory pathogens			●
6 Accuracy and interpretation of microbiological tests			●
7 Lung involvement in immunodeficiency disorders			●
Related modules			
Airway endoscopy			
Imaging			
Bronchial asthma and other wheezing disorders			
Cystic fibrosis			
Rare diseases			
Tuberculosis (TB) MANDATORY			
1 Epidemiology, microbiology, infectivity and pharmacology			●
2 <i>In vivo</i> and <i>in vitro</i> diagnostic tests including their accuracy and interpretation			●
3 Diagnosis and management of primary and post-primary pulmonary TB			●
4 Diagnosis and management of extrapulmonary TB		●	
5 Diagnosis and management of multidrug-resistant tuberculosis (MDR-TB)		●	
Related modules			
Acute and chronic lung infections			
Bronchial asthma and other wheezing disorders MANDATORY			
1 Different phenotypes and their different pathologies and long-term outcomes (including underlying pathophysiology and basic epidemiology)			●
2 Environmental factors relevant to asthma and other wheezing disorders			●
3 Diagnosis and management of bronchiolitis and its complications and long-term sequelae			●
4 Relevant abnormalities in lung function including airway responsiveness			●
5 Understanding difficulties in diagnosis and differential diagnosis			●
6 Evidence-based management of asthma at different ages including age-related pharmacology			●
7 Emerging therapeutic strategies		●	
Related modules			
Pulmonary function testing			
Airway endoscopy			
Allergic disorders			
Rehabilitation in chronic respiratory disorders			
Inhalation therapy			
Epidemiology and environmental health			
Allergic disorders MANDATORY			
1 Understanding pathophysiology: immune response, control of IgE regulation and the mechanisms of allergic inflammation; basic genetics; basic epidemiology			●
2 <i>In vivo</i> testing for IgE-mediated sensitivity (procedure and interpretation of skin prick testing, challenge testing; meaning and validity of test results)			●
3 <i>In vitro</i> methods for determination of specific IgE, inflammation markers (principle and interpretation; meaning and validity of test results)			●
4 Additional tests in allergology (patch tests, allergen bronchial provocation tests)		●	
5 Diagnosis and management of anaphylaxis			●
6 Diagnosis and management of allergic rhinitis			●
7 Diagnosis and management of mild-to-moderate atopic dermatitis			●
8 Diagnosis and management of food allergy		●	
9 Diagnosis and management of bronchopulmonary aspergillosis			●
10 Specific immunotherapy			●
11 Prevention measures			●
12 Alternative treatment		●	
Related modules			
Bronchial asthma and other wheezing disorders			
Inhalation therapy			
Epidemiology and environmental health			

	Level 1	Level 2	Level 3
Cystic fibrosis (CF) MANDATORY			
1 Genetics, pathophysiology and epidemiology			●
2 Screening and diagnosis			●
3 Prognosis			●
4 Diagnosis and management of CF lung disease			●
5 Diagnosis and management of extrapulmonary manifestations of CF			●
6 Evidence-based management			●
7 Cross-infection and hygiene			●
8 Understanding of microbiology relevant to CF			●
9 Knowledge of emerging treatment strategies		●	
10 Management of end-stage lung disease and indications for lung transplantation			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Imaging			
Acute and chronic lung infection			
Rehabilitation in chronic respiratory disorders			
Epidemiology and environmental health			
Congenital malformations MANDATORY			
1 Developmental anatomy relevant to the respiratory system			●
2 Diagnosis and management of congenital malformations affecting the respiratory system			●
3 Knowledge of surgical options for treating congenital malformations			●
4 Follow-up and outcomes of congenital malformations			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Imaging			
Bronchopulmonary dysplasia and chronic lung disease of infancy MANDATORY			
1 Developmental anatomy and pathophysiology			●
2 Aetiology, pathogenesis and prevention			●
3 Evidence-based management			●
4 Perinatal preventive measures	●		
5 Nutritional care		●	
6 Neurodevelopmental assessment		●	
7 Long-term outcomes			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Imaging			
Acute and chronic lung infection			
Bronchial asthma and other wheezing disorders			
Congenital malformations			
Technology-dependent children			
Rare diseases MANDATORY			
1 Pathophysiology, genetics, aetiology, diagnosis and management of primary ciliary dyskinesia			●
2 Diagnosis and management of gastro-oesophageal reflux-associated lung disease			●
3 Diagnosis and management of bronchiolitis obliterans			●
4 Pathophysiology, genetics, aetiology, diagnosis and management of interstitial lung diseases			●
5 Pathophysiology, genetics, aetiology, diagnosis and management of pulmonary vascular disorders including pulmonary arterial hypertension			●
6 Diagnosis and management of pulmonary haemorrhage			●
7 Diagnosis and management of respiratory manifestations of systemic disorders with lung involvement			●
8 Diagnosis and management of respiratory manifestations of oncological disorders with lung involvement			●

	Level 1	Level 2	Level 3
9 Diagnosis and management of respiratory manifestations of muscular-skeletal disorders with lung involvement			●
10 Diagnosis and management of pleural diseases including spontaneous pneumothorax			●
11 Diagnosis and management of respiratory manifestations of immunodeficiency disorders with lung involvement			●
12 Diagnosis and management of other rare lung diseases			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Acute and chronic lung infection			
Bronchial asthma and other wheezing disorders			
Cystic fibrosis			
Rehabilitation in chronic respiratory disorders			
Sleep medicine MANDATORY			
1 Physiology and pathophysiology of sleep relevant for paediatric respiratory medicine			●
2 Diagnosis of and screening for obstructive sleep apnoea and upper airway resistance syndrome and hypoventilation			●
3 Polysomnography		●	
4 Management of sleep-related respiratory problems			●
5 Impact of obesity on respiratory function			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Congenital malformations			
Technology-dependent children			
Rehabilitation in chronic respiratory disorders MANDATORY			
1 Setting up and coordinating a multidisciplinary team (including physiotherapy, strength and endurance training, psychosocial support, nutrition)			●
2 Evaluation of rehabilitation programmes		●	
3 Knowledge of health education including smoking prevention and cessation, and healthy eating			●
4 Nutritional management		●	
5 Psychological support for children and families		●	
6 Principles of physiotherapy—techniques, indications and limitations			●
7 Assessment of fitness to fly			●
8 Sports medicine		●	
Related modules			
Pulmonary function testing			
Bronchial asthma and other wheezing disorders			
Cystic fibrosis			
Bronchopulmonary dysplasia and chronic lung disease of infancy			
Rare diseases			
Inhalation therapy			
Inhalation therapy MANDATORY			
1 Basic science of aerosol production and delivery			●
2 Indications for inhalation therapy			●
3 Understanding available techniques and their advantages and limitations			●
4 Delivery of drugs in children with artificial airways			●
Related modules			
Bronchial asthma and other wheezing disorders			
Cystic fibrosis			
Rare diseases			
Technology-dependent children MANDATORY			
1 Pathophysiology of chronic respiratory failure			●
2 Home oxygen therapy including control investigations and weaning strategies			●

	Level 1	Level 2	Level 3
3 Invasive and noninvasive home ventilatory support including control investigations and weaning strategies			●
4 Tracheostomy management including control investigations and weaning strategies			●
5 Basic technical understanding of equipment			●
6 Airway clearance techniques (physiotherapy, intermittent positive breathing, insufflator–exsufflator)		●	
7 Recognition of associated problems, setting up and coordinating a multidisciplinary team			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Cystic fibrosis			
Congenital malformations			
Bronchopulmonary dysplasia and chronic lung disease of infancy			
Rare diseases			
Sleep medicine			
Epidemiology and environmental health MANDATORY			
1 Basic understanding of epidemiological principles including point and period prevalence <i>versus</i> incidence in respiratory diseases such as bronchial asthma, cystic fibrosis, bronchopulmonary dysplasia, tuberculosis			●
2 Impact of indoor and outdoor air pollution on respiratory health			●
3 The burden of paediatric respiratory diseases on healthcare resources			●
Related modules			
All			
Management and leadership MANDATORY			
1 Leadership and collaboration in a multidisciplinary team			●
2 Understanding healthcare resources in relation to paediatric respiratory medicine			●
3 Audit presentation and participation			●
4 Representation of respiratory medicine in the medical community and to the public			●
5 Negotiations with colleagues and other allied professionals			●
6 Understanding of health costs and economics		●	
7 Health care service development and project management			●
Teaching MANDATORY			
1 Knowledge and application of different teaching methods			●
2 Knowledge and application of assessment methods			●
3 Knowledge and application of educational programmes for parents and patients			●
4 Application of teaching methods at all levels of medical education			●
Research MANDATORY			
1 Understanding and application of the principles of planning, designing, conducting, analysing and publishing research projects			●
2 Scientific literature appraisal			●
3 Understanding and application of the ethical principles of paediatric research			●
4 Significant personal contribution to a scientific project and authorship in a peer-reviewed article			●
Communication MANDATORY			
1 Understanding anxieties and social problems of children and their parents, both related and unrelated to respiratory disease			●
2 Ability to discuss diagnosis, treatments and prognoses with children			●
3 Ability to encourage and respect the views of children and their families in decision-making			●
4 Understanding needs of adolescents with chronic lung disease and ability to ease their transition to adult care			●
5 Leadership and collaboration in a multi-disciplinary team, respect and appreciation of the contributions of all members			●
6 Management of complaints in a helpful and nonconfrontational way			●
7 Ability to know when to seek the advice of colleagues			●
8 Ability to support and make time for appraising trainees and other healthcare workers			●
9 Understanding of medical ethics, for both clinical practice and research			●

	Level 1	Level 2	Level 3
10 Knowledge of the articles of the convention of European Human Rights			●
11 Ability to discuss end-of-life decisions with families and young people			●
Rigid and interventional airway endoscopy OPTIONAL			
1 Performance of rigid bronchoscopy including foreign body removal			●
2 Performance of interventional bronchoscopy		●	
Related modules			
All			
Post-lung transplant management OPTIONAL			
1 Nonsurgical management of post-lung transplant patients			●
Related modules			
Pulmonary function testing			
Airway endoscopy			
Acute and chronic lung infection			
Rare diseases			
Rigid and interventional airway endoscopy			
Additional diagnostic tests			
Additional diagnostic tests OPTIONAL (one or more of the following)			
1 Performance and interpretation of exhaled nitric oxide measurements			●
2 Indications, performance and interpretation of induced sputum test			●
3 Measurement and interpretation of oscillatory mechanics (forced oscillation techniques)			●
4 Measurement and interpretation of lung function in non-cooperative children			●
5 Tests of ventilation homogeneity including multiple breath washout techniques			●
6 Principles and interpretation of cardio-respiratory exercise testing			●
7 Polysomnography			●
Related modules			
All			