



Paediatric HERMES: European Curriculum Recommendations for Training in Paediatric Respiratory Medicine

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Introduction

In order to ensure the best quality of care for all children with respiratory problems and to harmonise and develop paediatric respiratory medicine (PRM), the Paediatric HERMES (Harmonised Education in Respiratory Medicine for European Specialists) initiative is working towards the development of structured programmes for education and training in the subspecialty, to establish defined standards of knowledge and skills required to practice PRM on a tertiary care level.

Since its launch in 2007, the Paediatric HERMES has progressed swiftly. In 2009, it published a European syllabus for Training in Paediatric Respiratory Medicine, which served as a basis to develop the curriculum framework presented here. In parallel, initial steps have already been taken to allow for the introduction of a written European examination in PRM in 2011. Further down the line, criteria for training networks and training centre accreditation will be developed, so as to provide a holistic approach to PRM education and training (fig. 1).

The present report presents the Task Force's work to produce a consensus-based curriculum. The curriculum rationale of the European curriculum recommendations for training in adult respiratory medicine published in 2008 was used as a basis to develop a curriculum relevant to paediatric respiratory medicine [1]. The publication of the Paediatric HERMES syllabus in March 2009 provided groundwork for the curriculum phase [2]. Throughout the process, the Task Force kept in mind that they should

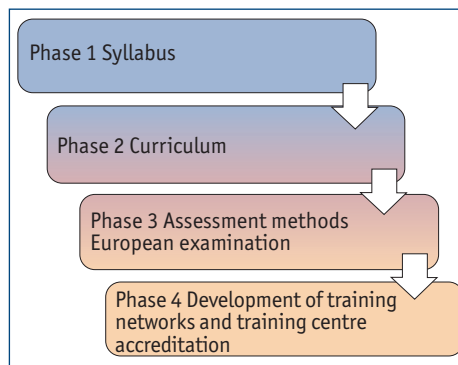


Figure 1
Paediatric HERMES project phases.

always aim for the highest quality of training. In addition, the principle that a curriculum is more than a syllabus and that it includes consideration of educational processes, mainly teaching, learning and assessment, guided the Task Force in formulating the curriculum content. The applicability of the curriculum content was validated by the Task Force members to ensure that the curriculum transcribes what happens in clinical practice. Each curriculum element was discussed with respect to whether it matched the reality of the specific training context. The main challenge in developing the curriculum was to bridge the gap between theory and practice and, thus, operationalise the syllabus, *i.e.* to provide a concise, straightforward and user-friendly training framework to target users: healthcare and education policy makers, curriculum developers, trainees, trainers and training centres. Whereas each syllabus module defines the knowledge and skills that a PRM trainee needs to acquire, the curriculum

seeks to describe learning outcomes, minimum exposure, assessment tools and sample clinical situations within the PRM training.

Roles of Task Force participants

Specific roles were assigned in the curriculum development. The Task Force members formulated the 24 curriculum modules. Task Force members, along with national respondents selected through the Forum of European Respiratory Societies, constituted the expert panel who contributed to this document. Throughout the process of curriculum development, the expert panel validated actual practices in their respective countries. J. Busari, who is a medical educationalist and also qualified as a general paediatrician, advised the Task Force and provided guidance throughout the process. The project was coordinated by ERS staff, who provided methodological, administrative, clerical and logistical support for all the participants (fig. 2).

Processes in curriculum development

The curriculum phase began with a workshop on curriculum development facilitated by J. Busari in November 2008, in Geneva (Switzerland). A common structure for development of the curriculum was agreed upon. As a result, the following elements were included into the curriculum that would also serve as a guide for the participants and thus facilitate the process:

- **Knowledge.** Knowledge items are cognitions, ideas or concepts that are expected to be learnt.
- **Skills.** Skill items are composed of cognitive skills and psychomotor-perceptual skills. Cognitive skill is the ability to utilise the learned ideas or concepts when faced with a problem in practice. Meanwhile, psychomotor-perceptual skills are the physical or perceptual competencies the trainees are expected to possess after the training.
- **Attitudes and behaviour.** Attitudes and behaviour demonstrate affective skill which is the ability to exhibit the behaviours that reflect certain desired behaviours [3].
- **Desired levels of competence.** The levels of competence agreed upon in the syllabus phase were adopted into the curriculum framework (fig. 4).
- **Minimum clinical exposure.** Minimum clinical exposure can relate to different aspects of time, duration of the programme or rotation, number of cases seen, number of procedures performed and certain specific actions of the trainee. These exposures are minimum conditions to ensure that the standards for training are met.
- **Assessment methods.** Assessment methods are emphasised to be either knowledge-based multiple-choice questions (MCQ) or both MCQ in addition to other assessment methods available. A separate assessment toolbox was provided discussing common assessment methods and how they are being used in the context of PRM training
- **Sample clinical situation.** A clinical scenario that gives a practical example of how the different elements of the curriculum can be applied in daily clinical settings. Sample

Figure 2
Geographical distribution of Task Force members.

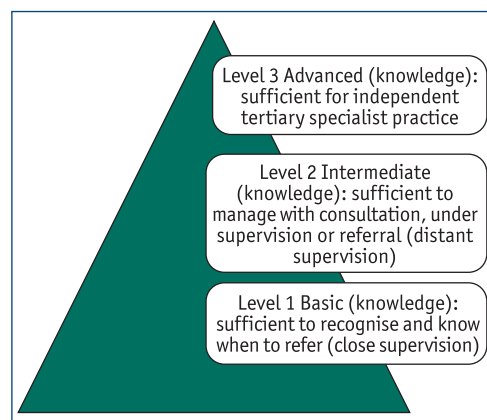


Figure 3
Definitions of levels of competence.

clinical situations are described for all clinical modules except generic modules, for which most clinical situations may apply (table 1).

Once these concepts had been clearly defined, the Task Force divided into small working groups and, with electronic exchange and telephone conferences, worked on the formulation of the 24 modules. In May 2009, in Munich (Germany), the Task Force met again to discuss and adapt the 24 draft modules. The main focus was to ensure that each module was specific, measurable, achievable, realistic and timely.

In line with the consensus-building processes used to produce the European syllabus, a modified Delphi process was launched in July 2009. The main objective was to obtain feedback on the draft curriculum modules from the expert panel. Moreover, respondents were encouraged to invite other experts in PRM training to complete the online survey. All respondents were invited to give general feedback on each completed module. Comments on the figures given for minimum clinical exposure were sought, as well as suggested exposure requirements, which they felt to be realistic and acceptable in their own settings. Finally, respondents were asked to specify assessment methods being used in their training institution for each syllabus item [4–7].

A plenary meeting with the Task Force members and national respondents was held in Vienna (Austria), in September 2009, to discuss the results of the modified Delphi round, minimum clinical exposure and assessment methods. Consensus was reached on minimum clinical exposure, assessment methods were validated and a free discussion ensued, giving further insights on the whole curriculum development process (fig. 4).

Regarding minimum clinical exposure, several points surfaced throughout the discussion, as the Task Force had failed to reach a consensus on quite a few items throughout the Delphi process. As a result, and taking into account



Figure 4
F. Reidel at the plenary meeting.

generalisability, and the balance between applicability and acceptability dimensions of the project, some numbers were reviewed and modified. As an example, minimum exposure for the whole module of pulmonary function tests (PFTs), which was originally stated as train in a centre performing at least 50 pulmonary function tests per month, was unanimously changed to at least 80 PFTs. In some other instances, a decision was made to eliminate the number of procedures and to replace them with an overall timeframe. For example, in the pulmonary function tests module, the minimum requirement for equipment maintenance was changed to participate for 3 months, instead of 50 equipment maintenance, hygiene and infection control procedures.

Further, regarding assessment methods, a pragmatic approach was taken. An initial list of familiar assessment methods was formulated within the Task Force. In addition, an inventory of assessment methods was done during the modified Delphi process where respondents were asked to specify assessment methods being used in their training institution for each syllabus item. During the plenary session, a shortlist of assessment methods was checked with the participants with the following questions.

- Is it an acceptable method?
- Is it an applicable method in your setting?
- Is it useful in your context?
- What are its strengths and limitations in your context?
- Are there missing methods and notable educational context that were not mentioned?

The Task Force members repeated the exercise with the expanded list and with additions from the modified Delphi survey results, and discussions took place in the plenary session in the final review of the curriculum recommendations.

Table 1 Generic modules

Generic Modules	Mandatory
Epidemiology and environmental health	Yes
Management and leadership	Yes
Teaching	Yes
Research	Yes
Communication	Yes

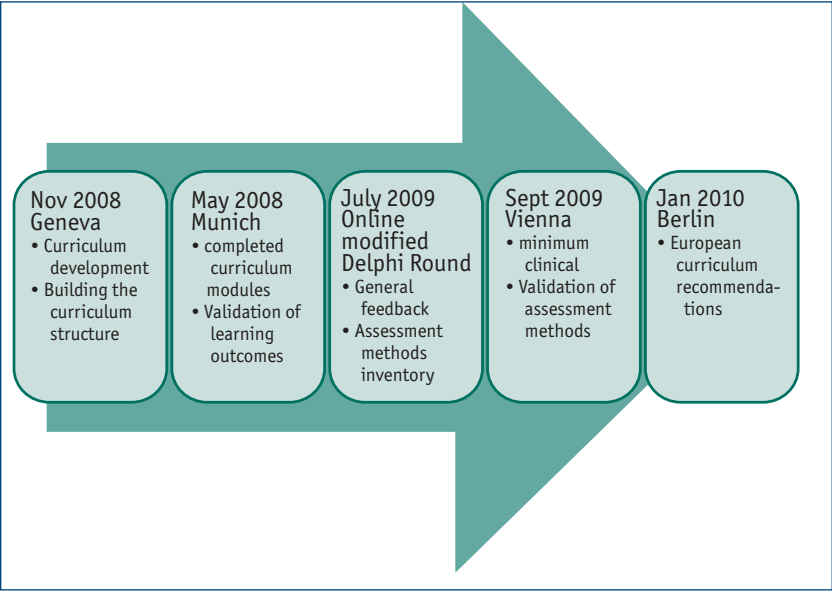


Figure 5
Paediatric HERMES Task Force curriculum phase processes.

The Task Force finally met in January 2010, in Berlin (Germany), to finalise and validate the completed curriculum modules (fig. 5).

Results

The result of the extensive processes were an assessment toolbox (table 2) and the 24 curriculum modules (Appendix 2).

The assessment toolbox provides recommendations for different assessment processes that can be used to ensure the appropriate development of the PRM trainee and also ascertain if the trainee is benefiting from their training experiences.

Table 2 Assessment toolbox

Assessment toolbox
Audit
Case based discussion (CbD)
Direct observation of practical skills (DOPS)
Feedback on letters: assessment instrument for letters
Mini-Clinical Evaluation Exercise (MiniCEX)
Multisource feedback
Objective structured clinical examination (OSCE)
Oral examination
Other options for example simulation and standardised patients

The 24 curriculum modules (table 3) are designed to provide a concise, straightforward and userfriendly framework of PRM training for all users. The curriculum modules set out the integration of the defined learning outcomes and serve as a guide to the educational experience and opportunities in PRM training.

Discussion

Throughout the development, great care was taken to ensure transparency of the process and obtain input from all involved in the development in order to increase acceptability and applicability of the end product. Details regarding the various topics are listed below.

Levels of competence

The relevance of indicating levels of competence was discussed and there was a consensus that this element of the framework was necessary to address the development of professional judgement within PRM training. It was felt to be important to indicate the high level of competence required to qualify as a specialist in PRM for most items and to identify other items which are less central to PRM, yet important for overall competence. It was also considered important that, during their training, trainees are encouraged to make appropriate professional judgements in order to deal with the complexity, uncertainty and unpredictability of clinical practice. More importantly, the trainee should be educated to recognise situations that are beyond the scope of his or her practice, act upon this, and, in particular, be able to refer their patients appropriately to the next point of care.

Minimum clinical exposure

The approach of the Task Force to define minimum clinical exposure was highly democratic, with a modified Delphi round and the plenary meeting discussing the options before a consensus was reached on values and parameters. Minimal clinical exposures are meant to address the educational value of learning in practice and the importance of clinical experience throughout the course of training in PRM. Different views reflected local practice and the Task Force participants found it challenging not to be prescriptive in the process. While being very specific with the values and parameters, the participants kept in mind the principle of generalisability in order to make the curriculum acceptable and applicable.

Assessment methods

Discussions among the Task Force participants made it clear that ideas about in-training assessment were largely international but there are marked differences with regard to specific application in the different countries. Some countries would be more advanced and well-developed in terms of standardised and structured assessment methods. However, the point was raised that standardised and structured assessments represent the future of training in medicine in general, and in PRM specifically. Therefore, some time was spent on developing an assessment toolbox reflecting best practice, and supporting the development of structured and harmonised assessment alongside the curriculum.

Equally, assessments were tackled by the Task Force participants with the awareness that it is a composite process. The Paediatric HERMES initiative has already begun its assessment phase in developing a European examination. This will be a knowledge-based MCQ examination in English, where each MCQ undergoes a rigorous process of formulation and validation to ensure that it will illustrate state-of-the-art practices as well as authentic professional situations.

For each curriculum module, a column entitled Assessment Tools serves to emphasise recommended methods. All items can be assessed using knowledge-based MCQ in addition to other available assessment methods. A separate assessment toolbox, which is the result of the Task Force participants' exercise, is provided. It discusses common assessment methods and how they are being used in the context of PRM training (Appendix 1). The Accreditation Council for Graduate Medical Education of the American Board of Medical Specialties produced descriptions of assessment methods, which were used as a reference [8].

Curriculum recommendations in Europe

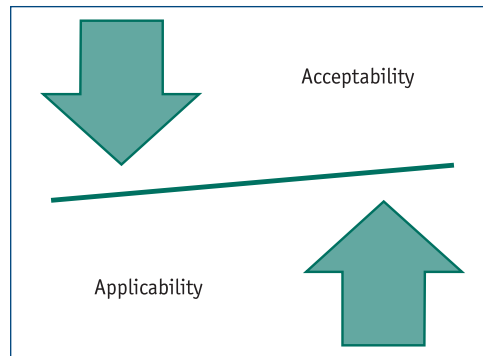
Within Europe, countries are in different stages of the development of medical training. In some countries, PRM as a subspecialty is not yet formally recognised [9]. The availability and size of training centres, technologies and other resources varies from country to country [10]. The heterogeneity between countries poses an ongoing challenge towards the uptake of these European curriculum recommendations. This means that the level of acceptance will differ from country to country.

Table 3 The 24 curriculum modules

Curriculum Modules	Mandatory	Optional
A) Evaluation of respiratory symptoms and signs	Yes	
B) Pulmonary function testing	Yes	
C) Airway endoscopy	Yes	
D) Imaging	Yes	
E) Acute and chronic lung infection	Yes	
F) Tuberculosis	Yes	
G) Bronchial asthma and other wheezing disorders	Yes	
H) Allergic disorders	Yes	
I) Cystic fibrosis	Yes	
J) Congenital malformations	Yes	
K) Bronchopulmonary dysplasia and chronic lung disease of infancy	Yes	
L) Rare diseases	Yes	
M) Sleep medicine	Yes	
N) Rehabilitation in chronic respiratory disorders	Yes	
O) Inhalation therapy	Yes	
P) Technology-dependent children	Yes	
Q) Epidemiology and environmental health	Yes	
R) Management and leadership	Yes	
S) Teaching	Yes	
T) Research	Yes	
U) Communication	Yes	
V) Rigid and interventional airway endoscopy		Yes
W) Post lung transplant management		Yes
X) Additional diagnostic tests (one or more of the following)		Yes

Therefore, the aim of this curriculum is to recommend, rather than to prescribe. There are no steadfast rules in implementing the curriculum. The Task Force is also conscious of the basic European Union principle of subsidiarity, which does not give any legal standing to the curriculum. However, the curriculum recommendations may serve as a framework on which to base each nation's individual curriculum development. It is hoped that national groups will find these recommendations useful in the design and development of a programme that meets the needs and special requirements of their circumstances. The

Figure 6
Acceptability and applicability.



Task Force, with its rigorous validation and commitment in formulating the curricular content, sought to find a balance between making the curriculum both realistic, and, therefore, a balance of acceptability and applicability, while at the same time aspirational. The aspirational aspect relies on the fact that, with the processes undertaken, the final content of the curriculum recommendations represent the highest standards of training in PRM (fig. 6).

The transnational nature of the curriculum recommendations attempts to address the current trend of mobility among trainees and specialists within Europe. Free access for European medical specialists to the European job market was possible via two relevant directives (issued in 1975 and 2005) by the European Union [11]. This has affected an automatic recognition of the diplomas and certificates of qualification in

medicine in all member countries. However, this is only acceptable on the basis of harmonised training standards across the entire European Union. The vision remains that PRM training and standards, as defined by the Paediatric HERMES initiative, will deliver well-trained specialists who will secure the best care for children with respiratory disease.

Conclusion

The European curriculum recommendations for training in paediatric respiratory medicine mark the next educational milestone in the Paediatric HERMES initiative. The third milestone is already being prepared by developing the voluntary European examination in PRM with its inauguration in Amsterdam, The Netherlands, in 2011, corresponding to the assessment phase of the project. At the same time, the Task Force has started to discuss the future task of developing training networks across Europe with accreditation activities. With all these educational milestones, the initiative looks forward to realising all the concrete steps towards a European Training Concept for PRM with the homogenisation and standardisation of training across Europe, quality control for all aspects of training, free movement of trainees across centres and nations, and the delivery of the very best care to children with respiratory diseases.

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1. Loddenkemper R, Haslam PL, Séverin T, *et al.* European curriculum recommendations for training in adult respiratory medicine: 2nd report of the HERMES Task Force. *Breathe* 2008; 5: 80–93.
2. Gappa M, Noël J-L, Severin T, *et al.* Paediatric HERMES: a European syllabus in paediatric respiratory medicine. *Breathe* 2009; 5: 237–241.
3. Ratnapalan S, Hilliard RI. Needs assessment in postgraduate medical education: a review. *Med Educ* 2002; 7: 1–8.
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7. Walker AM, Selfe J. The Delphi method: a useful tool for the allied health researcher. *Br J Ther Rehabil* 1996; 3: 677–681.
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9. Godfrey S, Carlsen K-H, Landau LI. Development of pediatric pulmonology in the United Kingdom, Europe, and Australasia. *Pediatr Res* 2004; 55: 521–527.
10. European Respiratory Society. ERS Guide to Paediatric Training Centres. <http://dev.ersnet.org/270-background.htm> Date last accessed: May 13, 2010.
11. Directive 2005/36/EC of the European Parliament and of the Council on the recognition of professional qualifications. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:255:0022:0142:en:PDF> Date last accessed: May 13, 2010. Date last updated: September 7, 2005.

Appendix 1. Assessment Toolbox

Audit

Medical audit refers to the process of a systematic and critical analysis of the quality of medical care. Thus, it is essentially a retrospective analysis involving assessment of key outcomes or processes against some predetermined standard. As such, audit is a quality assurance activity that is patient- or system-focused.

Objectives

- To develop an understanding of the importance of setting appropriate criteria and standards for clinical care.
- To develop an understanding of systems-based practice, realising that good clinical management requires an appropriate framework.
- To develop skills in identifying deficiencies within a system.
- To develop and to implement strategies to overcome these deficiencies.

PRM scenario

Trainees are asked to perform a clinical audit of patients or patient groups with a specific clinical condition/specific complications/specific problems *e.g.* care of an infant with bronchiolitis. They may also be asked to audit specific routines/protocols/procedures/guidelines *e.g.* a local guideline on difficult-to-treat asthma. An audit reviews the management of a particular case/a local guideline in comparison to published guidelines and actual study results. The audit should be structured according to key criteria (see assessment of audit). The result of the audit is presented by the trainee to teacher and team, followed by a discussion with the teachers and the team. A good audit may serve as a basis for changing and improving the local diagnostic/care-giving/documentation routine.

Method

This assessment should follow a criterion-referenced marking routine which should include five key criteria; these are:

- Reason for choice (why was this specific audit done?).
- Criteria chosen (how was the audit done?).
- Preparation and planning (which methodology was applied?).
- Interpretation of data (what was found?).
- Proposals for change (what next?).

Any properly performed audit should be structured according to these key criteria and should give clear answers to the above questions.

Suggested references

- Brazil V. Audit as a learning tool in postgraduate emergency medicine training. *Emerg Med Australas* 2004; 16: 348–352.
- Lough JR, McKay J, Murray TS. Audit and summative assessment: a criterion-referenced marking schedule. *Br J Gen Pract* 1995; 45: 607–609.

Case based discussion (CbD)

A structured interview designed to explore professional judgment exercised in clinical cases.

Objectives

To assess clinical judgement, decision-making and application of medical knowledge in relation to patient care in cases for which the trainee has been directly responsible.

It tests:

- application of medical knowledge;
- application of ethical frameworks;
- ability to prioritise, consider implications, justify decisions;
- recognition of complexity and uncertainty.

Trainee must be assessed against the standard expected of a trainee at the end of their stage of training.

PRM scenario

The trainee selects between two and four actual cases that they have managed, *e.g.* an infant with bronchiolitis, a child with cystic fibrosis and failure to thrive, a child with empyema and a teenager with difficult-to-treat asthma. Copies are presented to the clinical or educational supervisor and, depending on the time available, one or more cases are selected for discussion. The discussion should be framed around the actual case and should not explore hypothetical events. Questions should be designed to elicit evidence of competence and should not shift into a test of knowledge.

Method

The sequence of the CbD could be as follows.

- Exploratory discussion.
- Making judgements.
- Feedback.
- Recommendations for development.

It is recommended that it takes 20–30 min per case (including feedback).

Suggested reference

- Chana N, Gardiner P, Rughani A, *et al.* *Talking the Talk: Using Case-Based Discussion in Medical Assessments*. London, Royal College of General Practitioners, 2007.

Direct observation of practical skills (DOPS)

DOPS is the observation and evaluation of a procedural skill performed by a trainee on a real patient. Procedural skills are also known as technical skills or practical skills. The procedural skills assessed using DOPS include relatively simple and common procedures.

Objective

- To give opportunity for pertinent feedback from more experienced doctors. Feedback is given immediately after the encounter takes place, and includes highlighting strengths and weakness, and agreeing upon an action plan to address developmental needs.

PRM scenario

This assessment method pertains especially to training in the performance of invasive procedures that are typical for managing paediatric patients with respiratory disorders, *e.g.* pleural puncture, insertion of a pleural drain, activation of a permanently implanted venous access device, *etc.*

Procedural skills are also required for more simple invasive procedures like venopuncture, insertion of a venous access device, arterial blood sampling, *etc.* It is assumed that these procedural skills have already been acquired by the trainee during their basic paediatric training. Special procedural skills are also required for bronchoscopy.

Method

DOPS involves the performance of procedures on actual patients rather than cadavers, simulations or animal models. DOPS assessment takes the form of the trainee performing a specific practical procedure that is directly observed and scored by a consultant observer, and may use a standard form or checklist.

Suggested references

- Wigton R. Measuring procedural skills. *Ann Intern Med* 1996; 125: 1003–1004.
- Davies H, Archer J, Heard S. Assessment tools for Foundation Programmes—a practical guide. *BMJ Career Focus* 2005; 330: 195–196.
- Sample Form for Direct Observation of Procedural Skills (DOPS) – Anaesthesia. <http://www.bartsandthelondon.nhs.uk/docs/DOPs.pdf> Last accessed May 13, 2010.

Feedback on letters: assessment instrument for letters

Assessment of discharge or referral letters with a list of features (see below) that should be in an ideal letter that can be scored and commented on. Standard instrument Sheffield Assessment Instrument for Letters (SAIL) available as a validated tool.

Objective

- To assess the quality of written communication skills.

PRM scenario

Relevant types of letters include discharge summaries after inpatient treatment and letters after outpatient assessment; both scenarios include letters for patients with acute conditions (*e.g.* acute asthma exacerbation and community-acquired pneumonia) or chronic disease and follow-up assessment (*e.g.* cystic fibrosis and persistent asthma).

Method

The different aspects that are assessed include:

- Complexity of the case.
- Problem list included/complete?
- History appropriate?
- Examination appropriate and documented?
- Management appropriately described?
- Plan of investigations.
- Treatment plan.
- Communication with family appropriately documented.
- Follow-up plan stated?
- Overall clarity of the written communication/ letter.

SAIL is an example of a validated instrument using which written communication skills could be assessed.

Suggested references

- Crossley GM, Howe A, Newble D, *et al.* Sheffield Assessment Instrument for Letters (SAIL): performance assessment using outpatient letters. *Med Educ* 2001; 35: 1115–1124.
- Fox AT, Palmer RD, Crossley JG, *et al.* Improving the quality of outpatient clinic letters using the Sheffield Assessment Instrument for Letters (SAIL). *Med Educ* 2004;38: 852–858.
- Keely E, Myers K, Dojeiji S, *et al.* Peer assessment of outpatient consultation letters—feasibility and satisfaction. *BMC Med Educ* 2007; 7: 13.

Mini-Clinical Evaluation exercise (MiniCEX)

A form for assessment for trainees based on the actual examination of a patient in various settings (outpatient, inpatient and emergency department). Trainer evaluates the trainee as they take a medical history and perform a physical examination in several patients who present with a broader range of problems.

Objectives

- To assess trainees in a much broader range of clinical situations.
- To offer greater opportunity for observation and feedback by more than one faculty member and with more than one patient.

PRM scenario

A PRM trainee may be confronted with a patient with a broad range of problems, such as a patient with cystic fibrosis where focusing and prioritising of the problems is important in clinical decision-making, or with a patient with an acute problem (acute dyspnoea or asthma exacerbation) where differential diagnosis and emergency treatment are important.

Method

The MiniCEX takes ~15–20 min and may be conducted several times throughout the year. MiniCEX assesses the ability of trainee to focus and prioritise diagnosis and therapeutic decisions in real clinical situations.

Suggested reference

- Norcini J, Blank L, Duffy FD, *et al.* The Mini-CEX: A Method for Assessing Clinical Skills. *Ann Intern Med* 2003; 138: 476–481.

Multisource feedback (MSF)

An assessment method that uses feedback on performance from the colleagues working in the same team. This includes physicians as well as nurses, technicians *etc.*

Objective

- To know trainee's strengths and weaknesses, communication skills, leadership skills and ability to work in a team.

PRM scenario

In case of training in a medical specialty such as PRM this should be initiated by the trainer and performed within the team where the trainee works. Patients or family of patients, nonmedical coworkers (including other health professionals, managers and administrators) and medical colleagues (including other trainees and juniors) will be asked to reflect on their professional skills and behaviour.

Method

The MSF can be performed using some commercially available packages or developed within the institution. The structure of the MSF form may use tick boxes and free text fields; these are mostly combined. Free text answers have been validated in several studies as more useful than tick boxes and preformulated answers. The behaviours to be assessed should be described very clearly and the whole tool should be kept simple, with few items, and fit for purpose.

6–10 raters have been recommended for the process; however, it has also been shown that using more than 10 respondents increased reliability of the process. These may be selected by the candidate or randomly selected by the initiator of this process. As there has been shown some variability of the assessments by staff on different levels, this should be taken into account during the selection of the responders. The responders should be instructed to work in a constructive manner. Together with the evaluation of the individual skills of the candidate, there should be also some suggestions by the responders for the areas and ways of possible improvement. The respondents, as well as the trainee, should be familiar with the purpose of the process to avoid any misunderstandings. Anonymity of the responders must be strictly guaranteed.

The evaluation of the results should be performed during a properly scheduled interview of the trainer and the trainee with enough time available, together with a comparison of the MSF results and candidate's own views. The result of the process should be properly discussed and an action plan, aiming for an improvement of the areas with potential reserves, should be the outcome.

Repetition of the MSF process after a given period of time provides information as to how the performance of the candidate has improved based on the previous process and the action plan.

Suggested references

- Wood L, Hassell A, Whitehouse A, *et al.* A literature review of multi-source feedback systems within and without health services, leading to 10 tips for their successful design. *Med Teach* 2006; 28: e185–e191.
- Overeem K, Lombarts MJ, Arah OA, *et al.* Three methods of multi-source feedback compared: a plea for narrative comments and coworkers' perspectives. *Med Teach* 2010; 32: 141–147.
- Bullock AD, Hassell A, Markham WA, *et al.* How ratings vary by staff group in multi-source feedback assessment of junior doctors. 2009; 43: 516–520.
- Burford B, Illing J, Kergon C, *et al.* User perceptions of multi-source feedback tools for junior doctors. 2010 *Med Educ* [Epub ahead of print DOI: 10.1111/j.1365-2923.2009.03565.x]

Objective structured clinical examination (OSCE)

An OSCE is basically an organisational framework consisting of multiple stations around which students/trainees rotate, and at which they perform and are assessed on specific tasks.

Objective

To assess competence at the level of shows how or simulation (the assessment instrument at this level of Miller's pyramid).

PRM scenario

Specific communication challenges such as behavioural modification counselling (treatment adherence in a teenager with difficult asthma, smoking in a child with cystic fibrosis), clinical reasoning, diagnostic assessment skills such as lung function testing, or patient management skills.

Method

Many variants of OSCEs exist, *e.g.* 25–35 stations with a duration of 4.5 min each (Dundee, UK), 20 stations with a duration of 10 min each (Medical Council, Canada), and 16 stations with a duration of 9 min each (Harvard Medical School, Boston, MA, USA).

Establishing (content) validity in three steps

- Identify the problems or conditions with which the candidate needs to be competent in dealing.
- Define the tasks within the problems or conditions in which the candidate is expected to be competent.
- Construct a blueprint or grid (*i.e.* define the sample of items to be included in the test). In its simplest form, this will consist of a two-dimensional matrix (one axis representing the competencies to be tested, the other axis representing the problems or conditions on which the competencies will be demonstrated).

Determining and establishing reliability

To achieve acceptable levels of reliability, OSCEs need to incorporate measures across a large number of cases or problems, and thus, if used alone, often have to be longer than is practicable. The use of checklist-based markings may enhance inter-rater consistency in some OSCE stations (*e.g.* practical and technical skills stations). For other stations, global ratings used by trained assessors may be more appropriate (*e.g.* communication skills stations and diagnostic task stations with alternative routes to the same outcome).

Suggested references

- Davis MH. OSCE: the Dundee experience. *Med Teach* 2003; 25: 255–261.
- Adamo G. Simulated and standardized patients in OSCEs: achievements and challenges 1992–2003. *Med Teach* 2003; 25: 262–270.
- Newble D. Techniques for measuring clinical competence: objective structured clinical examinations. *Med Educ* 2004; 38: 199–203.

Oral examination

A type of performance assessment using realistic patient cases with an examiner questioning the examinee/trainee.

Objective

- To assess clinical decision-making and the application or use of medical knowledge with realistic patients.

PRM scenario

Clinical scenarios that are specific to the specialty, such as asthma and respiratory infections.

Method

The examiner begins by presenting to the examinee with a clinical problem in the form of a patient case scenario. The examinee is asked how they would manage the case. Questions probe the reasoning for requesting clinical findings, the interpretation of those findings and treatment plans. In efficiently designed exams, each case scenario takes 3–5 min. Exams last 1.5–2.5 h with two or four separate 30- or 60-min sessions. One or two physicians serve as examiners per session. An examinee can be tested on 18–60 different clinical cases.

Suggested reference

- Mancall EL, Bashook PG, eds. *Assessing Clinical Reasoning: The Oral Examination and Alternative Methods*. Evanston, American Board of Medical Specialties, 1995. [29]

Other options: simulations and standardised patients

Simulations used for assessment of clinical performance closely resemble reality and attempt to imitate, but not duplicate, real clinical problems.

Objectives

- To allow reasoning through a clinical problem with minimal or no cueing
- To allow life-threatening errors without hurting a patient
- To provide instant feedback, such that mistakes are immediately corrected
- To provide ratings on clinical problems that are otherwise difficult or impossible to evaluate

PRM scenario

Current uses in PRM training would commonly be the use of an acute paediatric airway intubation and difficult intubation. Future developments of available formats may give a new dimension to assessments in PRM.

Method

Simulation formats have been developed as paper-and-pencil branching problems (patient management problems; PMPs), computerised versions of PMPs called clinical case simulations (CCX), role-playing situations (e.g. standardised patients, clinical team simulations), anatomical models or mannequins, and combinations of all three formats. Mannequins are imitations of body organs or anatomical body regions frequently using pathological findings to simulate patient disease. The models are constructed of vinyl or plastic sculpted to resemble human tissue with embedded electronic circuitry to allow the mannequin to respond realistically to actions by the examinee. Virtual reality simulations or environments (VR) use computers, sometimes combined with anatomical models, to mimic, as much as feasible, realistic organ and surface images, and the touch sensations (computer-generated haptic responses) a physician would expect in a real patient. The VR environments allow assessment of procedural skills and other complex clinical tasks that are difficult to assess consistently by other assessment methods.

Suggested reference

- Scalese R, Obeso V, Issenberg SB. Simulation technology for skills training and competency assessment in medical education. *Gen Intern Med* 2008; 23: 46–49.

Appendix 2. Curriculum Modules

Further resources at <http://hermes.ersnet.org/>

A) EVALUATION OF RESPIRATORY SYMPTOMS AND SIGNS Mandatory

Syllabus Items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Physiology of cough, shortness of breath, noisy breathing including wheeze, snoring, stridor	- Anatomy of upper and lower airways - Respiratory physiology and pathophysiology in relation to clinical symptoms and signs - Physiology of airway clearance mechanisms including cough	- Recognition and evaluation of symptoms and signs - Ability to explain the origins of symptoms and signs	Willingness to listen and evaluate history as related	3			
2) Evaluation and management of isolated cough	Current published guidelines	Undertaking a clinical evaluation of isolated cough	Willingness to address parents' anxieties about cough	3	Portfolio documentation of five patients presenting with isolated cough	- Feedback on letters - MiniCEX - CbD	Differential diagnosis and management of a child with chronic isolated cough
3) Evaluation and management of dyspnoea	Pathophysiology and aetiologies of difficulty in breathing and shortness of breath	- Undertaking the clinical evaluation of difficulty in breathing and shortness of breath - Recognition and management of psychological causes of difficulty in breathing and shortness of breath	Willingness to address parents' anxieties about difficulty in breathing and shortness of breath	3	Portfolio documentation of five patients presenting with difficulty in breathing or shortness of breath, including hyperventilation	- Feedback on letters - MiniCEX	Assessment, differential diagnosis, and management of a child with dyspnoea
4) Evaluation and management of noisy breathing	Physiology and pathophysiology of noisy breathing in all age groups	- Distinguishing different forms of noisy breathing - Undertaking clinical evaluation of noisy breathing in different age groups - Management of functional stridor/vocal cord dysfunction	Willingness to communicate with parents and explain management of noisy breathing	3	Portfolio documentation of five cases of noisy breathing including functional stridor	- Feedback on letters - MiniCEX	Assessment, differential diagnosis and management of a child with noisy breathing
5) Understanding of validity of symptoms and signs	- Variability, validity and reliability of reported symptoms - Interobserver variability in documentation of signs	Evaluation of reported symptoms and signs	Acceptance of variability in reported symptoms and documentation of signs	3	Portfolio documentation of cases which illustrate difficulty of obtaining clear histories of reported symptoms and variability of observed signs	CbD	
6) Clinical use of questionnaires	- Validity and reliability of questionnaires as clinical, epidemiological and research tools - Design and application of questionnaires	Formulating questionnaires with an understanding of its value and limitations	Acknowledging the reasons some parents and patients may have in completing questionnaires	3	Portfolio to include examples of local and international questionnaires e.g. ISAAC (International Study of Asthma and Allergies in Childhood)	CbD	

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

B) PULMONARY FUNCTION TESTS Mandatory

Train in a centre performing at least 80 pulmonary function tests per month

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Anatomical and developmental respiratory physiology in health and diseases including ventilation-perfusion and gas exchange	Lung development and lung physiology in health and disease		Self-directed learning	3			
2) Measurement and interpretation of flow-volume curves	ATS/ERS guidelines and standards for performing and interpreting spirometry including preschool children	- Performance, interpretation, and reporting of spirometry according to the ATS/ERS guidelines and standards - Visual recognition of disease-specific abnormalities in the flow volume curve - Recognition of technical limitations in the performance of spirometry	- Willingness to explain and demonstrate the procedure to children, considering the limits related to different ages - Willingness to explain the results using a language the family can understand	3	Portfolio of the performance and interpretation of at least 50 flow-volume curves	DOPS	
3) Measurement and interpretation of lung volumes	ATS/ERS guidelines and standards for performing and interpreting lung volume measurements including preschool children	- Interpretation and reporting of lung volume measurements - Recognition of technical limitations in the performance of lung volume measurements	Willingness to explain the results in a language the family can understand	3	Portfolio of performance and interpretation of at least 30 lung volume measurements	DOPS	Indication, performance and interpretation of lung function testing for assessing a child with recurrent shortness of breath
4) Equipment maintenance, hygiene and infection control during test procedures	- Equipment performance criteria and requirements as recommended by ERS/ATS guidelines - Hygiene and infection control procedures for lung function testing according to the ERS/ATS guidelines	Supervision of procedures for maintenance and infection control	Appreciation of the importance of hygiene and infection control	3	Participate in quality equipment maintenance, hygiene and infection control for 3 months	DOPS	
5) Definitions of measured indices	Definitions and significance of all commonly used lung function indices and associated abnormalities	Integration of the test results into the diagnosis and management for an individual patient		3			

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
6) Appropriate use of reference values	• Basis of reference equations for lung function and factors which affect them (anthropometric measures, gender, ethnicity, etc)	• Appropriate selection of reference values	• Appreciation of the importance of reference values for the correct interpretation of results	3		• CbD	• Indication, performance and interpretation of lung function testing for assessing a child with recurrent shortness of breath
7) Test variability and reproducibility	• Factors affecting test variability and interpretation of test results			3			
8) Performance and interpretation of reversibility testing	• Procedure, aims and interpretative strategy according to guidelines	• Supervision and interpretation of reversibility tests		3	• Performance and interpretation of at least 30 reversibility tests	• DOPS	• Indication, performance and interpretation of reversibility testing
9) Performance and interpretation of bronchial provocation testing	• Physiology of airway responsiveness • Direct and indirect airway challenges and their limitations in the paediatric age range			3	• Performance and interpretation of at least 15 bronchial provocation testing	• DOPS	• Performance and interpretation of reversibility testing and bronchial provocation testing in a child with suspected airway hyperresponsiveness.
10) Performance and interpretation of exercise testing for the diagnosis of exercise-induced bronchoconstriction	• Respiratory physiology during exercise • Pathophysiology of exercise-induced bronchoconstriction • Equipment used in pulmonary exercise testing	• Performance, supervision and interpretation of exercise testing		3	• Performance and interpretation of at least 15 exercise testing	• DOPS	
11) Blood gas analysis and oximetry interpretation	• Ventilation-perfusion relationships	• Performance, supervision and interpretation of blood gas analysis and pulse oximetry		3	• Portfolio of interpretation of 30 blood gas measurements	• Oral examination	
12) Performance and indication for 6-minute walking test	• Refer to the cardiopulmonary exercise testing in Additional Diagnostic Tests optional module			3	• Indication for 10 6-min walking tests and performing 10 with a physiotherapist.	• DOPS	
13) Quality control in paediatric lung function laboratories	• Requirements for calibration checks, time interval and quality control procedures	• Implementation of a quality control program (calibration procedures, test performance procedures, reference values, etc) • Ability to check and calibrate a spirometer	• Willingness to ensure the implementation of quality control measures in spirometry	3	• Perform quality control in paediatric lung function laboratories for three months		
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

C) AIRWAY ENDOSCOPY Mandatory

Train in a centre performing at least 60 flexible bronchoscopies per year

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Anatomy, physiology and pathology of the respiratory tract of paediatric patients	• Normal endoscopic anatomy of upper and lower airways • Age-related anatomic variations • Endoscopic findings of the most common congenital and acquired abnormalities	• Performance and interpretation of bronchoscopy • Correct evaluation and scheduling the procedure according to clinical presentation and respecting age-related issues • Interpreting findings in relation to the clinical picture of airway disease	• Willingness to explain findings to parents and children in an understandable language • Interested in advancing new knowledge.	3	• Observe at least 100 bronchoscopies and perform at least 50 flexible bronchoscopies • Portfolio		• Indication, performance and interpretation of an airway endoscopy in a child with persistent stridor • Indication, performance and interpretation of an airway endoscopy in a child with recurrent or chronic lower respiratory tract consolidation
2) Performance of flexible endoscopy of the airway in paediatric patients of all ages	• Technical and methodological aspects in performing flexible bronchoscopy (FB) • Indications for performing and not performing FB • Contraindications of FB • Understanding the technical differences of different bronchoscopes • Safety and crossinfection issues	• Evaluation, performance interpretation, and reporting of flexible bronchoscopy • Obtaining informed consent	• Willingness to work in a multidisciplinary team • Willingness to communicate results of bronchoscopy	3	• Train in a tertiary paediatric respiratory centre • Perform at least 40 FBs • Portfolio	• DOPS	
3) Conscious sedation and local anaesthesia for paediatric patients	• Advantages and disadvantages of the drugs commonly used in sedation and anaesthesia for FB • Advantages and disadvantages of conscious sedation, versus deep sedation/general anaesthesia • Current published guidelines on BAL	• Safe administration of conscious sedation and local anaesthesia including guiding the endoscopy team	• Willingness to work in a multidisciplinary team	3	• Portfolio	• DOPS	
4) Indications, procedure and interpretation of bronchoalveolar lavage (BAL)	• Current published guidelines on BAL	• Evaluation, performance and interpretation of BAL		3	• Perform at least 30 FBs and BAL • Portfolio	• DOPS	

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
5) Indications, procedure and interpretation of bronchial brushings and biopsies	Indications and contraindications of bronchial brushings and obtaining endobronchial biopsies	- Performance and interpretation of bronchial brushings and biopsy - Obtaining informed consent for bronchial biopsy	Adhering to ethical principles in indicating biopsy procedures for both clinical and research purposes	3	- Participate and assist in performing five bronchial brushings and five biopsies - Portfolio	DOPS	
6) Indications and contraindications of rigid bronchoscopy including foreign body removal	Specific diagnostic and therapeutic indications for rigid bronchoscopy (RB)	Ability to judge when procedure is indicated	Willingness to collaborate with experts where indicated	3	- Indication for 10 RBs to appropriate patients - Portfolio		
7) Indications, procedure and interpretation for performing transbronchial biopsies	Technical and methodological aspects of transbronchial biopsy (TBB), its indications and contraindications, risk-benefits, and potential complications			2	- Attend a hands-on, appropriate paediatric bronchoscopy course and biopsies - Portfolio		
8) Evaluation and management of risks and complications	Risks and complications of FB and related endoscopic procedures	Risk assessment and management of emergencies and complications related to endoscopic procedures		3	Portfolio	MCQ and other assessment tools	
9) Organisation of an endoscopic suite including equipment maintenance and hygiene	- Equipment components for endoscopic procedures - Methods of cleaning and disinfection of equipment - Endoscopy organisation both within and without the bronchoscopy suite, including infection control	Compliance with local infection control policies	Willingness to comply with local infection control policies	3	- Observe 25 bronchoscopies and participate in the organisation of endoscopic suite for 3 months - Portfolio	DOPS	
10) General anaesthesia for paediatric flexible bronchoscopy	Principles of general anaesthesia for FB		Willingness to work in a multidisciplinary team	2	Portfolio		

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

D) IMAGING Mandatory

Train in a centre with 100 interpretations of clinical images per year

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Anatomy of the respiratory tract including the extrathoracic airways as visualised using imaging techniques	• Anatomy of the thorax	• Correlating anatomy and imaging findings	• Self-directed learning	3	• Portfolio		• Indication and interpretation of imaging in a child with congenital lung malformations • Indication and interpretation of imaging in a child with complicated pleural infections
2) Indication, interpretation and basic principles of conventional radiography, computed tomography, magnetic resonance imaging, ultrasonography and isotope imaging methods	• Indications for, advantages and limitations of imaging methods	• Selecting appropriate imaging methods • Interpretation of imaging findings in relation to the clinical respiratory presentation	• Willingness to collaborate with radiology colleagues	3	• Portfolio		
3) Comparative radiation burden of the different procedures	• Comparative radiation hazards of commonly used imaging methods in children	• Conducting a risk-benefit evaluation of imaging procedures in children	• Self-directed learning	2	• Portfolio		
4) Indications for interventional radiology (biopsy, drainages)	• Available interventional radiology techniques, and their clinical indications and risks	• Conducting a risk-benefit evaluation in a specific clinical situation	• Willingness to collaborate with imaging specialists	3			
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

E) ACUTE AND CHRONIC LUNG INFECTIONS Mandatory

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Epidemiology, microbiology, infectivity and pharmacology of antimicrobial and antiviral drugs	- National and international epidemiology and resistance patterns of common respiratory pathogens - Pharmacology and costs of antimicrobial drugs	- Recognition of necessity of isolation procedures - Recognition of when second line treatment should be considered	Willingness to regularly update on epidemiology and pharmacology	3	Audit of local prevalence of respiratory infections and resistance patterns	Audit	Management of a child with complicated bacterial pneumonia on antimicrobial treatment
2) Diagnosis and management of common respiratory tract infections and their complications	Guidelines for treatment of community-acquired pneumonia, influenza, bronchiolitis, upper respiratory tract infections	- Recognition and management of short- and long-term complications, such as empyema, pneumothorax, complications of ventilatory support and obliterative bronchiolitis - Ability to initiate ventilatory support in a timely manner	Willingness to consider patient and family needs in management decisions	3	- Documentation of management of five cases of severe bronchiolitis, five cases of severe community-acquired bacterial pneumonia and five cases of empyema - Portfolio	- MiniCEX - CbD	Management of an infant with severe bronchiolitis
3) Diagnosis and management of respiratory infections in high-risk situations	- Microorganisms affecting immunocompromised patients - Different presentations of immunocompromised patients	Identification and management of lung infection in immunocompromised patients	Willingness to communicate effectively in a MDT	3	- Documentation of the management of five cases each of lung infection in immunocompromised and other high-risk patients - Portfolio	CbD	Diagnosis and management of a lower respiratory tract infection in an immunodeficient child
4) Diagnosis of bronchiectasis	Aetiology and pathophysiology of bronchiectasis	Ability to investigate and manage a child with probable bronchiectasis	Willingness to lead and work with the MDT, including radiologists and surgeons when indicated	3	- Documentation including images of five cases. - Portfolio	CbD	- Diagnosis and long-term management of a child with noncystic fibrosis - Diagnosis and long-term management of a child with bronchiectasis
5) Immunisations for respiratory pathogens	- Local availability of immunisations - Local and international guidelines for use and administration of immunisations	Giving advice to families and health-care workers about need and timing of immunisations	- Willingness to communicate benefits, risks and limitations of immunisation - Willingness to understand perceived risks of immunisations	3	- Documentation of local schedules and audit of uptake of immunisations - Portfolio		Discussion about the need for active and passive immunisations to prevent respiratory infections with patient and family

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
6) Accuracy and interpretation of microbiological tests	- Diagnostic accuracy of available tests - Optimal collection and processing of specimens	- Giving advice health care workers about collection and processing of specimens - Management of unexpected results	- Willingness to discuss the interpretation of results with the microbiologist - Willingness to explain to family the implications of microbiological results	3	- Documentation of local collection procedures - Documentation of cases with unusual results - Portfolio	CbD	Management of a child with unexpected microbiological findings
7) Lung involvement in immunodeficiency disorders	Pulmonary involvement in primary immunodeficiency disorders	Recognition, assessment of severity and treatment of respiratory disease in primary immunodeficiency disorders	- Willingness to work in a MDT - Willingness to acknowledge the need of one clinician to inform family of primary problem which may present with respiratory compromise e.g. AIDS	3	- Documentation of diagnosis and management of immunodeficiency presenting with lung infection and of lung infection in patients already diagnosed with immunodeficiency - Portfolio	CbD	Long term management of chronic respiratory disease in an immunodeficient child

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

F) TUBERCULOSIS (TB) Mandatory

Train at an institution with an average of 15 TB-related cases per year

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Epidemiology, microbiology, infectivity and pharmacology	- Microbiology of typical and atypical mycobacteria and differences between primary and post primary infections and their infectivity and the relation to the epidemiology of TB - Development of tuberculin sensitivity - Infection control as it relates to management of patients with TB - Microbiological factors of TB that determine the pharmacological treatment approaches	- Initiation of contact tracing - Implementation of appropriate measures to prevent crossinfection with TB in the hospital and in the outpatient clinic	- Self-directed learning - Ability and willingness to work in a multidisciplinary environment including public health services	3	Portfolio		
2) In vivo and in vitro diagnostic tests including their accuracy and interpretation	- Principles of diagnostic accuracy (sensitivity, specificity etc.) - Tests available in TB diagnosis in children and their limitations including newer diagnostic modalities	- Performance and interpretation of tuberculin skin tests. - Sample collection appropriate for the diagnosis of TB from children of all ages		3	- Participate in the management of 10 intracutaneous tests - Portfolio	DOPS	

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
3) Diagnosis and management of primary and post-primary pulmonary TB	• Presentation and natural history of TB and factors affecting prognosis • Current guidelines and evidence on the management of TB • Principles of drug treatment for TB prophylaxis, latent TB and TB in children • Importance of treatment completion in TB treatment • Available strategies to monitor and ensure treatment compliance	• Ability to differentiate between typical and atypical mycobacteria • Ability to differentiate between active and latent TB • Communicating diagnosis in language the family can understand • Ability to act according to population risk level. • Performance of a bacille Calmette-Guérin (BCG) immunisation when nationally required	• Willingness to listen to and manage families' questions and anxieties • Willingness to communicate with other professionals • Willingness to work in a multicultural environment	3	• Participate in the management of 10 intracutaneous tests • Portfolio	• CbD	• Investigation, diagnosis and management of a child with confirmed TB • Investigation, diagnosis and management of a child with suspected TB
4) Diagnosis and management of extrapulmonary TB	• Natural history, range of clinical presentations and management of extrapulmonary TB	• Recognition, investigation and management of extrapulmonary TB	• Willingness to collaborate with other colleagues	2	• Participate in the management of three cases of extrapulmonary TB	• CbD	
5) Diagnosis and management of multidrug-resistant tuberculosis (MDR-TB)	• Epidemiology, and causes of MDR-TB and its treatment strategies • Second and third line drugs			2	• Participate in the management of at least three cases of MDR-TB	• CbD	

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

G) BRONCHIAL ASTHMA AND OTHER WHEEZING Mandatory

Train in a centre with at least 200 patients for a minimum of 1 year

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Different phenotypes and their different pathologies and long-term outcomes (including underlying pathophysiology and basic epidemiology)	• Asthma syndrome and its complexity including the difference between allergic and nonallergic asthma and the various types of recurrent wheezing in preschool children • Changing patterns of recurrent wheeze and asthma across children of different ages • Pathophysiology of asthma, chronic airway inflammation, mechanisms of airway hyper-responsiveness and airway remodelling	• Explaining the basic features of the disease in an understandable way to parents and patients as a basis of an informed self-management	• Willingness to undertake self-directed learning	3	• Providing long-term (1 yr) care for at least 10 preschool children with recurrent wheezing, 10 school children with bronchial asthma and 10 asthmatic adolescents • Portfolio	• ChD	• Diagnosis, counselling and long-term management of a child with bronchial asthma
2) Environmental factors relevant to asthma and other wheezing disorders	• Controversies on allergen avoidance measures • Interaction of physical activity, sports and asthma • Gene-environment interactions, including the role of viral infections and their effect on the airways • Influence of passive smoking and air pollution on asthma morbidity	• Counseling patient and families with an emphasis on environmental factors, including allergen avoidance and avoidance of passive smoking • Counseling against smoking in adolescents with asthma	• Respecting the attachment of a family and a child to a domestic animal • Willingness to have and to convey a convincing position on the issue of passive and active smoking	3	• Providing environmental consultation for at least 30 patients and their parents including in-depth advice on problems with domestic animals and against smoking and passive smoking • Portfolio	• ChD	• Counseling of patient and family on environmental issues including passive and active smoking
3) Diagnosis and management of bronchiolitis and its complications and long-term sequelae	• Controversies in nomenclature (bronchiolitis versus wheezy bronchitis) • Viral aetiology of bronchiolitis • Pathophysiology of typical symptoms of bronchiolitis • Evidence and controversies in current management including guidelines • Long-term sequelae of viral bronchiolitis • Up to date knowledge of interaction of viral infections and allergy in the development of allergic asthma	• Providing competent clinical care for children with bronchiolitis in the outpatient and inpatient settings • Recognition of complications • Providing long-term care of children with recurrent wheezing after viral bronchiolitis	• Willingness to respond to the anxieties of a family with a recurrently wheezing child	3	• Inpatient management of at least 30 infants/children with bronchiolitis including medication, supportive care and monitoring • Providing long-term care for at least 10 children with post-bronchiolitis recurrent wheeze. • Portfolio	• DOPS • Feedback on letters	• Long-term management of a preschool child with recurrent wheezing

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
4) Relevant abnormalities in lung function including airway responsiveness	Controversies in peak-flow monitoring (refer to Pulmonary Function Tests module)	- Providing long-term care of children with recurrent wheezing after viral bronchiolitis - Appropriate use of pulmonary function tests in the management of asthma (refer to Pulmonary Function Tests module)	Refer to Pulmonary Function Tests module	3	- Recording and interpreting in the clinical context the lung function of 50 children with bronchial asthma - Performance of 10 pharmacological and 20 nonpharmacological bronchial challenge tests - Training of at least three children/parents in home peak-flow monitoring - Portfolio	DOPS	Refer to Pulmonary Function Tests module
5) Understanding difficulties in diagnosis and differential diagnosis	- Typical clinical presentation of the asthmatic syndrome - Accuracy of reported symptoms - Differential diagnosis of bronchial asthma and viral bronchiolitis to other (rare) wheezing disorders (refer to Evaluation of Respiratory Signs and Symptoms module)	Recognition of clinical features which suggest an alternative diagnosis	Willingness to critically review diagnoses in atypical cases	3	- Establishing the diagnosis of bronchial asthma in at least 20 cases - Participate in the management of 3 cases with a nonasthmatic wheezing disorder - Portfolio	- DOPS - Feedback on letters	- Differential diagnosis and management of an adolescent with a suspected functional breathing disorder - Differential diagnosis and management of a young child with recurrent or persistent wheezing unresponsive to antiasthma treatment

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
6) Evidence-based management of asthma at different ages including age-related pharmacology	- Pharmacology and side effects of antiasthma drugs - Current national and international management guidelines - Compliance problems - Management of allergy in asthma patients - Existing complementary and alternative medicine - Pathophysiology of acute asthma	- Providing outpatient and inpatient care for preschool children with recurrent wheezing and school children and adolescents with bronchial asthma - Translating current national and international management recommendations into an individualised management - Clinical and emergency management of acute asthma - Integrating nonpharmacological treatment in the management of asthma - Identifying poor compliance - Recognition and management of patients at risk for life-threatening asthma - Recognition and management of patients with difficult asthma	- Willingness to appreciate and deal with issues of noncompliance - Willingness to translate guidelines into a custom made approach for an individual patient - Acknowledging and dealing with patient's and family's interest in complementary and alternative medicine - Acknowledging and dealing with population-based anxieties with regard to specific substances (steroids)	3	- Training at least 10 patients/parents in asthma self-management including proper use of inhaled medication - Managing at least 20 cases of bronchial asthma according to current national and international treatment guidelines - Providing in-patient care for at least 10 children with acute asthma - Portfolio	- DOPS - Feedback on letters - MiniCEX	- Inpatient management of a child with acute asthma - Outpatient management of a child with bronchial asthma including annual review - Educating patient and family in prevention and control of asthma - Training patient and family in the proper use of inhaled anti-asthma medication - Long-term management of a child with difficult asthma
7) Emerging therapeutic strategies	- Relevant pharmacological developments - New diagnostic aspects including inflammation - Newly emerging management concepts	Identification of patients who may require novel treatments	Demonstrating up to date knowledge of emerging therapeutic strategies	2	- Participating in the discussion of 6 problem cases that require a special therapeutic management - Portfolio		

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

H) ALLERGIC DISORDERS Mandatory

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Understanding pathophysiology: immune response, control of immunoglobulin (Ig)E regulation and the mechanisms of allergic inflammation; basic genetics; basic epidemiology	- Immune mechanisms underlying the development of allergic sensitization - Relationship between allergy, lung disorders, rhinitis and allergic dermatitis - Hygiene hypothesis	Explaining allergic respiratory diseases and their relationship with other allergies	Willingness to keep up to date with new knowledge	3			
2) In vivo testing for IgE-mediated sensitivity (procedure and interpretation of skin-prick testing, challenge testing; meaning and validity of test results)	- Normal values and their diagnostic accuracy - Physiological, technical and methodological aspects of these tests	- Performance of skin prick test - Supervision of others who perform tests - Interpretation of results	Willingness to explain results and their implications to parents and patients	3	Performance of skin-prick tests in 20 children	DOPS	Indication, performance and interpretation of skin-prick test in a child with suspected allergy
3) In vitro methods for determination of specific IgE; inflammation markers (principle and interpretation, meaning and validity of test results)	- Normal values and their diagnostic accuracy - Physiological, technical and methodological aspects of these tests	Interpretation of IgE values	Willingness to explain results and their implications	3		DOPS	Indication and interpretation of in vitro allergy testing in a child with suspected allergy
4) Additional tests in allergology (patch tests, allergen bronchial provocation tests)	- Normal values and their diagnostic accuracy - Indications, physiological, technical and methodological aspects of nasal, oral and conjunctival provocation tests	Using interpretation of results in clinical management	- Willingness to explain the value and limitations of these tests to patients - Willingness to communicate with allergy experts	2		DOPS	
5) Diagnosis and management of anaphylaxis	Current guidelines for diagnosis, differential diagnosis and treatment	- Understanding risks of anaphylaxis - Management of an acute reaction - Prescribing epinephrine and explaining its correct use - Evaluation of the anterior portion of the nasal cavities - Ability to indicate and prescribe oral and topical treatments according to current guidelines	Willingness to tailor guidelines for patient, school and caregivers	3	- Documentation of educating patient and family in the management of anaphylaxis - Portfolio of 10 cases	CbD	Management of a child at risk for anaphylaxis
6) Diagnosis and management of allergic rhinitis			Willingness to explain treatments and avoidance measures to patient and caregivers	3	Management of 20 patients	CbD	Management of a child with allergic rhinitis

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
7) Diagnosis and management of mild to moderate atopic dermatitis	Current guidelines for diagnosis, differential diagnosis and treatment	Initiating topical treatment according to current guidelines	Willingness to collaborate with dermatologist and allergologist	3	Management of 10 patients	CbD	Management of a child with atopic dermatitis
8) Diagnosis and management of food allergy		- Recognition of a child with suspected food allergy - Differentiating sensitivity across different age groups - Ability to initiate appropriate investigations and refer if indicated	- Willingness to understand difficulties and complications of exclusion diets - Willingness to consult with allergologist	2	Management of 10 patients	CbD	Management of child with suspected food allergy
9) Diagnosis and management of allergic bronchopulmonary aspergillosis (BPA)	Availability and value of treatments	- Interpretation of sputum results, false positives and imaging - Initiation of appropriate treatment and guidance for long term management	Willingness to explain treatments to patient and caregivers	3	Management of three patients	CbD	Management of a patient with BPA
10) Specific immunotherapy		Evaluation and indication for specific immunotherapy	- Willingness to consult with experts in the field - Willingness to discuss with parents and patients the need for long-term good compliance	3	Management of two patients including consultation with experts	CbD	Indicate specific immunotherapy in a child with allergic disease
11) Prevention measures	- Value of avoidance measures - Current guidelines	Appropriate prescription of avoidance measures	Willingness to communicate the value and difficulties of allergen avoidance effectively to patients	3	Contribution to guideline writing	Audit	Management of a patient with multiple aeroallergen sensitisation
12) Alternative treatment	Awareness of available alternative treatments	Acknowledgement and negotiation with parents the place of conventional medical treatments and harmless alternative approaches	- Willingness to discuss the role of alternative treatments in a non-confrontational manner - Willingness to explain the dangers of some alternative treatments	2	Documentation of what treatments are being promoted locally.		
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

1) CYSTIC FIBROSIS (CF) Mandatory

Train in a centre with at least 50 patients for a minimum of 1 yr

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Genetics, pathophysiology and epidemiology	- Genotype identification and its relevance to the basic cellular abnormality and its relationship to structural and functional pathology - Role of alternative treatments - Risks of some alternative treatments	- Illustrating a family tree - Family/ parent counselling with an emphasis on explaining the basic abnormality to a family in a language they can understand		3	Minimum of two newly diagnosed cases		
2) Screening and diagnosis	Principles of diagnostic accuracy (sensitivity, specificity etc.)	- Interpretation of clinical test results including ambiguous results - Communication of positive screening test results	- Willingness to give a family the diagnosis with a good balance between informative and empathic communication - Reflective communication	3	- Observe and participate in the initial diagnosis and care of two newly diagnosed CF cases - Portfolio	- DOPS - CbD	Diagnosis and counselling of a family with a child with newly diagnosed CF
3) Prognosis	Natural history of CF and factors affecting prognosis	Communication of prognosis and factors affecting it in a language the family can understand	- Active listening to families' questions and anxieties - Effective communication in a multidisciplinary team - Ability to judge how and when to adopt novel treatments into local practice	3	- Observe and participate in the care of 10 cases at different disease stages - Portfolio	- DOPS - CbD	
4) Diagnosis and management of CF lung disease	- Principles of drug treatment and aerosol therapy - Principles of physiotherapy - Nutritional requirements - Pulmonary complications of CF lung disease including e.g. allergic bronchopulmonary aspergillosis (ABPA), pneumothorax, pulmonary haemorrhage - Psychosocial and developmental issues related to CF	- Interpretation of clinical features and clinical test results - Practical skills in indwelling i.v. access and line management procedures	- Understanding the burden of disease and treatment on child and family - Willingness to work and lead in a multidisciplinary team - Willingness to obtain informed consent for relevant procedures	3	- Supervision of inpatient and outpatient management for at least 1 year in a CF centre - Participation in >10 MDT discussions - Portfolio	Feedback on letters	- Inpatient management of an exacerbation - Outpatient management including annual review - Management of adolescent patients/ transitional care

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
5) Diagnosis and management of extrapulmonary manifestations of CF	• Range of presentations of CF • Presentation of extrapulmonary manifestations of CF • Interactions between pulmonary and nonpulmonary disease manifestations	• Identification of extrapulmonary disease • Ability to judge when to investigate for subclinical disease	• Willingness to adopt holistic approach to clinical care	3	• Supervision of inpatient and outpatient management for at least 1 yr in a CF centre • Participation in >10 MDT discussions • Portfolio	• Feedback on letters	• Management of extrapulmonary complication of CF, e.g. diagnosing and managing CF related diabetes
6) Evidence-based management	• Up-to-date knowledge of published guidelines and evidence on the management of CF	• Interpretation and application of guidelines	• Willingness to formulate an individualised treatment plan integrating evidence-based treatment and family input	3	• Audit of guideline implementation (at least one during the time in the CF unit) • Portfolio	• Feedback on letters • Audit	• Review of local practice
7) Crossinfection and hygiene	• Crossinfection in respiratory aspects of CF	• Development and implementation of local infection control guidelines	• Willingness to understand the barriers to ensuring effective implementation of crossinfection prevention policies	3	• Audit of hygiene	• Audit	• Managing the first isolate of Pseudomonas in a child with CF
8) Understanding of microbiology relevant to CF	• Relevant respiratory pathogens	• Effective respiratory specimen collection from children of all ages		3	• Microbiological case review • Minimum of five successful sample collections • Portfolio		• Managing the first isolate of Pseudomonas in a child with CF
9) Knowledge of emerging treatment strategies	• Up-to-date knowledge of novel and experimental treatment of CF	• Ability to judge how and when to adopt novel treatments into local practice	• Willingness to respond in an informed and empathic manner to families' requests for novel treatments • Willingness to understand the need for obtaining consent when initiating novel treatments	3	• Discussion of local applicability and cost-effectiveness of novel treatments. • Portfolio		• Managing a child with advanced CF
10) Management of end-stage lung disease and indications for lung transplantation	• Principles of terminal care for CF patients • Indications for referral for transplant, complications and outcomes of transplant	• Counselling for transplant • Management of end stage respiratory failure in a CF patient	• Willingness to demonstrate effective support for families and caregivers of dying patients • Willingness to acknowledge the wishes of patient and family	3	• Observing and participating in care of dying child, learning from experienced team members • Portfolio	• Feedback on letters • CbD	• Managing a child with advanced CF
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

J) CONGENITAL MALFORMATIONS Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Developmental anatomy relevant to the respiratory system	Classification of malformations and their implications			3	Exposure to slides in a good pathology department		
2) Diagnosis and management of congenital malformations affecting the respiratory system	Neonatal and late presentation of congenital diaphragmatic hernia and other thoracic wall malformations	Recognition and management of clinical situations including emergencies which may be due to common congenital thoracic malformations	- Willingness to counsel parents about their options, prognosis of antenatally diagnosed cases, and postnatal treatment options - Willingness to discuss with parents implications of the diagnosis of congenital thoracic anomalies - Willingness to discuss the perinatal management of congenital thoracic malformations (See Communication module, syllabus item 5, for willingness to work in a multidisciplinary team; see Communication module, syllabus item 4, for willingness to actively manage transition to adulthood)	3	- Observe three cases or documentation of 10 cases - Portfolio	- CbD - MiniCEX	- Prenatal counseling of parents where a diagnosis of congenital lung malformation has been made on fetal ultrasound - postnatal management in a multidisciplinary team - long-term follow-up of a patient with congenital thoracic malformation
3) Knowledge of surgical options for treating congenital malformations			Willingness to discuss the pros and cons of operative against conservative management	3	Portfolio		
4) Follow-up and outcomes of congenital malformations	The natural history of congenital thoracic malformations and the implications for follow-up	- Ability to recognise and act upon lung function changes anticipated during follow-up - Discussing long-term prognosis of a child with congenital thoracic malformation		3	- Observe the follow-up of 3 cases - Portfolio	Feedback on letters	
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

K) BRONCHOPULMONARY DYSPLASIA (BPD) AND CHRONIC LUNG DISEASE Mandatory

Train in a centre performing at least 10 BPD children for a minimum of 6 months and in contact with a paediatric intensive care unit (PICU) for a minimum of 2 months

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Developmental anatomy and pathophysiology	• Definition and classification of old and new BPD • Development of lung and circulation • Pathophysiology of BPD • Respiratory and nonrespiratory clinical manifestations			3			
2) Aetiology, pathogenesis and prevention				3			
3) Evidence-based management	• Current published guidelines and evidence on the management of BPD • Typical findings in diagnostic investigations (e.g. lung function, imaging, bronchoscopy) • Principles of drug treatment and aerosol therapy in different age groups • Comorbidities associated with BPD	• Recognition and management of acute and chronic problems including nonpulmonary comorbidities associated with BPD • Recognition of the need for, prescription and management of long-term oxygen therapy, noninvasive and mechanical ventilation	• Willingness to apply a holistic approach to different clinical problems • Willingness to work in and lead a multidisciplinary team • Willingness to address the anxieties of a family with a child with BPD	3	• Supervision of inpatient and outpatient management for at least 6 months • Portfolio	• CbD • MiniCEX	• Inpatient management of a child with exacerbation including assessment of severity of respiratory exacerbation and dealing with the needs of a patient and family • Outpatient management including discharge process of a child and family with special treatment and care (caregiver training, medications, oxygen, emergency management, oximetry technique)
4) Perinatal preventive measures	• Knowledge of preventive strategies		• Willingness to explain the usefulness and risks of preventive strategies	1	• Observe the care of at least 5 cases		• Management of respiratory and nonrespiratory problems on long-term basis including the follow-up of lung development, child growth characteristics, mental and neurological condition
5) Nutritional care	• Nutritional requirements and methods of support • Pathophysiology of growth failure and undernutrition	• Ability to take a nutritional history and evaluation of age-adjusted growth • Recognition of swallowing problems	• Willingness to work in a multidisciplinary team and communicate with other professionals	2	• Observe and participate in the care of at least five cases. • Portfolio		• Management of a preterm baby with BPD
6) Neurodevelopmental assessment	• Long-term cognitive, educational and behavioural impairments associated with prematurity	• Recognition of neuropsychological impairment and seeking expert advice		2	• Observe and participate in the care of at least five cases • Portfolio	• DOPS	• Management of a dietary regimen in a child with BPD

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
7) Long-term outcomes	Respiratory and nonrespiratory consequences of BPD during infancy and adolescence and factors affecting prognosis	Communication of prognosis in a language the family can understand	Willingness to explain the consequences of prematurity and BPD to the parents including preventive measures for respiratory infections	3	- Observe and participate in the care of 15 cases at different ages (infancy, school-age, adolescence) - Portfolio	- CbD - Feedback on letters	- Management of a child with complicated neurodevelopmental condition - Management of a child with special needs and his/her family

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

L) RARE DISEASES Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviours	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Pathophysiology, genetics, aetiology, diagnosis and management of primary ciliary dyskinesia (PCD)	Genetic, structural and functional aspects of ciliary defects and their clinical presentations	- Performance of ciliary biopsy - Treatment initiation and guidance for long-term management of patients with PCD		3	- Perform 10 ciliary biopsies - Portfolio	- CbD - MiniCEX	Diagnosis of a child with persistent respiratory symptoms and focal radiological signs
2) Diagnosis and management of gastro-oesophageal reflux (GOR) and aspiration syndromes	Anatomical and functional aspects of gastro-oesophageal reflux (GOR) and aspiration syndromes	- Performance and interpretation of a pH study - Ability to initiate management of GOR	- Willingness to discuss the role of GOR on respiratory disease - Willingness to work in a multidisciplinary team	3	- Report five pH studies - Portfolio	- CbD - MiniCEX	
3) Diagnosis and management of bronchiolitis obliterans (BO)	Pathogenesis and pathophysiology of BO	- Initiation of appropriate investigations - Treatment initiation and guidance for long-term management		3	- Observe and participate in the care of at least three cases - Portfolio	- CbD - MiniCEX	
4) Pathophysiology, genetics, aetiology, diagnosis and management of interstitial lung disease (ILD)	Classification and differential diagnosis of paediatric ILD including eosinophilic lung diseases and hypersensitivity pneumonitis	- Assessing indications for lung biopsy - Interpretation of lung pathology report - Treatment initiation and guidance for long-term management		3	- Observe and participate in the care of at least three cases - Portfolio	- CbD - MiniCEX	Ongoing management of a child with diffuse parenchymal lung disease interstitial pneumonitis
5) Pathophysiology, genetics, aetiology, diagnosis and management of pulmonary vascular disorders, including pulmonary hypertension	- Genetics and pathogenesis of pulmonary vascular disorders - Current therapeutic options for pulmonary arterial hypertension (PAH) and its prognosis	- Initiation of appropriate investigations - Treatment initiation and guidance for long-term management	Willingness to work and lead in a multidisciplinary team	3	- Observe and participate in the care of at least three cases - Portfolio	- CbD - MiniCEX	
6) Diagnosis and management of pulmonary haemorrhage	- Differential diagnosis of pulmonary haemorrhage - Diagnostic and therapeutic options in emergency situations and long-term management	- Initiation of appropriate investigations - Treatment initiation		3	- Observe and participate in the care of at least two cases - Portfolio	- CbD - MiniCEX	

Syllabus items	Knowledge	Skills	Attitude and behaviours	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
7) Diagnosis and management of respiratory manifestations of systemic disorders with lung involvement	Differential diagnosis of noninfectious pleural effusions	Diagnosis and management of noninfectious pleural effusion	Willingness to work and lead in a multidisciplinary team	3	Portfolio	- CbD - MiniCEX	
8) Diagnosis and management of respiratory manifestations of oncological disorders with lung involvement	Pathogenesis and possible presentations of pulmonary involvement in different systemic diseases	- Initiation of appropriate investigations and interpretation of the findings - Treatment initiation and collaboration with respect to long-term management		3	- Observe and participate in the care of at least three cases - Portfolio	- CbD - MiniCEX	Consultation about pulmonary infiltrates in a child undergoing treatment for a haemato-oncological disease
9) Diagnosis and management of respiratory manifestations of musculoskeletal disorders with lung involvement	- Pathogenesis and classification of musculoskeletal disorders. - Physiology and pathophysiology of extrapulmonary aspects of breathing.	- Assessing thoracic skeletal disorders. - Evaluation of the function of respiratory muscles. - Evaluation of respiratory function using objective measurements of ventilation and respiration - Initiating supportive ventilation and home ventilation.	- Willingness to work and lead in a multidisciplinary team - Willingness and ability to discuss the unfavourable outcome with parents of the child with progressive respiratory failure.	3	- Observe and participate in the care of at least two cases - Portfolio	- CbD - MiniCEX	Ongoing management of a child with progressive respiratory failure
10) Diagnosis and management of pleural diseases including spontaneous pneumothorax	- Diagnosis and differential diagnosis of pleural effusion. - Diagnosis and differential diagnosis of pneumothorax.	- Initiation of appropriate investigation, including imaging and pleural tap with appropriate analysis of the sample. - Management of pleural drainage in a patient with effusion or pneumothorax.	- Willingness to work in a multidisciplinary team with thoracic surgeons. - Ability to take decisive steps and initiate immediate treatment in a child with pneumothorax.	3	- Observe and participate in the care of at least two cases of pleural effusion and two cases of spontaneous pneumothorax. - Portfolio	- CbD - MiniCEX	Setting up an appropriate follow-up protocol for a child with spontaneous pneumothorax
11) Diagnosis and management of respiratory manifestations of immunodeficiency disorders with lung involvement	- Diagnosis and differential diagnosis of different types of immunodeficiency. - Diagnosis and differential diagnosis of lung infiltrates, bronchiectasis, granulomatous disorders and ILD.	- Initiation of diagnostic protocol including selection of appropriate imaging, indication of bronchoscopy with BAL, targeted immunological investigation. - Management of immune related disorders including replacement therapy, antibiotic strategy and supportive measures (physiotherapy etc.)	- Willingness to work in a multidisciplinary team with immunologists. - Ability to discuss the importance of continuous long-term management with the patient and family	3	- Observe and participate in the care of at least five cases of immunodeficiency related pulmonary disorders. - Portfolio	- CbD - MiniCEX	Setting up a reliable and effective protocol for long-term management of a child with immunodeficiency related lung disease, including appropriate continuous education

Syllabus items	Knowledge	Skills	Attitude and behaviours	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
12) Diagnosis and management of other rare lung diseases	• Diagnosis and differential diagnosis of different types of uncommon respiratory diseases.	• Initiation of diagnostic protocol including selection of an appropriate imaging and functional assessment.	• Willingness to work in a multidisciplinary team involving other specialists according to the type of the disease. • Ability to explain to the family the diagnosis and the paucity of data in some rare diseases.	3	• Observe and participate in the care of at least one case of rare disease. • Portfolio	• CbD • MiniCEX	• Setting up a targeted investigation with appropriate management according to the diagnosed disease
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

M) SLEEP MEDICINE Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*
1) Physiology and pathophysiology of sleep relevant for paediatric respiratory medicine	• Physiology of sleep • Pathophysiology of sleep-disordered breathing (SDB)		• Willingness to undertake self-directed learning	3	• Diagnosis of 10 new cases	
2) Diagnosis of and screening for obstructive sleep apnoea and upper airway resistance syndrome and hypopventilation	• Presenting symptoms of SDB in different age groups • Advantages and limitations of different diagnostic tools for SDB • Conditions at high risk of SDB where screening may be appropriate	• Ability to take a sleep history • Recognising indications for different diagnostic tools for studying SDB • Performance and interpretation of oximetry and oxycapnography recordings	• Willingness to recognise and address SDB	3	• Participate in diagnosis and screening • Report on diagnostic oximetry or oxycapnography, at least 10 studies	• CbD • MiniCEX
3) Polysomnography	• Current recommended scoring criteria for cardiorespiratory variables in a polysomnograph • Validity and reliability of polysomnography in the diagnosis of sleep disordered breathing (SDB) • Different stages of sleep and how they are recognised at different ages	• Performance and interpretation of a cardiorespiratory polysomnograph at different ages	• Willingness to explain the process of polysomnography to the child and parents • Willingness to judge when to compromise between patient distress and less rigorous investigation	2	• Interpret five polysomnographies	• DOPS

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*
4) Management of sleep-related respiratory problems	• Risks of SDB • Indications, risks and benefits of adenotonsillectomy, nonsurgical treatment options including drugs, oxygen and continuous positive airway pressure (CPAP), and tracheostomy for SDB	• Ability to make recommendations for treatment of SDB • Initiating CPAP and selecting the appropriate device and interface	• Willingness to explain the risks of SDB and the risks and benefits of different therapeutic options to the patient and parents • Willingness to work in a multidisciplinary team including ENT and neurology colleagues	3	• Management of 10 cases of different ages and different causes of SDB	• Cbd
5) Impact of obesity on respiratory function	• Evidence linking obesity to SDB • Other effects of obesity on respiratory function	• Initiating the management of SDB caused by obesity • Recognition of obesity as a cause of respiratory impairment	• Willingness to inform the child and family of the potential risks of obesity on breathing with empathy • Willingness to discuss strategies to reduce obesity with child and family in a non-judgemental manner • Willingness to refer to colleagues in the management of obesity	3	• Management of 10 cases	• Cbd

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

N) REHABILITATION IN CHRONIC RESPIRATORY DISEASES Mandatory

- Train in a tertiary paediatric respiratory centre for 6 months

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Setting up and coordinating a multidisciplinary team (including physiotherapy, strength and endurance training, psychosocial support, nutrition)	• Physiological basis of pulmonary rehabilitation	• Leading and working in a MDT	• Holistic approach to clinical care • Willingness to acknowledge the importance of communicating with other professionals • Willingness to seek and to use expert advice	3	• Participating in MDT conferences (>10) • Portfolio	• CbD	
2) Evaluation of rehabilitation programmes	• Published evidence-based literature on rehabilitation programmes in children	• Critical evaluation of published literature		2	• Evaluation of 10 rehabilitation programmes • Portfolio	• CbD	• Discharge planning in a child with significant respiratory impairment due to neuromuscular disease e.g. Duchenne dystrophy
3) Knowledge of health education including smoking prevention and cessation and healthy eating				3	• Observe and participate in the care of at least five cases • Portfolio		
4) Nutritional management	• Nutrition and nutritional support in children	• Prescribing and monitoring long term oxygen therapy for children • Work in a multidisciplinary team with para-medical professionals		2	• Manage 10 cases with a dietitian • Portfolio		
5) Psychological support for children and families	• Psychosocial and developmental problems associated with chronic illness in children			2	• Portfolio	• DOPS	
6) Principles of physiotherapy - techniques, indications, and limitations	• Physiological, technical and methodological aspects of long term oxygen therapy • Current physiotherapy techniques used in children with respiratory disease. • Indications for physiotherapy referral		• Willingness to communicate with parents and patients in a non-prejudicial manner • Willingness to avoid criticising lifestyle choices in order to avoid alienating patients	3	• Experience of 5 children on long term oxygen therapy • Portfolio		
7) Assessment of children for fitness to fly	• Physiological and methodological bases of fitness to fly assessments	• Performance and interpretation of fitness to fly tests	• Willingness to advise and assist parents with medical advice on travel	3	• Participate in three fitness to fly tests • Portfolio	• CbD • MiniCEX	
8) Sports medicine	• Physiological, technical and methodological aspects of methods used to evaluate fitness in children of different ages	• Interpretation of cardiorespiratory exercise test		2	• Portfolio	• DOPS	• Managing child with significant exercise induced asthma

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

O) INHALATION THERAPY Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Basic science of aerosol production and delivery	Importance of the interaction of aerosol characteristics, such as particle size and other physico-chemical properties and airway and breathing characteristics and its relation to the basic mechanisms of aerosol deposition (impaction, sedimentation and diffusion)		Self-directed learning	3	Having read and presented a review article or book chapter on the topic		Initiating appropriate aerosol therapy in a child with a newly diagnosed respiratory disease
2) Indications for aerosol therapy	Relationship between pathophysiological mechanisms of airway diseases and aerosol therapy	- Ability to indicate appropriate aerosol therapy in various forms of respiratory disease - Ability to choose appropriate aerosol therapy for children with different conditions and at different ages - Teaching aerosol therapy to patients and families - Teaching aerosol therapy to allied health professionals	- Willingness to translate basic knowledge into an individualised approach to a specific patient - Patience when communicating with patients and families	3	Observe and participate in the regular respiratory outpatient clinic of patient with respiratory disease and the need for inhaled therapy (at least 500 patients per yr)	CbD	
3) Understanding available techniques and their advantages and limitations	- Aerosol characteristics: particle size, drug formulation - Design characteristics e.g. face mask - Technical requirements: required inspiratory flow of available techniques, nebulisers, pressurised metered dose inhalers (pMDIs), holding chambers and dry powder inhalers (DPIs) - Potential limitations for the use of certain drugs and in certain age groups			3	Observe and participate in the regular respiratory outpatient clinic of patient with respiratory disease and the need for inhaled therapy (at least 50 patients per yr)		
4) Delivery of drugs in children with artificial airways	Indications and application of inhaled therapy to children with artificial airways i.e. tracheostomy, endotracheal tubes		Willingness to communicate with intensive care specialists	3	Observe and participate in the regular respiratory outpatient clinic of patients with artificial airways and the need for inhaled therapy (at least three patients per year)	MiniCEX	
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

P) TECHNOLOGY-DEPENDENT CHILDREN Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Pathophysiology of chronic respiratory failure	- Pathophysiology of chronic respiratory failure - Diseases of the lung, airway, chest wall, respiratory muscles and control of breathing that may cause respiratory failure			3			
2) Home oxygen therapy including control investigations and weaning strategies	- Current national and international guidelines in the long-term use of home oxygen in children - Locally available protocols of prescribing and delivering home oxygen	- Performance and interpretation of an overnight recording of oximetry - Organising and prescribing home oxygen for a child	Willingness to discuss the need for home oxygen with parents and child in an appropriate manner	3	Manage 10 patients	- CbD - MiniCEX	Set up a baby with chronic neonatal lung disease on home oxygen, and monitor and manage the ongoing care for 3 months
3) Invasive and non-invasive home ventilatory support including control investigations and weaning strategies	Different forms of ventilatory support, including pressure and volume-controlled ventilators, and different trigger modalities	Leading and working in a multidisciplinary team to set up and manage an appropriate package of care for a child requiring home ventilation	- Willingness to discuss the management in view of the child's condition and prognosis - Willingness to collaborate with a palliative care team	3	Manage 10 patients with invasive and noninvasive home ventilatory support	DOPS	Set up and manage the ongoing care of a child with aneurysmal problem who needs overnight non-invasive ventilation
4) Tracheostomy management including control investigations and weaning strategies	- Different types of tracheostomy tubes and their advantages and disadvantages - Advantages and disadvantages of speaking valves	- Tracheostomy tube replacement in emergencies - Preliminary assessment of problems with tracheostomies	Willingness to involve and work with a multidisciplinary team in tracheostomy management	2	Manage 6 patients with tracheostomy	DOPS	
5) Basic technical understanding of equipment	Advantages and disadvantages of available technologies and strategies for home ventilatory support	Settings adjustment on ventilators in common use in the local centre		3			
6) Airway clearance techniques (physiotherapy, intermittent pressure breathing, insufflator-exsufflator)	Different techniques available for clearing secretions in children on ventilation including evidence for each		Willingness to work with a physiotherapist in training parents to use appropriate secretion clearance techniques	2	Experience airway clearance with five patients	DOPS	
7) Recognition of associated problems, setting up and coordinating a MDT	Associated medical and social problems likely to be encountered in a child in need of home respiratory support	Leading a multidisciplinary team where necessary	- Willingness to explore proactively with the child and family any non-respiratory problems encountered - Willingness to work as part of a multidisciplinary team in addressing these problems	3	Experience five cases with a multidisciplinary team	CbD	

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

Q) EPIDEMIOLOGY AND ENVIRONMENTAL HEALTH Mandatory

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum exposure	Assessment tools*
1) Basic understanding of epidemiological principles including point and period prevalence versus incidence in respiratory diseases such as bronchial asthma, cystic fibrosis, bronchopulmonary dysplasia, TB	Local and international epidemiology and their differences	Interpretation of relevance of published data	Willingness to audit local prevalence data and monitor international data	3	- Evidence of knowledge in presentations collected in portfolio - Portfolio	
2) Impact of indoor and outdoor air pollution on respiratory health	Effects of particulate and nonparticulate matter on respiratory health	- Recognition of the effect of tobacco smoke and other pollutants on patients' health - Advising on avoidance	Willingness to give non-judgemental advice about lifestyle modifications	3	- Evidence of knowledge in presentations collected in portfolio - Portfolio	CbD
3) The burden of paediatric respiratory diseases on healthcare resources	Local costs of hospital and community care	Minimising unnecessary costs	Willingness to evaluate cost-effectiveness of care	3	- Evidence of knowledge in presentations collected in portfolio - Portfolio	CbD
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods						

R) MANAGEMENT AND LEADERSHIP Mandatory

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum exposure	Assessment tools*
1) Leadership and collaboration in a multidisciplinary team	Basic management principles	- Ability to lead and participate - Ability to take minutes	- Willingness to value the input and opinions of team members - Willingness to respect professional boundaries	3	- Leading and participating in MDT discussions about the care of 10 patients - Portfolio	DOPS
2) Understanding health-care resources in relation to paediatric respiratory medicine	Health economics and the measurements of health care costs	- Allocation of available resources - Negotiating a budget	Willingness to acknowledge and respect competing bids for resources	3	- Documentation of the cost of common and unusual drugs, and the cost of an episode of a hospital admission for acute and chronic respiratory illnesses - Portfolio	
3) Audit presentation and participation	Principles and methodology of audit	Ability to undertake regular audits and supervision of others	Persistence in implementing change driven by audit	3	Documentation of regular audits in portfolio	
4) Representation of respiratory medicine in the medical community and to the public	Local priorities in paediatric respiratory medicine	- Presenting priorities to the public through the media in a balanced way - Teaching and presentation skills	Exhibiting enthusiasm	3	- Documentation of teaching programmes to the wider medical community, including parents' groups and medical students - Portfolio	

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum exposure	Assessment tools*
5) Negotiations with colleagues and other allied professionals	Knowledge and understanding other colleagues' priorities	Listening and valuing other opinions.	Willingness to cooperate and respect different management styles	3	- Documentation of negotiations and reflective notes about their value - Portfolio	DOPS
6) Understanding of health costs and economics	Cost of care and factors affecting it	Ability to keep up to date with cost	Willingness to be interested in and be conscientious about cost	2	- Documentation in portfolio of the cost of different treatments - Portfolio	
7) Health care service development and project management	Principles and methods of preparing and presenting a business plan	- Preparing a business plan - Ability to keep time-tables	Willingness to take advice from others	3	- Documentation of a proposal for service development - Portfolio	Audit
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods						

S) TEACHING Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum exposure	Assessment tools*
1) Knowledge and application of different teaching methods	- Didactic principles - Different teaching methods such as lectures, tutorials and bedside teaching, and their standard structures	Ability to structure, prepare and present lectures, tutorials, and bedside teaching to different target audiences	- Motivation to convey knowledge to all types of audience - Patience with a less experienced audience, their questions and needs	3	- Minimum requirement of 10 lectures in three teaching programmes - Portfolio 3 Appraisals	
2) Knowledge and application of assessment methods	Principles of formative and summative assessment in medical education	Maintaining and applying a portfolio	Giving and receiving constructive feedback	3	- Minimum of 10 MCQ questions - Portfolio	
3) Knowledge and application of educational programmes for parents and patients	Theoretical framework in health educational programmes for parents, patients (and allied health professionals) i.e. delivery of effective health educational programmes	Effective delivery of important messages to families and other caregivers.		3	- Participation in two educational programmes per year - Portfolio	Audit
4) Application of teaching methods at all levels of medical education	Appropriate teaching methods for different levels of education			3	- Application of two methods per year - Portfolio	
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods						

T) RESEARCH Mandatory

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum exposure	Assessment tools*
1) Understanding and application of the principles of planning, designing, conducting, analysing and publishing research projects	Good clinical practice (GCP) guidelines, quantitative and qualitative study designs, epidemiology, and statistics	- Ability to develop a research protocol - Conducting a research study - Preparing a publication	- Continuous interest in the development of knowledge and scientific progress in the field of PRM - Motivation to contribute to current knowledge	3	- Two certificates of participation in research-related courses - Portfolio	MCQ
2) Scientific literature appraisal	Literature search strategies	Critical evaluation of published research		3	- Performing 10 appraisals per month - Portfolio	MCQ
3) Understanding and application of the ethical principles of paediatric research	Ethical principles of paediatric research	Ability to plan, design, conduct, analyse and publish research projects		3	Portfolio	MCQ
4) Significant personal contribution to a scientific project and authorship in a peer-reviewed article				3	- One paper as first author in a peer-reviewed article - Portfolio	MCQ

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

U) COMMUNICATION Mandatory

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum exposure	Assessment tools*
1) Understanding anxieties and social problems of children and their parents, both related and unrelated to respiratory disease	Psychosocial problems related to paediatric lung disease	Proactive identification and management of families' concerns and related psychosocial problems	Sensitivity in the approach to all children and their families	3	Recording of conversations with families in medical notes of all patients	
2) Ability to discuss diagnosis, treatments and prognoses with children	Influence of cognitive and emotional development of children in communication about respiratory diseases	Effective communication with children at all ages	Accommodating children's views about their illness and its management	3	Recording of conversations with children, especially adolescents, about their condition and proposed treatment in medical notes	DOPS
3) Ability to encourage and respect the views of children and their families in decision-making	Effective engagement of children and their families	Ensuring the provision of time to discuss all aspects of care	Ability to acknowledge all concerns and anxieties	3	Recording of conversations with families in medical notes of all patients	
4) Understanding needs of adolescents with chronic lung disease and ability to ease their transition to adult care	The Rights of the Child	Ability to communicate with adolescents who are on their own	Acknowledging differing developmental levels of adolescents	3	Recording of adolescents views on care and implications of transition	CbD

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum exposure	Assessment tools*
5) Leadership and collaboration in a MDT, respect and appreciation of the contributions of all members	• Leadership and working in multidisciplinary environment	• Ability to lead and contribute to multidisciplinary meetings	• Willingness to motivate group members • Willingness to attend multidisciplinary meetings	3	• Recording of MDT minutes • Portfolio	
6) Management of complaints in a helpful and nonconfrontational way	• Dealing with complaints including local procedures and policies	• Objective evaluation of quality of care delivered to a child whose family have complained	• Ability and willingness to acknowledge discrepancies in care in a professional manner	3		
7) Ability to know when to seek the advice of colleagues	• Awareness of own limitations	• Ability to ask for help • Self-reflection	• Acknowledging what you don't know • Acknowledgement of others' contribution to patient care	3		
8) Ability to support and make time for appraising trainees and other healthcare workers		• Setting aside time to appraise in a constructive manner	• Recognition of appraisal as helpful to personal development and effective team working and ability to apply this in practice	3		
9) Understanding of medical ethics, for both clinical practice and research	• Local and European ethical guidelines	• Attention to ethical practice at all times	• Willingness to challenge practices which are or may not be ethical	3	• Portfolio	
10) Knowledge of the articles of the convention of European Human Rights (EHR)		• Recognising clinical situations, such as end-of-life scenarios, where EHR might apply	• Willingness to participate in discussion of local and published cases where there has been application of EHR	3		
11) Ability to discuss end-of-life decisions with families and young people	• Palliative care and end-of-life management	• Conducting sensitive discussion with family, child and health care workers	• Recognition and documentation of parents' and child's wishes	3	• Attendance at 2 family discussions about palliative care and end-of-life decisions	• DOPS
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods						

V) RIGID AND INTERVENTIONAL BRONCHOSCOPY Mandatory

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Performance of RB including foreign body removal	• Indications, risks and contraindications for RB • Requirements for anaesthesia when performing rigid bronchoscopy • Equipment necessary for rigid bronchoscopy	• Equipment assembly for rigid bronchoscopy • Performance of rigid bronchoscopy in children of different ages	• Willingness to discuss with the parents the indication for bronchoscopy	3	• Train in a center where a minimum of 20 RBs are performed per yr • Perform a minimum of 20 RBs under supervision, including minimum of 10 foreign body removals • Portfolio	• DOPS	• Indicate and perform RB in a child with suspected foreign body aspiration
2) Performance of interventional bronchoscopy	• Indications and risks of transbronchial biopsy, balloon dilatation, local drug injections, stent placement, laser treatment etc. • Equipment for intervention (choice of biopsy forceps, advantages and disadvantages of laser systems etc.)	• Explaining procedures (indication and risks) to patient and parents • Working in a MDT (cardiologists, anesthesiologists, radiologist)	• Willingness to discuss indication for interventional bronchoscopy in a multidisciplinary team	2	• Performing 15 interventional bronchoscopies • Portfolio	• DOPS	• Indicate and perform transbronchial biopsy in a child with diffuse parenchymal disease
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							

W) POST-LUNG TRANSPLANT MANAGEMENT Mandatory

- At least 3 months training in a paediatric lung transplantation centre

Syllabus items	Knowledge	Skills	Attitude and behaviour	Level of competence	Minimum clinical exposure	Assessment tools*	Sample clinical situation
1) Nonsurgical management of a post-lung transplant patient	• Indications and contraindications of single-lung transplantation, double-lung transplantation, heart-lung transplantation and their physiological consequences • Short-term and long-term risks associated with lung transplantation • Diagnosis of acute and chronic graft rejection and pulmonary infection • Nonpulmonary infectious complications • Immunosuppressive management	• Recognition of clinical indications for heart-lung, bilateral lung, and single-lung transplantation • Discussing indications and prognosis of transplantation with patients and families • Performance of pre-transplant assessment • Recognition of signs and symptoms of acute and chronic rejection following heart-lung or lung transplantation • Management of immunosuppressive treatment • In- and outpatient management of lung transplant recipients • Performance of bronchoscopy, BAL and transbronchial biopsy • Diagnosis and treatment of common problems associated with lung transplantation (arterial hypertension, diabetes, osteoporosis, lymphoma) • Recognition of psychological/ psychiatric problems following lung transplantation	• Willingness to work in a MDT • Demonstrate commitment to lung transplant patients	3	• Involvement in the management of at least five patients • Portfolio	• Cbd	• Counselling of a family referred for evaluation for lung transplantation • Long-term management of a child with chronic graft rejection

* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods

X) ADDITIONAL DIAGNOSTIC TESTS Optional

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools	Sample clinical situation
1) Performance and interpretation of exhaled nitric oxide measurements	- Physiology of exhaled NO in the airway - Technical and methodological aspects of exhaled NO measurements	- Ability to understand how measurements of exhaled NO contribute to diagnosis and management - Discussing advantages and limitations of the exhaled NO measurements	- Willingness to acknowledge the limitations of novel diagnostic investigations - Willingness to explain the procedure and its potential complications to patients and parents - Willingness to obtain informed consent from parents	3	Portfolio of five patients and successful measurement	DOPS	Differential diagnosis of child with chronic cough
2) Indications, performance and interpretation of induced sputum tests	- Physiological, technical and methodological aspects of obtaining induced sputum in children with respiratory illnesses including its place in the collection of respiratory samples for microbiology - Value of test in the management	- Discussing the advantages and limitations of induced sputum tests - Induced sputum collection and interpretation of results		3	Portfolio documentation of five patients presenting with uncontrolled or poorly defined respiratory pathology	DOPS	- Differential diagnosis and management of a child with asthma unresponsive to treatment - Differential diagnosis and management of a child with undefined chronic cough - Differential diagnosis or suspicion of pulmonary tuberculosis
3) Measurements and interpretation of oscillatory mechanics (forced oscillation techniques)	- Physiological, technical and methodological aspects of forced oscillation techniques for the measurement of lung function - Value of the test in the management	- Understanding the correct measurements - Application of minimal requirements in the performance of these techniques		3	Portfolio documentation of five patients who had forced oscillation measurements	DOPS	Differential diagnosis and management of a child with bronchial obstruction, assessment of bronchial hyperresponsiveness
4) Measurements and interpretation of lung function in noncooperative children	Techniques used for measuring lung function in noncooperative children including infants and very young children	- Performance and interpretation of measurements - Discussion of indications for infant lung function measurements		3	Portfolio documentation of five cases of lung function measurements in noncooperative infants	DOPS	Differential diagnosis and management of a child with inability to cooperate or understand the manoeuvres

Syllabus items	Knowledge	Skills	Attitudes and behaviour	Level of competence	Minimum clinical exposure	Assessment tools	Sample clinical situation
5) Tests of ventilation homogeneity including multiple breath wash out techniques	- Gas exchange physiology - Technical and methodological aspects of assessing ventilation homogeneity in children such as multiple breath washout and ventilation perfusion scans	Performance and interpretation of multiple-breath inert gas washout in children. (see Pulmonary Function Tests Module, syllabus item number 11)	- Willingness to acknowledge the limitations of novel diagnostic investigations - Willingness to explain the procedure and its potential complications to patients and parents - Willingness to obtain informed consent from parents	3	Portfolio documentation of participating in tests of ventilation homogeneity tests	DOPS	Differential diagnosis of a child with normal spirometry and airway resistance but abnormal ventilation distribution
6) Principles and interpretation of cardiorespiratory exercise testing	- Principles of cardiorespiratory physiology at rest and during exercise - Physiological, technical and methodological aspects of exercise testing in children	- Exercise test selection according to the clinical situation - Performance and interpretation of exercise tests in children	Willingness to explain to patients and parents the procedure and equipment used for cardiorespiratory exercise testing	3	Portfolio documentation of five cases of exercise testing in children	DOPS	Deal with asthmatic child active in sports and his/her possibility to stand the cardiorespiratory demands in extreme physical activities
7) Polysomnography	- Current recommended scoring criteria for cardiorespiratory variables in a polysomnograph - Validity and reliability of polysomnography in the diagnosis of SDB - Different stages of sleep and how they are recognised at different ages	Performance and interpretation of a cardiorespiratory polysomnograph at different ages	- Willingness to explain the process of polysomnography to the child and parents - Willingness to judge when to compromise between patient distress and less rigorous investigation	3	Portfolio documentation of three cases of children with sleep disordered breathing	DOPS	Differential diagnosis of a child with upper airway problems or nonrespiratory diseases and symptoms of sleep apnoea
* all items can be assessed using MCQ in a written knowledge-based examination; refer to assessment toolbox for suggested methods							