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# Guidelines from the Association for European Paediatric Cardiology

# Standards for training in paediatric echocardiography

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In this document, we set out the levels of knowledge and expertise that we consider paediatric cardiologists can acquire during their period of training, defining the different levels of expertise that are emerging in modern day services.

## Structure of the training programme

Echocardiographic training must be organized within a programme for paediatric echocardiography organized and headed by a paediatric cardiologist accredited by the Association for European Paediatric Cardiology.

The laboratory should be placed in the setting of a hospital with facilities for both in-patient and out-patient care in paediatric cardiology, and the hospital should also have both neonatal and paediatric intensive care units. The accredited programme in paediatric echocardiography should be linked to similarly accredited programmes in paediatric cardiac catheterization and intervention, and/or paediatric cardiac surgery. The paediatric echocardiography laboratory should perform a sufficient number of studies per year, this number to be discussed with, and determined by, those accrediting the programme. The echocardiography laboratory must be directed by a full-time paediatric cardiologist specializing in echocardiography, who must have trained to at least the third level of expertise (see below). The director of the echocardiography laboratory will be expected to assume the responsibility for supervision of training. All those training in the programme will be expected to keep a logbook charting in detail the studies performed.

## Levels of expertise in paediatric echocardiography

We define three different levels of expertise, which are explained below.

### *Basic paediatric echocardiography*

- For this, the first level of expertise, the trainee should understand the basic physical principles of ultrasonic imaging and the practical usage of ultrasonic equipment.
- The trainee should have demonstrated the ability to perform and interpret echocardiograms in patients with simple forms of congenital cardiac diseases, and acquired diseases of the heart as seen in children.

This level of expertise requires the supervised performance of at least 250 echocardiograms in children with acquired and congenital diseases of the heart.

### *Advanced paediatric echocardiography*

Accreditation at this second level of expertise will require the following:

- The performance of at least 750 additional supervised echocardiographic studies in children with acquired and congenital cardiac malformations under supervision.
- Demonstration by the trainee of the ability to perform transoesophageal and fetal echocardiography under supervision.

This second level of expertise will need to be satisfied in order for the trainee to obtain the European Accreditation in Paediatric Echocardiography.

### *Specialized paediatric echocardiography*

Accreditation at this third, and most advanced, level of training will require the following:

- The performance and interpretation of at least 2,000 paediatric, transoesophageal, and fetal echocardiographic studies.

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- Knowledge and practical experience of other advanced techniques.
- Demonstration of the ability to supervise paediatric echocardiography studies.

Accreditation at the tertiary level will be needed by those seeking to direct echocardiographic laboratories in European centres for treatment of children with acquired and congenital cardiac disease.

## Components of training

*Basic paediatric echocardiography*

This training requires:

- A good understanding of the physics of cardiac ultrasound.
- A thorough understanding of ultrasonic instrumentation, and insight into its use and safety.
- A basic understanding of cardiac anatomy and physiology associated with acquired and congenital diseases of the heart.
- A thorough knowledge of sequential morphological analysis of congenital cardiac disease.
- Performance and interpretation of complete transthoracic echocardiographic studies in patients with simple forms of congenital cardiac disease, such as septal defects, arterial valvar stenoses, and coarctation of the aorta.

The trainee should have performed and interpreted at least 250 echocardiographic studies in children, of whom at least 100 should be infants. No more than one-fifth of these may be normal studies.

*Advanced paediatric echocardiography*

All paediatric cardiologists performing paediatric echocardiography in children should have demonstrated expertise at the second level. This level requires:

- Performance and interpretation of transthoracic echocardiographic studies in patients with more complex forms of acquired and congenital cardiac diseases, both before and after any therapeutic interventions.
- Assessment of systolic, diastolic, and regional myocardial function, including M-mode, contrast, Doppler, and other advanced techniques.
- Experience in transoesophageal echocardiography.
- Experience in fetal echocardiography.
- Experience in monitoring interventional procedures.

The trainee should perform and interpret at least 750 additional transthoracic echocardiograms independently, and at least 75 transoesophageal and 50 fetal studies under supervision. The transoesophageal studies include the introduction and manipulation of the ultrasonic probe under direct supervision. The trainee must have performed at least 25 studies monitoring interventional procedures, albeit that these can include intracardiac echocardiography.

On completion of training to the second level, the trainee will be eligible to apply for Accreditation in Paediatric Echocardiography as organized by Association for European Paediatric Cardiology, in co-operation with the European Society of Cardiology. This accreditation process includes submission of a logbook, along with theoretical and practical assessments.

*Specialized paediatric echocardiography*

This tertiary level of training should be achieved by all those paediatric cardiologists who have responsibility for training paediatric sonographers and physicians, and directing paediatric echocardiographic laboratories or programmes of training.

In addition to attaining accreditation at the second level, the trainee should:

- develop a high-level expertise in the performance and interpretation of transthoracic, transoesophageal, and fetal echocardiography;
- maintain up-to-date knowledge and experience of advanced techniques;
- actively participate in training junior paediatric cardiologists and sonographers;
- actively participate in research.

To achieve this level, the trainee should have performed and interpreted at least a further 1,000 transthoracic studies, 100 transoesophageal examinations, and 100 fetal investigations, all including a variety of clinical situations of different complexities, and including normal studies.

## Maintenance of competence

Applications and techniques in paediatric echocardiography will continue to evolve. It is important, therefore, that physicians responsible for the performance and interpretation of echocardiograms participate in continuous education in echocardiography. This can be achieved by attendance at scientific meetings, at courses designed to review developments in echocardiography, and by reading scientific journals. It is recommended that at least one conference related to paediatric echocardiography should be attended in each year.