

SPECIALIST TRAINING

CURRICULUM

FOR

Paediatric Cardiology

MAY 2007

Joint Royal Colleges of Physicians Training Board

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INTRODUCTION

Paediatric Cardiology is practised in regional centres staffed by three or more consultant paediatric cardiologists, with the supporting personnel and equipment necessary to diagnose and treat children with cardiac conditions. These centres are either part of paediatric hospitals or major cardiothoracic centres. The specialty provides a service from fetal life, through childhood, into adulthood and is concerned with diseases of the heart in the growing and developing individual. Close liaison with paediatrics, paediatric subspecialties, cardiothoracic surgery, adult cardiology, obstetrics, radiology and pathology is required. The paediatric cardiologist in training must have a thorough grounding in paediatrics and should be capable of providing all round patient care.

Training includes the investigation and treatment of children with congenital heart disease, acquired heart disease, arrhythmias and disturbances of circulatory function. Paediatric cardiology is an academic as well as clinical specialty and the paediatric cardiologist has a major role in the education of students, doctors, primary health care specialists, nurses and paramedical personnel. Most paediatric cardiologists engage in basic or clinical research.

Aims of the curriculum

The most important function of the specialist training programme is to educate individuals who will become consultants capable of providing the highest standard of service to children with cardiac disorders and adolescents and adults with congenital heart disease. The educational process set out in this curriculum aims to develop positive attitudes to lifelong learning and aims to equip the trainee to adapt to the changing expectations of society as well as to technological advances. The syllabus accompanying this curriculum sets out the subject matter to be covered during training. The planned outcomes of the training programme are included, with clear goals for achievement of a sound knowledge base, appropriate attitudes to practice and achievement of competencies as well as appropriate methods of learning and assessment throughout the programme.

The rationale behind the development of the curriculum

The demands of patients with congenital heart disease have changed considerably over the last decade with increasing expertise and technological advances being reflected in the training programme. In particular, this curriculum recognises the importance of concentration of expertise and avoidance of occasional practice in improving the long term care of patients with congenital heart disease. The increasingly complex practice of modern congenital cardiology dictates that cardiologists should no longer be jacks of all trade in the specialty. The current demand and lower threshold for specialist referral for cardiology opinion has led to the main changes in this curriculum, which relate to more clearly defined training either as a general paediatric cardiologist or as a "subspecialist".

The Specialist Advisory Committee (SAC)

This curriculum has been developed by the SAC of the Joint Committee for Higher Medical Training (now Royal College of Physicians Training Board - JRCPTB of the Federation of Royal Colleges of Physicians. The SAC is constituted to ensure representation of the Colleges of London, Glasgow and Edinburgh, the British Congenital Cardiac Association (BCCA), and UK trainees in the specialty. The SAC

will continue to revise and refine the curriculum as the NHS and the healthcare needs of our patients evolve.

Entry requirements

Before embarking on specific training in paediatric cardiology, the trainee must have completed Level 1 training in core paediatrics (see www.rcpch.ac.uk), core medical training medicine or acute care common stem (medicine) (see www.JRCPTB.org.uk), in line with the recommendations set out in the document "Modernising Medical Careers" (MMC). At the time of writing this curriculum (during the stage of transition to full implementation of MMC) this means that those eligible for entry to specialist paediatric cardiology training usually will have obtained the MRCPCH, MRCP, or an equivalent qualification in either paediatrics or medicine as evidence that the competencies set out in the RCPCH syllabus for core training or the RCP General Internal Medicine (Acute) curriculum have been achieved. A minimum period of two years of general professional training must have been completed including at least 6 months of general paediatrics and 6 months of neonatal intensive care (preferably in a regional referral unit), including management of general paediatric emergencies. If core training has not included 6 months of general paediatrics and 6 months of neonatology, this experience should be arranged as fixed term training early after entry into specialist training in paediatric cardiology (resulting in an extension of the overall period of training). These entry requirements and the assessment involved in achieving core level 1 competencies will be set out in greater detail in a revised version of this curriculum during 2007.

Allocation into specialist training in paediatric cardiology will be by open competition and will favour candidates who have obtained some experience in cardiology in their preceding training or research in addition to the competencies required by the MRCPCH or MRCP. The allocation procedure will adhere to good human resources practice and will be fair, open and transparent.

Duration of Training

The total duration of runthrough training in general paediatric cardiology is an indicative 5 years (2 years core paediatrics or acute medicine training and 3 years of specific paediatric cardiology), but will depend on the achievement of the training outcomes rather than a rigid duration of training. Paediatric cardiology training will take place in an accredited training post in a regional paediatric cardiology centre. Some training programmes may incorporate periods of training at more than one centre. It may be necessary for a trainee to spend a dedicated period of time (e.g. 3 months) in a paediatric cardiac intensive care unit, if the trainee is unable to achieve the levels of skills in intensive care required in the curriculum in order to understand the fundamental principles and practice of postoperative care of children with congenital heart disease. A period of training abroad is permissible during the training programme but prospective approval from the Deanery and the SAC for such "out of programme" training is essential.

Subject to satisfactory training assessments and achievement of the curriculum competences a trainee will be eligible to apply for a CCT in paediatric cardiology at the end of 3 years in specific paediatric training (i.e. after a total of an indicative 5 years). The CCT in paediatric cardiology will indicate that the holder has acquired

the skills in *general* paediatric cardiology required to be able to practise independently as a consultant in *general* paediatric cardiology. It does not indicate that adequate skills have been acquired to practise independently as a consultant in one of the subspecialties of paediatric cardiology.

Those trainees wishing to take up very specialised practice such as fetal cardiology, specialist imaging, cardiac catheterization, electrophysiology (including pacemaker implantation and care), transplant cardiology, pulmonary hypertension or adult congenital cardiology will require additional specialist training. The duration of that additional training will depend upon the subspecialty in question as well as achievement of the relevant competences. Subspecialty training will take place within approved training programmes and will be allocated through a competitive national process amongst trainees who are in their third year of general paediatric cardiology training. Trainees who successfully compete for this additional training will defer their CCT date until completion of it. It is envisaged that subspecialty trainees will continue to be involved in general paediatric cardiology, including on call commitments. Trainees will need to consider whether they wish to compete for a subspecialty training program by the time they are starting their third year of general paediatric cardiology training.

On completion of this additional subspecialty training the trainee will be awarded a CCT in paediatric cardiology. Current legislation does not allow for specific CCTs in subspecialties; it will remain the role of consultant appointment committees, consultant job plans and local clinical governance arrangements to ensure that consultants practise within the limits of their training and expertise.

Trainees who wish to undertake subspecialty training but who fail to compete successfully for a subspecialty post within a period of 6 months after completion of general paediatric cardiology training will be awarded a CCT and will vacate their training post.

Generic Curriculum

This specialty curriculum is complementary to the generic curriculum which applies to all 28 physicianly specialities. The generic curriculum follows the headings of good medical practice and runs through from core training to CCT (see fig 1).

Trainees should read and understand both their specialty curriculum and the generic curriculum. Both curricula should be seen as integrated so that generic competencies are acquired at all stages of specialty training. Some generic components are also further expanded and deepened for some specialties (eg palliative medicine). When planning specialty programmes, deaneries and trainers should ensure that both specialty and generic competencies can be acquired and assessed.

Training delivery, training development for individuals and assessment of competencies

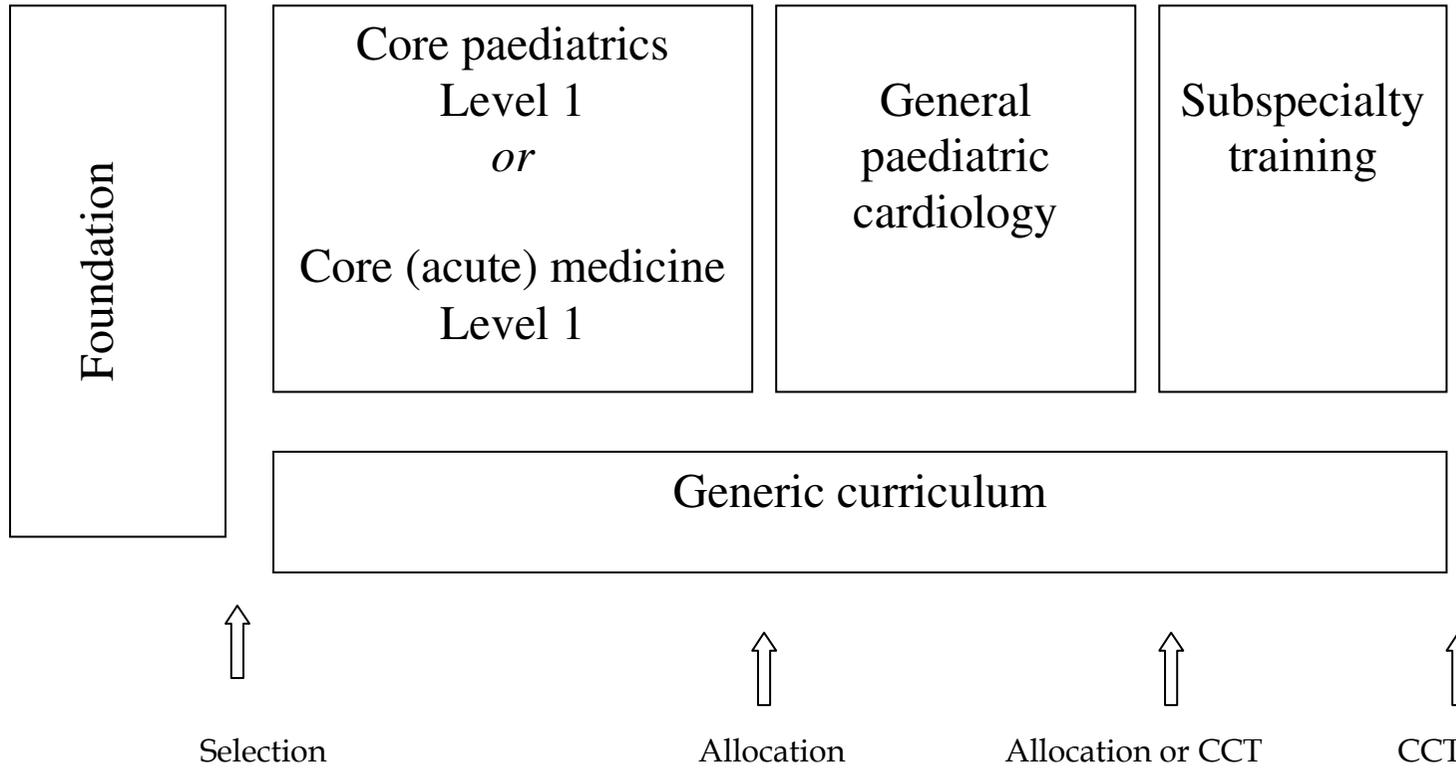
An individual's progress through the training curriculum will be guided by a named educational supervisor. Initial induction into the specialty will include a generic induction to the employing Trust. Clinical work based learning will take place in a progressively independent manner, with close consultant and senior peer supervision gradually relaxed as competencies are achieved such that trainees are capable of independent practice by the time of CCT. Personal career aims and choice of potential subspecialisation being facilitated by regular appraisal, which will include verbal and written feedback with the setting of individual training goals.

Methods of learning and assessment are set out in Appendices 5 and 6 and appropriate methods are referred to at each section of the specific aspects of the curriculum (see Parts 3-5).

The educational supervisor will encourage the use of different methods of learning, including attendance at curriculum based, didactic teaching held both locally and nationally as well as regular attendance at approved national and/or international academic symposia.

Assessment of progress will be an ongoing process using a variety of assessment tools including multisource feedback, direct observation of practical skills, clinical evaluation exercises, knowledge based assessment and case reviews. It is likely that patient opinion (for instance by questionnaire) will also play a role. In addition, formal annual assessments of progress in training, guided by the curriculum, will take place annually under the auspices of the local Postgraduate Deanery in liaison with the JRCPTB. The traditional regular assessments of training programmes are likely to continue under the auspices of the Postgraduate Medical Education and Training Board (PMETB).

Diagrammatic representation of runthrough training in paediatric cardiology



Training in fetal cardiology

General paediatric cardiology training should include a basic introduction to fetal cardiology, usually in the third year, but those wishing to specialise in this field will require an additional 1 year of training, obtaining concentrated experience in the practice of fetal echocardiography. This training should take place in an educationally approved post in a centre with on site obstetric and fetal medicine services.

Training in specialist imaging techniques

General paediatric cardiology training should include a basic introduction to the indications for and the interpretation of magnetic resonance imaging, CT scanning and nuclear cardiology. This will include a basic understanding of how the procedures are carried out, in particular the issues around safety. There will be also some training in the way the images are analysed and the post-processing tools used, with basic training in the interpretation of the images and data obtained and how this relates to the management of patients.

Those wishing to specialise in this field will require an additional 2 years of training, obtaining concentrated experience in specialist imaging techniques. This training should take place in an educationally approved post in a centre with on site paediatric cardiac services.

Training in diagnostic and therapeutic cardiac catheterisation

General paediatric cardiology training should include a basic introduction to the indications for and the interpretation of cardiac catheterisation and angiography. Those wishing to specialise in this field, however, will require an additional 2 years of training, obtaining concentrated experience in invasive techniques. This training should take place in an educationally approved post in a centre dealing with both paediatric and adult congenital cardiology services. The concept of life long learning is of particular importance in the field of invasive cardiology; collaborative working with senior colleagues after being appointed as a consultant is likely to be in the best interest of the patient when dealing with infrequently performed or very complex interventions.

Training in pacemaker implantation and electrophysiology

General paediatric cardiology training should include a basic introduction to the indications for pacemaker implantation and invasive electrophysiology. Those wishing to specialise in this field, however, will require an additional 2 years of training, obtaining concentrated experience in invasive techniques. This training should take place in an educationally approved post in a centre dealing with both paediatric cardiology and adult congenital cardiology services. In some cases, a period of up to 6 months may need to be spent in an adult cardiology unit.

Training in transplant cardiology

General paediatric cardiology training should include a basic introduction to the care of patients with heart and heart/lung transplants. Those wishing to specialise in this field, however, will require an additional period of two years training in an accredited specialist centre, obtaining concentrated experience in transplant care.

Training in pulmonary hypertension

Since pulmonary hypertension complicates the management of many patients with congenital heart disease it is essential that the core curriculum should enable the trainee to diagnose the condition, have an appreciation of the significance of their findings and the likely impact on the management of the cardiac lesion. Trainees should also be capable of recognising the disease in the normally formed heart. This will entail clinical training at the bedside, an awareness of the basic techniques necessary to make the diagnosis, competence in evaluating the results, appreciating the significance of their findings and an awareness of the drugs used to treat pulmonary hypertension. Knowledge of the management of acute post-operative pulmonary hypertension is an important aspect of general paediatric cardiology training.

Those wishing to specialise in this field will require an additional period of two years training in an accredited specialist centre, obtaining concentrated experience.

Training in Adult Congenital Heart Disease

Details of training in adult congenital heart disease are included in this document as there is considerable overlap with training in paediatric cardiology. Guidelines for those entering specialist training in adult congenital heart disease from a general adult cardiology training program are also set out in the curriculum for specialist training in adult cardiology.

Entry from paediatric cardiology programme

General paediatric cardiology training should include a basic introduction to the care of adolescents and adults with congenital heart disease, but those wishing to specialise in the field will require an additional 2 years training, obtaining concentrated experience in adult congenital heart disease. This period should include 6 months attachment to general adult cardiology. In most centres it should be possible for this attachment to run concurrently with congenital cardiology training. An additional year, out of programme, to obtain experience in research or in additional subspecialty training such as specialist imaging, therapeutic catheterisation or electrophysiology, is desirable.

Entry from adult cardiology programme

After the first 3 years in general cardiology training (which will include 1 year with additional training in general internal medicine) trainees wishing to specialise in adult congenital heart disease will require an additional 2 year period of training in a centre for tertiary referral of adults (and, ideally, children) with congenital heart disease. The training will cover all aspects of congenital heart disease and must include a period of a minimum of 6 months in the care of infants and children with heart disease.

As in the current adult cardiology training programme, a 6th year will normally be derived from a period of research or perhaps training in a related sub-specialty, such as specialist imaging, therapeutic catheterisation or electrophysiology.

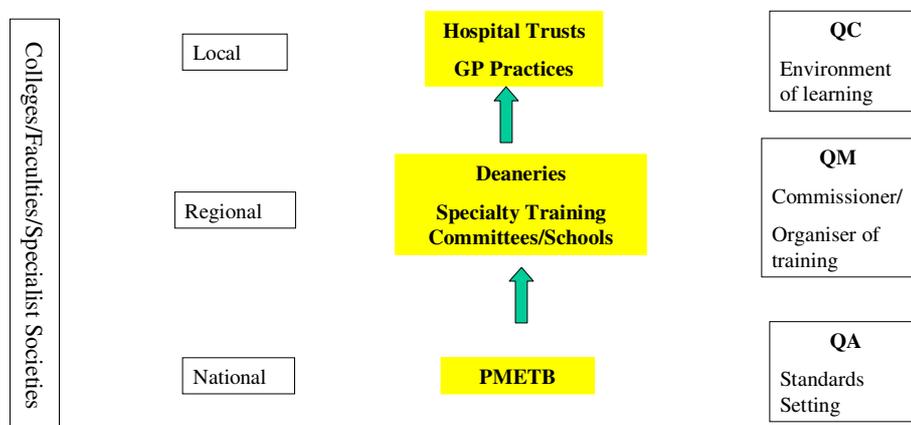
Flexible training

Trainees who are unable to work full-time are entitled to opt for flexible training programmes. They must undertake a pro-rata share of the out of hours duties required of their full-time colleagues in the same programme and at an equivalent stage (including on call and other out of hours commitments). EC Directive 93/16/EEC should be adhered to:

- i Part-time training shall meet the same requirements as full time training from which it will differ only in the possibility of limiting participation in medical activities to a period of at least half of that provided for full-time trainees
- ii The competent authorities shall ensure that the total duration and quality of part-time training of specialists are not less than those of full time trainees

Deaneries are responsible for quality management, PMETB will quality assure the deaneries and educational providers are responsible for local quality control, to be managed by the deaneries. The role of the Colleges in quality management remains important and will be delivered in partnership with the deaneries. The College role is one of quality review of deanery processes and this will take place within the SACs on a regular basis.

The Organisation and Quality Assurance of PG Training



Curriculum review will be informed by a number of different processes. For instance the SAC will be able to use information gathered from specialty heads, specialty deans and the National Health Service. It will have available to it results of the trainee survey, which will include questions pertaining to their specialty. Interaction with the NHS will be particularly important to understand the performance of specialists within the NHS and feedback will be required as to the continuing need for that specialty as defined by the curriculum. It is likely that the NHS will have a view as to the balance between generalist and specialist skills, the development of generic competencies and, looking to the future, the need for additional specialist competencies and curricula.

Research

Trainees are expected to be actively involved in research throughout the training period and are encouraged to undertake a period of full time research, most likely after the CCT has been achieved. It is anticipated that many will wish to take two or three years to obtain a higher degree (MSc, MD or PhD). Research is not however obligatory. For those undertaking a period of research after entry to specialist training but prior to achieving the CCT a maximum of 3 months' educational credit may be granted at the discretion of the SAC for clinical work relevant to training undertaken in the course of research. This concession does not apply to those undertaking research before entering the specialist training programme. Time out of programme needs prospective approval from the SAC and the support of the Postgraduate Dean. Funding will need to be identified for the duration of the research period. Time spent in research post CCT should normally be carried out in addition to rather than in place of subspecialty training. A maximum period of 3 years out of programme is allowed.

Clinical experience

From the very beginning of specialist training, the trainee should be fully integrated into the clinical work of the training department. Throughout the training programme the trainee should participate in at least two outpatient clinics per week under consultant supervision and should see both new and follow-up patients. Continuing regular participation in inpatient management is vital at all stages of training. A regular on-call commitment, ideally as frequent as working hours directives allow, should be maintained throughout the period of training. Part of the inpatient and outpatient clinical work should include adolescent cardiology and an introduction to adult congenital heart disease. There should be an appropriate balance between clinical service and academic endeavours, with at least one half-day session a week protected from service requirements to allow the trainee to carry out audit and research and to establish a regular programme of self-education.

The structure of the curriculum

The overall aims of the specialist training programme are set out in appendix 1.

During the course of specialist training the trainee must develop:

Generic skills that every physician is expected to demonstrate (appendix 2)

Clinical skills particular to the specialty (appendix 3)

Skills in procedures and investigations relevant to paediatric cardiology (appendix 4)

The curriculum document sets out a detailed syllabus for each of these skills. Part 2 deals with generic skills, Part 3 with clinical skills and Part 4 with procedural skills. In each part of the syllabus, the trainee is required to attain a number of educational objectives. Each educational objective is achieved by acquiring knowledge, skills and attitudes relevant to clinical practice. Recommended methods of learning are detailed in each section and are summarised in appendix 5. Recommended means of assessing achievement of the educational objective are also detailed in each section and are summarised in appendix 6. The trainee must demonstrate that each of the educational objectives set out in the syllabus has been achieved by the end of year 3 of the educational programme to obtain a CCT in paediatric cardiology. As each

objective is attained, the trainee is deemed competent in that particular area of practice. The formal requirements of training are completed when competence has been demonstrated in all areas. It is anticipated that competence will be achieved quickly in certain areas (such as professional behaviour). Introduction to some aspects of training (such as fetal cardiology) will not usually commence until the third year of specialist training programme.

In clinical skills and practical procedures learning will usually follow a series of stages:

Basic knowledge

Knowledge of how to carry out the objective

Ability to carry out the objective with assistance

Ability to carry out the objective with supervision

Ability to carry out all aspects of the objective independently.

To pass each annual review successfully (marked by issuing a RITA C form):

The trainee must demonstrate competence in those learning objectives that are required to be completed in that year of training

In other areas where full competence is not yet expected, the trainee will be required to demonstrate that a certain stage of learning (1-5 above) has been reached (the stage that has to be reached will be different for various educational objectives and will depend on how far through the programme the trainee has progressed)

Appendix 3 includes recommendations on when certain areas of learning should be reached in basic clinical skills and procedures. However, attaining a defined stage of competence in advanced clinical skills and procedures will proceed according to a more flexible timetable, as different centres may offer training in various areas at differing stages of the educational programme. In respect of these more advanced training objectives, it is sufficient that the trainee demonstrate reasonable progress over the course of the training year.

Training record

A training record will be supplied by the JRCPTB on commencing the period of specialist training and will remain the property of the trainee. It should be maintained by the trainee and must be produced at annual assessments to demonstrate satisfactory progress in attaining the educational objectives set out in the specialty curriculum.

The training record consists of three main sections:

A record of assessments carried out by supervisors, documenting what stage of learning has been reached by the trainee in various areas of the curriculum.

A log book, kept by the trainee, which records all procedures and investigations performed and all clinical and educational sessions attended. The log book forms a running commentary of the trainee's day to day activity and documents the extent of experience gathered in various areas of the curriculum. The log book entries should be signed off by the educational supervisor, prior to each training assessment, to confirm satisfactory fulfilment of the required training experience. There is no longer a minimum number of procedures that must be performed to complete the training requirement. The emphasis is now on the achievement of competence, and this may be attained at different rates by different trainees.

A portfolio of educational achievements, which is updated by the trainee throughout the period of specialist training. This is a semi-structured record that allows the trainee to record evidence of progress in set educational objectives. Some of these objectives are of an intrinsically clinical nature and some reflect the generic skills that the Royal College of Physicians and the General Medical Council expect physicians to be able to demonstrate. Part of the portfolio provides for critical reflection on events in clinical practice. This is of particular importance and should be completed in a prospective fashion, detailing how the management of individual patients or clinical problems has furthered a trainee's education and understanding.

These three components of the training record provide an assessment of achievement in different ways and should be used together by the trainee to prove that competence has been achieved in various areas of the curriculum. At the end of each year of training the trainee should provide a report in the portfolio which summarises the competencies and learning points achieved during that year. A brief discussion of any realistic objectives not achieved should also be included. Comments on how to achieve such objectives in subsequent years should then be made.

Assessment

Assessment will be carried out continuously throughout the training programme by the trainee's educational supervisor, other consultants involved in trainee's education and from time to time by external assessors from other deaneries. The results of these assessments will be retained in the JRCPTB training record. They will form the basis of the annual (RITA) review, together with the trainee's portfolio of educational achievements, log book and documentation of critical reflection on events in clinical practice (see appendices 6 and 7). In the future, assessment may also incorporate more formal examination of competence in the form of MCQs, short answer questions and OSCE assessment of clinical skills using standard cases.

Particular importance will be attached to the penultimate year assessment, towards the latter half of year 2, at which stage a decision will be made about the trainee's suitability to continue in the training programme. Full details may be found in the introduction to the JRCPTB handbook. The award of CCT will be based on

satisfactory completion of the entire series of annual assessments (copies of the RITA C form should be retained in the training record for each year).

Appraisal

At each stage of the training programme it should be clear to the trainee what educational objectives must be met and what practical measures should be taken to achieve this end. It should also be clear to the trainee's educational supervisor what stage the trainee has reached in the educational process. An appraisal should take place every 6 months at which both parties should agree on a plan for training for the next 6 month period. If there are outstanding training requirements, both the trainee and the educational supervisor hold responsibility for changing the trainee's working practice to ensure adequate training opportunities are obtained. The second review each year should ideally take place approximately 1-2 months before the annual (RITA) review, to allow time for deficiencies to be rectified. If there are any deficiencies in the trainee's performance, these should be made clear to him/her at the earliest possible opportunity by the educational supervisor.

EQUALITY AND DIVERSITY

In the exercise of these powers and responsibilities, the Royal Colleges of Physicians will comply, and ensure compliance, with the requirements of relevant legislation, such as the:

- Race Relations (Amendment) Act 2000;
- Disability Discrimination Act 1995 and Special Educational Needs and Disabilities Act 2001;
- The Disability Discrimination Act 1995 (amendment) (further and higher education) regulations 2006
- Age Discrimination Act in October 2006

The Federation of the Royal Colleges of Physicians believes that equality of opportunity is fundamental to the many and varied ways in which individuals become involved with the Colleges, either as members of staff and Officers, as advisers from the medical profession, as members of the Colleges' professional bodies or as doctors in training and examination candidates. Accordingly, it warmly welcomes contributors and applicants from as diverse a population as possible, and actively seeks to recruit people to all its activities regardless of race, religion, ethnic origin, disability, age, gender or sexual orientation. Deanery quality assurance will ensure that each training programme complies with the equality and diversity standards in postgraduate medical training as set by PMETB. Compliance with anti-discriminatory practice will be assured through:

- Monitoring of recruitment processes
- Ensuring all College representatives and Programme Directors have attended appropriate training sessions prior to appointment or within 12 months of taking up post.
- Ensuring trainees have an appropriate, confidential and supportive route to report examples of inappropriate behaviour of a discriminatory nature.
- Monitoring of College examinations.

Ensuring all assessments discriminate on objective and appropriate criteria and do not unfairly disadvantage trainees because of gender, ethnicity, sexual orientation or disability (other than that which would make it impossible to practise safely as a physician). All efforts shall be made to ensure the participation of people with a disability in training.

STATUTORY RESPONSIBILITIES

The Royal Colleges of Physicians will comply, and ensure compliance, with the requirements of legislation, such as the:

- Human Rights Act 1998
- Freedom of Information Act 2001
- Data Protection Acts 1984 and 1998

APPENDIX 1

Overall aims of the curriculum

The education programme in paediatric cardiology aims to produce physicians who:

- Address all aspects of the healthcare needs of patients and their families
- Communicate effectively with children, families, and colleagues
- Are able to effectively coordinate the work of the paediatric cardiology team
- Manage time and resources to the benefit of themselves, their patients and their colleagues
- Are able to operate as safe independent practitioners whilst recognising the limitation of their own expertise and the obligation to seek assistance of colleagues where appropriate
- Have acquired and developed team working and leadership skills
- Work effectively with other health care professionals
- Are able to teach other physicians and health care professionals
- Will be honest and objective when assessing the performance of those they have supervised and trained
- Develop clinical practice which is based on an analysis of relevant clinical research and have an understanding of research methodology
- Are aware of current thinking about ethical and legal issues
- Can take advantage of information technology to enhance all aspects of patient care
- Maintain the highest standard in their professional field and show themselves able to respond constructively to assessments and appraisals of professional competence and performance
- Are able to identify and take responsibility for their own educational needs and the attainment of these needs
- Are aware of procedures and able to take action when things go wrong, both in their own practice and in that of others
- Work effectively and efficiently in health care organisation
- Are able to apply the knowledge of biological and behavioural sciences in clinical practice
- Apply appropriate knowledge and skill in the diagnosis and management of children with cardiovascular disorders and adults with congenital heart disease
- Are competent to perform the core investigations required in congenital heart disease
- Can develop management plans for the whole patient and maintain knowledge of other areas of paediatrics which impinge on the specialty of paediatric cardiology

APPENDIX 2

Generic Learning Objectives

By the end of specialist training the trainee should have developed competence in the following:

- Good clinical care
- History, examination, investigations, treatment, notekeeping and correspondence
- Managing chronic disease
- Time management and decision making
- Communication skills
- Maintaining good medical practice
- Maintaining Trust
- Professional behaviour
- Ethics and legal issues
- Patient education and disease prevention
- Working with colleagues
- Teamwork and leadership skills
- Teaching and educational supervision
- Research
- Clinical governance
- Structure of the NHS and principles of management
- Information use and management
- Cross-specialty skills
- Admissions and discharges
- Discharge planning
- Resuscitation
- Nutrition

APPENDIX 3

Clinical Learning Objectives

By the end of the education programme the trainee is expected to manage the following clinical problems:

- Cardiovascular collapse in infancy
- Cardiac failure in infants and children
- Cyanosis in the newborn period
- Cyanosis beyond the newborn period
- Evaluation of the child with a cardiac murmur
- Evaluation of children and adolescents with chest pain, palpitations, presyncope or syncope
- Patients with acyanotic congenital heart disease
- Left to right shunting defects
- Duct dependent systemic circulation
- Obstructive left heart lesions
- Acyanotic obstructive right heart lesions
- Patients with cyanotic congenital heart disease
- Duct dependent pulmonary circulation
- Transposition of the great arteries
- Cyanotic congenital heart disease with high pulmonary flow
- Complex cyanotic congenital heart disease
- Pulmonary hypertension
- Fontan circulation
- Inflammatory cardiovascular disease
- Cardiomyopathy and myocarditis
- Prevention and management of infective endocarditis
- Cardiovascular abnormalities in neonatal intensive care
- Cardiovascular evaluation of children with genetic disorders and syndromes
- Cardiac evaluation of the child with stridor
- Detection and management of fetal cardiac abnormalities
- Adolescent and adult congenital heart disease
- Arrhythmias
- Paediatric cardiac transplantation
- Nutrition and growth in congenital heart disease
- Assessment of children prior to cardiac surgery
- Care of children following cardiac surgery
- Assessment of children with cardiac disease prior to non-cardiac surgery
- Management of critically ill children with cardiovascular compromise

As an approximate guide, the aspects of training trainees might be expected to include in each year of training are:

Year 1

Formal audited reporting of ECGs

Formal audited analysis and reporting of ambulatory ECG recordings.

Formal audited reporting of Chest Xrays

A foundation course in cardiac morphology

A foundation course in echocardiography

Advanced Paediatric Life Support training and certification

Year 2

A foundation course in diagnosis and management of arrhythmias in childhood

A foundation course in pacemaker management

A foundation course in MR imaging

Basic training in transoesophageal echocardiography

Year 3

A foundation course in fetal cardiology

An introduction to the practical aspects of fetal echocardiography and counselling of parents after fetal echocardiography

An introduction to the practical aspects of cardiac catheterisation

An introduction to adult congenital heart disease

An introduction to invasive electrophysiology

APPENDIX 4

Investigations and Procedures

Investigations and procedures all trainees are expected to select appropriately and either perform competently and/or interpret correctly

- 12 lead ECG
- Ambulatory ECG
- Exercise test
- Cardiac event recorder
- ECG with adenosine challenge
- Chest x-ray
- DC cardioversion
- Basic cardiac pacing
- Pericardiocentesis
- Balloon atrial septostomy
- Transthoracic echocardiography
- Echocardiography with contrast study
- Transoesophageal echocardiography

Investigations all trainees should be able to select and interpret appropriately (the trainee is not expected to perform these tests)

- Radionuclide imaging of the cardiovascular system
- CT scanning
- Magnetic resonance imaging
- Cardiac catheterisation
- Radiation use and safety
- Tilt table testing

Trainees wishing to develop a special interest should aim to achieve basic competence in that area during the first three years of the training programme. Trainees who successfully compete for a subspecialist training post will spend a much greater proportion of clinical and research time devoted to the special interest after the general 3 year training programme has been completed. In the majority of cases only one special interest should be developed, although in certain circumstances two compatible special interests may be accommodated in the training programme (for example cardiac catheterisation and adult congenital heart disease). It is not obligatory to subspecialise and some trainees may wish (and should be encouraged) to maintain a more general practice.

The main sub-specialty areas are as follows:

- Adult congenital heart disease
- Fetal cardiology
- Non invasive imaging
- Diagnostic and therapeutic catheterisation
- Invasive electrophysiology and pacing in congenital heart disease
- Pulmonary hypertension
- Heart failure and cardiac transplantation

APPENDIX 5

Learning methods

- a) Self directed learning (e.g. textbooks, journals and internet sources)
- b) Dedicated teaching by consultant staff (e.g. period of tuition by cardiac pathologist or radiologist)
- c) Hospital meetings (e.g. surgical conferences, radiology meetings)
- d) Local postgraduate education (e.g. departmental teaching, journal review, grand round presentations)
- e) Foundation courses and study days
- f) Attendance (or presentation of research) at regional, national and international conferences
- g) Reflective commentary about anonymised patients in the portfolio of educational achievements
- h) Apprenticeship learning (experiential learning)
- i) Participation in research or audit supervised by consultant trainer
- j) Participation in teaching
- k) Participation in management

APPENDIX 6

Assessment Methods

JRCPTB training record - This will document assessments carried out by training supervisors and may include:

- 1) Evaluation by the trainee's educational supervisor
- 2) Evaluation by a consultant other than the trainee's educational supervisor
- 3) Evaluation by an allied health professional
- 4) Evaluation by an external assessor
 - Each of whom may carry out an assessment by:
 - (i) direct observation of the trainee
 - (ii) discussion with other staff members
 - (iii) discussion with patients and their parents
- 5) Inspection of the trainee's portfolio of educational achievements (which should present evidence of a trainee's progress in acquiring generic and clinical skills)
- 6) Inspection of the trainee's log book (which should record investigations or procedures performed by the trainee)
- 7) Evaluation of the trainee's critical reflection on events in clinical practice (the assessor should examine the trainee's documentation of points learned from the care of individual patients)

APPENDIX 7

A guide to assessments in paediatric cardiology training

DOPS (Direct Observation of Practical Skills) and MSF (Multi Source Feedback, previously known as 360 degree assessment) were introduced into trainee competence assessment in paediatric cardiology in April 2005. The newer assessment methods of documented Case Based Discussions (CBD) and Patient Questionnaires (PsQ) will be used when this curriculum is implemented. The assessment grid is a guide to which assessments may be used to assess each competency set out in the curriculum. For many competencies a variety of assessment methods may be employed; it is not necessary to use all the potentially suitable assessment methods for each competency and it will be possible in many instances for multiple competencies to be assessed in any single assessment episode. The SAC has recommended successful completion of a specific number of assessments at given stages of training and these are set out in the RITA guide.

As a general rule the assessments should be carried out prior to the annual RITA so that the appropriate documentation of competences is available at the RITA, allowing appropriate action to be planned if a trainee scores poorly. The frequency and the number of assessments may well need refining as time goes by and as we receive more specialty specific feedback from trainers and trainees. The recommendations for frequency and number of assessments are for trainees who progress satisfactorily. If a trainee's assessment scores are poor at any stage, not only will specifically directed training be necessary for that trainee, but an additional series of assessments will be required to ensure problems with achievement of competence have been successfully addressed. The specialty's experience of DOPS during the RCP pilot study suggested that the generic DOPS form designed by the RCP was probably adequate for a wide variety of procedures if accompanied by some guidance as to the specific aspects of competence being assessed (see below). The SAC will welcome feedback on the use of the generic form.

MSF

There are several different models of MSF, with varying recommendations on how many assessors are necessary and whether the assessors should be chosen by the trainee or by the trainers. There is little evidence to suggest any are superior and the SAC do not hold strong views on the model to be used. It is most expedient to use the model in place at each local Postgraduate Deanery as automated collation of results is then likely to be available at the Deanery, saving a great deal of work. It is probably appropriate for MSFs to be carried out early in the curriculum once a trainee has had a chance to settle in, again prior to the third year RITA and again during the later stages of training, prior to PYA. We suggest: after first 6 months, in first half of year 3, and in second half of year 4.

CBD and PsQ

CBD has been in use for some time in the assessment of general professional training. By the time of implementation of the new curriculum specialty specific CBD forms will be available. PsQ is a newer concept and generic forms are in development at the RCP.

Practical skill

Praecordial
echocardiography

Notes

A cross section of cases, to include elective echo (including confirmation of normality), neonatal referral, acute admission

Transoesophageal
echocardiography

A cross section of cases to include full diagnostic TOE, not just TOE for ASD closure

Cardiac
catheterisation

A cross section of cases to include diagnostic and therapeutic procedures

Fetal cardiac
scanning (and
parental
counselling)

A cross section of cases to include normality, structural pathology and rhythm abnormalities

Cardioversion

Need not be restricted to children

Pericardiocentesis

Need not be restricted to children

Temporary
pacemaker
implantation

Need not be restricted to emergency pacing. Wire insertion at electrophysiology study would suffice

DOPS: praecordial echocardiography: specific skills to be scored

Puts patient and parents at ease, explains the procedure and behaves in a considerate manner throughout the scan

Obtains all relevant demographic data, details of referring doctor, relevant previous treatment and reasons for the scan

Uses appropriate transducers and machine settings throughout the scan

Is capable of using traditional and anatomical image orientation

Identifies visceratrial situs and position of heart

Identifies venous, atrioventricular and ventriculoarterial connections

Identifies abnormalities, distinguishing between normal variants and pathological findings

Knows the differential diagnosis when there are indirect signs of anomalies (eg dilated right heart)

Interprets echo measurements appropriately, demonstrating knowledge of limitations of calculations

Uses colour flow, pulsed wave and continuous wave Doppler when relevant

Interprets Doppler findings correctly (eg appropriate use of Bernoulli equation and formulae for calculations such as valve area)

Records clear, relevant images with appropriate brevity

Cleans transducers appropriately after completion of the scan

Counsels the patient or parents appropriately on the findings of the scan

Documents the echo report fully, writing a concise and appropriate report

DOPS: Transoesophageal chocardiography: specific skills to be scored

Obtains all relevant demographic data, details of referring doctor, relevant previous treatment and reasons for the scan

Understands the reasons for the scan and the additional information it might give after a praecordial scan

Prepares probe appropriately prior to passing it

Passes transducer successfully, asking for anaesthetist's help appropriately if patient under general anaesthetic

Uses appropriate machine settings throughout the scan

Identifies landmark cardiac structures during probe positioning

Manoeuvres probe appropriately to give clear views of cardiac structures (or devices during therapeutic catheterisation)

Identifies abnormalities, distinguishing between normal variants and pathological findings

Interprets echo measurements appropriately, demonstrating knowledge of limitations

Uses colour flow, pulsed wave and continuous wave Doppler when relevant

Interprets Doppler findings correctly (eg appropriate use of Bernoulli equation and formulae for calculations such as valve area)

Records clear, relevant images with appropriate brevity

Cleans transducers appropriately after completion of the scan

Counsels the patient or parents appropriately on the findings of the scan if relevant

Documents the echo report fully, writing a concise and appropriate report

DOPS: Fetal scan: specific skills to be scored

Puts patient at ease, explains the procedure and behaves in a considerate manner throughout the scan

Obtains all relevant demographic data, details of referring doctor, gestation, and previous relevant history

Uses appropriate gain, depth and magnification settings throughout the scan

Identifies fetal lie, position of fetal heart and viscerotrial situs

Uses appropriate scan planes to examine fetal heart

Obtains 4 chamber view and correctly identifies all cardiac structures and connections seen in this view

Obtains and correctly interprets views of the arterial connections and their relationships

Identifies the fetal heart rate and rhythm

Recognises and interprets abnormalities appropriately

Reassures mother promptly when scan appears normal but clearly explains the limitations of the scan

When a scan is abnormal explains clearly that the heart is abnormal, explaining the abnormality in understandable language

Gives appropriate advice on what treatment might be offered, including short and long term prognosis

Gives non directional counselling relating to options for the future of the pregnancy

Provides written information for parents whether the scan is normal or abnormal

Makes appropriate arrangements for parental support and follow up when a scan is abnormal

Generates a report/letter and ensures prompt appropriate communication with relevant health staff

DOPS: cardiac catheterisation: specific skills to be scored

Understands indication for catheter and information required from it.

Takes consent from patient or parents having ensured risks and benefits have been clearly explained in easily understandable language, ensures written information leaflets (as appropriate) have been given in advance and understood. Answers questions in a clear and unambiguous manner.

Achieves vascular access efficiently and attends to haemostasis.

Attends to sterility and radiation protection.

Is capable of multitasking, taking note of rhythm, oxygen saturation and general haemodynamics, also concentrating on diagnostic or therapeutic procedure whilst retaining composure.

Shows knowledge of different catheter design, size and purpose.

Shows knowledge of contrast dose and relevant angiographic projections as well as risks of pressure versus hand injection of contrast in different settings.

Shows knowledge of appropriate haemodynamic calculations.

Deals appropriately with any complications that occur during or immediately after the procedure.

Communicates effectively with and shows appropriate respect to co-workers in the cath lab.

Counsels the patient or parents appropriately after the procedure.

DOPS: placing a temporary pacing wire: specific skills to be scored

Understands indication for the procedure and when it should be done as a matter of urgency.

Takes consent from patient or parents having ensured risks and benefits have been clearly explained in easily understandable language.

Attends to sterility and radiation protection as appropriate.

Is capable of multitasking, taking note of rhythm, oxygen saturation and general haemodynamics, also concentrating on the procedure whilst retaining composure.

Understands measurement of pacing threshold and appropriate settings of temporary pacemaker.

Deals appropriately with any complications that occur during or immediately after the procedure.

Communicates effectively with and shows appropriate respect to co-workers in the cath lab.

Counsels the patient or parents appropriately after the procedure.

DOPS: pericardiocentesis: specific skills to be scored

Understands indication for the procedure and when it should be done as a matter of urgency, to include echocardiographic assessment of pericardial effusion and tamponade.

Understands the benefits and potential drawbacks of general and local anaesthesia for the procedure.

Takes consent from patient or parents having ensured risks and benefits have been clearly explained in easily understandable language.

Attends to sterility and radiation protection as appropriate.

Understands the value and practical application of ultrasound to guide the procedure and to recognise complications.

Is capable of multitasking, taking note of rhythm, oxygen saturation and general haemodynamics, also concentrating on the procedure whilst retaining composure.

Deals appropriately with any complications that occur during or immediately after the procedure.

Communicates effectively with and shows appropriate respect to co-workers in the cath lab.

Counsels the patient or parents appropriately after the procedure.

PART 2 - GENERIC LEARNING OBJECTIVES

1. Good Clinical Care

A) HISTORY, EXAMINATION, INVESTIGATIONS, TREATMENT, NOTEKEEPING AND CORRESPONDENCE

Objective: To be able to carry out specialist assessment of patients by means of history taking, physical examination and use of relevant investigations. To implement appropriate treatment, keep accurate records and communicate findings effectively.

Subject	Knowledge	Skills	Attitudes
(i) History Learning methods a b d g h Assessment methods 1 2 4	Define the patterns of symptoms found in patients presenting with disease	Be able to take and analyse a clinical history in a relevant succinct and logical manner Be able to overcome difficulties of language, physical and mental impairment Use interpreters and advocates appropriately	Show empathy with patients Appreciate the importance of psychological factors of patients and relatives Appreciate the interaction of social factors and the patient's illness
(ii) Examination Learning methods a b d g h Assessment methods 1 2 4	Define the pathophysiological basis of physical signs Define the clinical signs found in diseases	Be able to perform a reliable and appropriate examination	Respect patients' dignity and confidentiality Acknowledge cultural issues Involve relatives appropriately Appreciate the need for a chaperone
(iii) Investigations including imaging Learning methods a b c d e h Assessment methods 1 2 3 4	Define the pathophysiological basis of investigations Define the indications for investigations Define the risks and benefits of investigations Know the cost effectiveness of individual investigations	Be able to interpret the results of investigations Be able to perform investigations competently where relevant Be able to discuss investigations with colleagues and to order them appropriately	Understand the importance of working with other health care professionals and team working Show a willingness to provide explanations to the patient as to the rationale for investigations, and possible unwanted effects
(iv) Treatment (Therapeutics)	Know the scientific theory relating to the pharmacology and the pathophysiology of pain	Be able to accurately assess the patients needs Be able to initiate the appropriate	Show appropriate attitudes towards patients and their symptoms and be conscious of religious or other philosophical contexts, particularly in

<p>Learning methods a b c d h j Assessment methods 1 2 3 4</p>		<p>prescription of analgesia, blood products and medication</p> <p>Be able to manage transfusion reactions and side-effects</p>	<p>the arena of blood products</p> <p>Clearly and openly explain treatments and the side effects of drugs</p>
<p>(v) Notekeeping and correspondence</p> <p>Learning methods a b c d e g h Assessment methods 1 2 3 4 7</p>	<p>Define the structure, function and legal implications of medical records and medico-legal reports</p> <p>Know the legal and professional obligations pertaining to confidentiality in record keeping and correspondence</p>	<p>Date and sign all records</p> <p>Record concisely, accurately, confidentially and legibly the appropriate elements of the history, examination, results of investigations, differential diagnosis and management plan</p> <p>Document discussions with patients or relatives in the notes</p> <p>Be able to write discharge summaries, outpatient letters and medico- legal reports</p>	<p>Appreciate the importance of timely dictation, cost effective use of medical secretaries and the growing use of electronic communication</p> <p>Be aware of the need for prompt and accurate communication with primary care and other agencies</p> <p>Show courtesy towards medical secretaries and clerical staff</p>

B) MANAGING CHRONIC DISEASE

Objective: To be able to carry out specialist assessment and treatment of patients with chronic disease and to demonstrate effective management of chronic disease states

Subject	Knowledge	Skills	Attitudes
Management of chronic disease Learning methods a b c d e h j Assessment methods 1 2 3 4	Define the clinical presentation and natural history of patients with chronic disease Define the role of rehabilitation services, pain control and palliative care Define the concept of quality of life and how it can be measured	Maintain hope whilst setting long term realistic goals Develop long term management plans Act as patient advocate in negotiations with support services Have skills in palliative care including care of the dying	Treat each patient as an individual Develop and sustain supportive relationships with patients with chronic disease Appreciate the impact of chronic disease on patients and their relatives Appreciate the importance of co-operation with primary care

C) TIME MANAGEMENT AND DECISION MAKING

Objective: To be able to manage time efficiently and deal with clinical problems effectively

Subject	Knowledge	Skills	Attitudes
(i) Time management Learning methods a b c d e h j k Assessment methods 1 2 3 4 6 7	Know which patients and tasks take priority	Start with the most important tasks Work more efficiently as clinical skills develop Anticipate workload and plan appropriately Recognise when you are falling behind and re-prioritise or call for help	Recognise the importance of punctuality Have realistic expectations of tasks to be completed by self and others Be willing to consult and work as part of a team
(ii) Decision making Learning methods a b c e h Assessment methods 1 2 3 4	Understand clinical priorities for investigation and management	Analyse and manage clinical problems	Be flexible and willing to change in the light of changing conditions Be willing to ask for help

2. Communication Skills

Objective: To demonstrate effective communication with patients, relatives and colleagues

Subject	Knowledge	Skills	Attitudes
(i) Within a consultation Learning methods a b d e h Assessment methods 1 2 3 4	Know how to structure the interview to identify the patient's: concerns and priorities problem list expectations understanding acceptance	Listen Use open questions followed by appropriate closed questions Avoid jargon and use familiar language Be able to communicate with patients whose first language may not be English in a manner that they understand and use interpreters when appropriate Give clear information and feedback to patients and share information with relatives when appropriate Reassure 'worried well' patients	Demonstrate an understanding of the need for: involving patients in decisions offering choices respecting patients views Understand that dress and appearance should be appropriate to the clinical situation and patient sensibility
(ii) Breaking bad news Learning methods a b d e h Assessment methods 1 2 3 4	Know how to structure the interview and where it should take place Be aware of the normal bereavement process and behaviour Know the legal and practical matters that need to be addressed following death Have awareness of organ donation procedures and role of local transplant coordinators	Be able to break bad news in steps appropriate to the understanding of the individual and support distress Avoid jargon and use familiar language Encourage questions Address questions of post-mortem and organ donation sensitively Maintain appropriate hope whilst avoiding inappropriate optimism	Act with empathy, honesty and sensitivity Cooperate with other members of staff involved in bereavement counselling Appreciate the importance of informing primary care quickly of bad news and bereavement to ensure coordinated support
(iii) Complaints	Be aware of the local complaints procedures	Demonstrate understanding and skill in managing dissatisfied	Act promptly and with honesty and sensitivity

<p>Learning methods a c d h g k Assessment methods 1 2 3</p>	<p>Be aware of systems of independent review</p> <p>Know the role of the hospital risk management team and the claims department</p>	<p>patients and relatives</p> <p>Anticipate potential problems</p> <p>Deal with minor complaints with appropriate explanation and by taking practical measures to rectify problems</p> <p>Make enquiries about earlier contact dissatisfied patients or relatives may have had with other members of staff and pending legal action before dealing with serious complaints</p>	<p>Be prepared to accept responsibility</p> <p>Appreciate the need for timely explanation of the problem and ensure that the patient or relatives understand the events that lead to the complaint</p> <p>Avoid allocation of blame</p>
<p>(iv) Communication with colleagues</p> <p>Learning methods a b c d e f g h j Assessment methods 1 2 3</p>	<p>Know how to write a problem orientated letter and discharge summary</p> <p>Know when to telephone a GP</p>	<p>Select an appropriate method of communication (telephone, email, letter)</p> <p>Use appropriate language</p> <p>Communicate with all members of staff, including non-medical staff, to achieve effective coordination and delivery of patient care</p>	<p>Be prompt and respond courteously and fairly</p>

3. Maintaining Good Medical Practice

Objective: To instil the habit of life long learning

Subject	Knowledge	Skills	Attitudes
Life long learning Learning methods a b c d f g h i Assessment methods 1 2 3	Define continuing professional development	Institute routines for personal life-long learning Recognise and use learning opportunities Use the potential of study leave to keep up to date	Be self motivated and willing to learn Show willingness to learn from colleagues Be willing to accept criticism

4. Maintaining Trust

A) PROFESSIONAL BEHAVIOUR

Objective: To ensure that the trainee is able to act in a professional manner at all times

Subject	Knowledge	Skills	Attitudes
(i) Continuity of care Learning methods b c d e g h Assessment methods 1 2 3	Understand the relevance of continuity of care.	Ensure satisfactory completion of reasonable tasks at the end of the shift/day Ensure adequate handover with appropriate documentation Make adequate arrangements to cover leave Ensure arrangements are in place to continue patient care after discharge	Recognise the importance of attention to detail
(ii) Doctor-patient relationship	Understand all aspects of the professional relationship Establish the limiting boundaries	Help the patient appreciate the importance of cooperation between patient and doctor	Adopt a non-discriminatory attitude to all patients and recognise their needs as individuals

<p>Learning methods a b d e g h</p> <p>Assessment methods 1 2 3 4</p>	<p>surrounding the consultation</p>	<p>Develop a relationship that facilitates solutions to patient's problems</p> <p>Deal appropriately with behaviour falling outside the boundary of the agreed doctor patient relationship. in patients, e.g. aggression, violence, sexual harassment</p>	<p>Seek to identify the health care belief of the patient</p> <p>Acknowledge patient rights to accept or reject advice</p> <p>Secure equity of access to health care resources for minority groups</p>
<p>(iii) Recognise own limitations</p> <p>Learning methods b c d f g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know the extent of one's own limitations and know when to ask for advice</p>		<p>Be willing to consult others and to admit mistakes</p>
<p>(iv) Stress</p> <p>Learning methods a b c d k</p> <p>Assessment methods 1 2 3</p>	<p>Know the effects of stress</p> <p>Have knowledge of the support facilities for doctors</p>	<p>Develop appropriate coping mechanisms for stress and ability to seek help if appropriate.</p>	<p>Recognise the manifestations of stress in self and others</p>
<p>(v) Relevance of outside bodies</p> <p>Learning methods a c d k</p> <p>Assessment methods 1 2 3 4</p>	<p>Have an understanding of the relevance to professional life of:</p> <p>The Royal Colleges GMC Postgraduate Dean Defence unions BMA Specialist Societies</p>	<p>Recognise situations when it is appropriate to involve these bodies/individuals</p> <p>Know and adhere to the GMC code of conduct (e.g. in respect of consent, confidentiality and the doctor-patient relationship)</p>	<p>Be open to constructive criticism</p> <p>Accept professional regulation</p>

(v) Personal health Learning methods a d h Assessment methods 1 2 3 4	Know the role of occupational health services Know the doctors responsibility to take action when his/her personal health is affecting patient care Know not to treat oneself or one's family	Recognise when personal health takes priority over work pressures Take time off when necessary	Recognise personal health as an important issue
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B) ETHICS AND LEGAL ISSUES

Objective: To ensure that the trainee can cope with ethical and legal issues that arise in clinical practice

Subject	Knowledge	Skills	Attitudes
(i) Informed consent Learning methods a b d e h i Assessment methods 1 2 3 4 5	Know the process for gaining informed consent Understand appropriateness of consent to post-mortem Know how to gain consent for a research project	Give information in a manner patients understand and use appropriate written material Be able to gain informed consent from patients	Consider the patient's needs as an individual
(ii) Confidentiality Learning methods a b c d g h k Assessment methods 1 2 3 4 7	Be aware of strategies to ensure confidentiality Be aware of situations when confidentiality might be broken	Use and share all information appropriately Avoid discussing one patient in front of another Seek patients permission where appropriate before disclosing information	Respect the right to confidentiality
(iii) Legal issues relating to: Death certification Advance directives and living wills	Know the legal responsibilities involved in completing death certificates Know the legal status of advance directives and living wills	Be able to complete death certificates Check whether the patient has an advance directive or living will	Show attention to detail and recognise time pressures Respect advance directives and living wills

<p>The role of the coroner or procurator fiscal</p> <p>Mental illness</p> <p>DVLA</p> <p>Criminal proceedings</p> <p>Civil litigation</p> <p>Learning methods a b d e k</p> <p>Assessment methods 1 2 3 4 7</p>	<p>Know the types of deaths that should be referred to the coroner or procurator fiscal</p> <p>Know the indications for section under the Mental Health Act</p> <p>Know the conditions that require patients to report to the DVLA</p> <p>Know a doctors responsibilities in serious criminal matters</p> <p>Be aware of hospital risk management strategies and how they are implemented</p> <p>Be aware of the fundamental steps in defending a claim</p>	<p>Liaise with the coroner or procurator fiscal</p> <p>Be able to obtain suitable evidence in criminal matters or know whom to consult if in doubt</p>	<p>Recognise the importance of the hospital risk management team and legal team in helping to manage legal issues, particularly those that may potentially result in litigation</p>
<p>(iv) Legal issues relevant to children</p> <p>Learning methods a b c d e f h</p> <p>Assessment methods 1 2 3 4 7</p>	<p>Know the signs of physical, emotional and sexual abuse and how to initiate further investigation of child protection issues</p> <p>Know the indications for making a child a ward of court</p> <p>Know the legal issues relevant to particular religious groups (e.g. Jehovah's witness patients)</p>	<p>Identify child protection issues and refer appropriately for experienced paediatric assessment</p> <p>Determine who holds parental responsibility and obtain consent from the correct party when a child is adopted, fostered, under the care of social services or is cared for by family other than the parents</p>	<p>Be active in promoting the best interests of the child, but balance this with respect for the wishes of the parents and family</p> <p>Promote cooperative decision making with a patient's family but recognise when the best interests of the child require legal action</p>

C) PATIENT EDUCATION AND DISEASE PREVENTION

Objective: To ensure that the trainee is able to educate patients effectively

Subject	Knowledge	Skills	Attitudes
(i) Educating patients about: Disease investigations therapy Learning methods a b d g h Assessment methods 1 2 3 4 7	Have a thorough knowledge of investigations and procedures including possible alternatives and choices Be aware of strategies to improve adherence to therapies	Give information to patients in a clear manner that they can understand Provide written information if possible Encourage questions Negotiate individual treatment plans including action to be taken if a patient deteriorates or improves	Consider involving patients in developing mutually acceptable investigation plans Encourage patients to access further information and patient support groups
(ii) Environmental and lifestyle risk factors Learning methods a b c d e h Assessment methods 1 2 3 4	Understand risk factors for disease including: diet exercise social deprivation occupation substance abuse behaviour	Advise on lifestyle changes Involve other health care workers as appropriate	Suppress any display of personal judgment
(iii) Smoking Learning methods a b c d f Assessment methods 1 2 3 4	Know: The effects of smoking on health The implications of addiction Smoking cessation strategies	Be able to advise on smoking cessation and supportive measures Identify 'ready to quit' smokers	Consider the importance of support during smoking cessation.
(iv) Alcohol Learning methods a b c d Assessment methods 1 2 3 4	Understand the effects of alcohol on health and psychosocial well-being Know of local support groups and agencies	Advise on drinking cessation.	Suggest patient support groups as appropriate Suppress any display of personal judgement

<p>(v) Illicit Drugs</p> <p>Learning methods a b c d e h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know the effects of common illicitly taken drugs</p> <p>Know Legislation in respect of drug abuse</p> <p>Know what to do if a patient takes an overdose of drugs</p> <p>Know the role of support services</p>	<p>Be able to use detoxification services</p> <p>Understand prevention policies and liaise with psychiatric services</p> <p>Deal with other prevention and liaison services</p>	<p>Provide sympathetic help</p> <p>Suppress any display of personal judgement</p>
<p>(vi) Epidemiology and screening</p> <p>Learning methods a b c d e f h i</p> <p>Assessment methods 1 2 3 4 5</p>	<p>Know the methods of data collection and their limitations</p> <p>Know diseases that are notifiable</p> <p>Know principles of 1^o and 2^o prevention and screening</p>	<p>Assess an individual patient's risk factors</p> <p>Encourage participation in appropriate disease prevention or screening programmes</p>	<p>Consider the positive and negative aspects of prevention</p> <p>Respect patient choice</p> <p>Recognise the importance of patient confidentiality</p>

5. Working With Colleagues

Objective: To demonstrate good working relationships with colleagues

Subject	Knowledge	Skills	Attitudes
Interactions between: Members of the medical team Medical and surgical specialties Hospital and GP Hospital and other agencies (e.g. social services) Learning methods a b c f h k Assessment methods 1 2 3 4	Understand the roles and responsibilities of: Other members of the team Referring physicians Primary care doctors Non-medical professionals Know the role of surgery and its limitations Know the roles of other clinical specialties and their limitations	Show leadership, delegate appropriately and supervise safely Be able to communicate effectively Handover safely Seek advice if unsure Recognise when input from another specialty is required for individual patients Be able to work effectively with GPs, other medical and surgical specialists and other health care professionals	Respect colleagues, including non-medical professionals Show respect for others opinions and recognise good advice Work co-operatively Recognise own limitations

6. Teamwork And Leadership Skills

Objective: To ensure that the trainee can work effectively within a clinical team and has the ability to lead the team

Subject	Knowledge	Skills	Attitudes
Effective team work Leadership skills Learning methods a b c d g h I j k Assessment methods 1 2 3 4 6 7	Know the principles of effective teamwork and leadership Know the roles and responsibilities of each team member	Be conscientious and work constructively Perceive the need for action and initiate that action Set an example Ensure colleagues understand the individual roles and responsibilities of each team member Develop skills in: Setting objectives - Lateral thinking Planning - Organising - Motivating - Negotiation	Recognise your own limitations Respect the skills and contribution of colleagues Demonstrate enthusiasm, integrity, courage of convictions, imagination, determination, energy and develop professional credibility

7. Teaching And Educational Supervision

Objective: To ensure the trainee can provide effective teaching, assessment and appraisal

Subject	Knowledge	Skills	Attitudes
<p>(i) Teaching</p> <p>Learning methods a b c d e f h i j</p> <p>Assessment methods 1 2 3 4 5 7</p>	<p>Know:</p> <p>Adult learning principles</p> <p>Varied teaching strategies</p> <p>Varied learning styles</p> <p>How to identify learner needs</p> <p>How to structure a teaching activity</p> <p>Principles of evaluation</p>	<p>Facilitate learning process</p> <p>Identify learning outcomes</p> <p>Construct educational objectives</p> <p>Design and deliver an effective teaching event</p> <p>Communicate effectively with the learners</p> <p>Use effective questioning techniques</p> <p>Teach large and small groups effectively</p> <p>Select and use appropriate teaching resources</p> <p>Give constructive effective feedback</p> <p>Evaluate programmes and events</p> <p>Use different media for teaching that are appropriate to the teaching setting</p>	<p>Demonstrate a willingness and enthusiasm to teach</p> <p>Show respect for the learner</p> <p>Demonstrate a professional attitude towards teaching</p> <p>Show commitment to teach</p> <p>Demonstrate a learner centred approach to teaching</p>
<p>(ii) Assessment</p> <p>Learning methods a b d h j</p>	<p>Know the principles of assessment</p> <p>Know different assessment methods</p>	<p>Use appropriate assessment methods</p> <p>Give constructive, effective feedback</p>	<p>Be honest and objective when assessing performance</p>

Assessment methods 1 2 3 4	Define formative and summative assessment		
(iii) Appraisal Learning methods a b d h Assessment methods 1 2 3 4 7	Know the principles of appraisal Know the structure of the appraisal interview	Conduct effective appraisals	Show respect for the person being appraised

8. Research

Objective: To demonstrate a thorough knowledge of research methodology and an ability to analyse published research. To ensure the trainee can successfully conduct a research project from planning to publication.

Subject	Knowledge	Skills	Attitudes
Analysing published research Carrying out a research project Learning methods a b c d e f h i Assessment methods 1 2 3 4 5	Know: The principles of research ethics When and how to obtain consent How to design a research study How to seek funding How to use appropriate statistical methods How to write a scientific paper	Be able to undertake systematic critical review of scientific literature Have good written and verbal presentation skills Be able to: Frame questions to be answered by a research project Develop protocols and methods for research Use databases Accurately analyse data Write a scientific paper	Demonstrate curiosity and a critical spirit of enquiry Ensure patient confidentiality Appreciate the importance of ethical approval and patient consent for clinical research Humility

9. Clinical Governance

Objective: To demonstrate an understanding of the context, meaning and implementation of clinical governance

Subject	Knowledge	Skills	Attitudes
(i) Clinical Governance Learning methods a b c d e h k Assessment methods 1 2 3 4 5 7	Define clinical governance Understand the role and importance of the following in clinical governance: Research and Development Clinical effectiveness Complaints Procedures Risk management Evidence based practice Medical and clinical audit Guidelines and integrated care pathways Understand the benefits a patient might reasonably expect from clinical governance Know the organisational framework for clinical governance at local, health authority and national levels	Actively partake in clinical governance Be active in research and development Aim for clinical effectiveness (best practice) at all times Be able to handle and deal with complaints in a focused and constructive manner Report and investigate critical incidents Take appropriate action if you suspect you or a colleague may not be fit to practice Educate self, colleagues and other health care professionals	Make the care of your patient your first concern Respect patients privacy, dignity and confidentiality Help to create an environment where mistakes and mismanagement of patients can be openly discussed and learned from Be prepared to learn from mistakes, errors and complaints Recognise the importance of team work Share best practice with others Show a capacity to be critical of your own performance
(ii) Risk management Learning methods a b c d e h k Assessment methods 1 2 3 4 5 7	Know the principles of risk management Know the role of the hospital risk management team Be aware of the hospitals strategy and policy on ensuring safety in clinical care	Report any unexplained occurrence involving death or serious injury (physical or psychological) Report "near miss" events that involved a risk of death or serious injury When there are adverse events or complaints, liaise with the hospitals risk management team	Be alert to the conduct of individuals and factors in the organisation of patient care that may give rise to compromise in the quality of care Learn from adverse events Be truthful and to admit error to patients, relatives and colleagues Recognise the importance of adequate notekeeping and communication

		<p>In cases of error ensure that there is adequate contemporaneous documentation</p> <p>Warn patients of the complications and side effects of treatments and procedures so that they are prepared for adverse outcomes</p>	<p>Respect the patients right to participate in decisions on their medical care</p>
<p>(iii) Evidence based medicine</p> <p>Learning methods a b c d e f h i</p> <p>Assessment methods 1 2 3 4</p>	<p>Understand the principles of evidence based medicine</p> <p>Know the type of evidence that may be used</p> <p>Know the types of clinical trial design</p>	<p>Be able to critically appraise evidence</p> <p>Be competent in the use of databases, libraries and the internet</p> <p>Be able to discuss the relevance of evidence with individual patients</p> <p>Use evidence based medicine in clinical practice</p>	<p>Be keen to apply evidence based medicine to patient care</p>
<p>(iv) Audit</p> <p>Learning methods a b c d e f h I k</p> <p>Assessment methods 1 2 3 4 5</p>	<p>Know the relevance of audit to clinical governance and how it may benefit patient care</p> <p>Understand the audit cycle</p> <p>Know how to access data sources and how to ensure data confidentiality</p>	<p>Be able to undertake an audit project and complete the audit cycle</p>	<p>Be an enthusiastic participant in on-going audit</p>
<p>(v) Guidelines and integrated care pathways</p> <p>Learning methods a b c d e f h i</p> <p>Assessment methods 1 2 3 4 5</p>	<p>Know the advantages and disadvantages of guidelines</p> <p>Know methods of determining best practice</p>	<p>Show ability to utilise guidelines</p> <p>Be involved in generating, evaluating, reviewing and updating guidelines and integrated care pathways</p>	<p>Show a willingness to use guidelines when appropriate</p> <p>Show regard for individual patient needs when using guidelines</p>

10. Structure Of The NHS And Principles Of Management

Objective: To demonstrate knowledge of the principles of management and the structure and organisation of the NHS

Subject	Knowledge	Skills	Attitudes
<p>The structure of the NHS</p> <p>Principles of management</p> <p>Learning methods a c d e h k</p> <p>Assessment methods 1 2 3 4 5</p>	<p>Know the structure of the NHS, primary care groups, Trusts and Hospital Trusts</p> <p>Know the local Trusts structure including Chief Executives, Medical Directors, Clinical Directors and others</p> <p>Know the role of postgraduate deaneries, specialist societies, the Royal Colleges and the General Medical Council</p> <p>Understand finance issues in general in the Health Service, especially budgetary management</p> <p>Know the appointments procedures and the importance of equal opportunities</p> <p>Know of Central Government health regulatory agencies (e.g. NICE, CHL, NCAA)</p>	<p>Develop skills in managing change and managing people</p> <p>Develop techniques for interviewing performance reviews</p> <p>Be able to build a business plan</p>	<p>Show an awareness of equity in health care access and delivery</p> <p>Demonstrate an understanding of the importance of a health service for the population</p> <p>Show respect for others, ensuring equal opportunities</p>

11. Information Use And Management

Objective: To demonstrate competence in managing and using health information and information technology

Subject	Knowledge	Skills	Attitudes
Health information The use of information technology for patient care and personal development Learning methods a b c d e f h I k Assessment methods 1 2 3 4 5	Know how to retrieve and utilize data recorded in clinical systems Demonstrate an understanding of the range of possible uses for clinical data and information Appreciate the dangers and benefits of aggregating clinical data Know the main responsibilities and liabilities in the UK and Europe pertaining to confidentiality Know main local and national projects and initiatives in information technology and their applications Define the stages of evaluation that new technology needs to go through	Demonstrate competent use of database, word processing and statistics programmes Be able to undertake searches and access web sites and health related databases Be able to critically appraise available software Implement the principles of confidentiality in clinical practice in the context of information technology	Show willingness to make maximum use of information technology in patient consultations Demonstrate appropriate techniques for sharing information on computer with the patient in a constructive manner Adopt a pro-active and enquiring attitude to new technology

12. Cross-Specialty Skills

a) Admissions And Discharges

Objective: To be able to safely manage acute general medical problems

Subject	Knowledge	Skills	Attitudes
Managing acute general medical problems when on call Learning methods a b c h Assessment methods 1 2 3 4 5	Know: The medical indications for urgent investigation and therapy The skills and capabilities of members of the 'on-take' team When to seek help or refer to other specialties Support available in the community	Receive referrals appropriately Be able to prioritise Delegate effectively and safely Interact effectively with other health care professionals Keep patients and relatives informed Keep an accurate patient list Handover safely with appropriate documentation	Handle acutely ill patients sympathetically Cope with stress Be aware of the pressures on other members of staff

b) Discharge Planning

Objective: To be able to plan difficult discharges for patients

Subject	Knowledge	Skills	Attitudes
Discharge planning Learning methods a b g h Assessment methods 1 2 3 4	Know the impact of physical problems on activities of daily living Know the roles and skills of members of the multidisciplinary team including nurses, occupational therapists, physiotherapists, speech therapists, psychologists, discharge coordinators and social workers Understand the impact of unnecessary hospitalisation Know what type of support is available in primary care	Recognise when in-patient care is not required Contribute effectively to discharge planning meetings Liaise and communicate with patient, family and primary care Be able to write reports for appropriate bodies	Display empathy Show an awareness of family dynamics and socio-economic factors influencing success of discharge

c) Resuscitation

Objective: To be able to recognise critically ill patients, provide advanced life support and confidently lead a resuscitation team. To be able to use local protocols in deciding when not to resuscitate patients.

Subject	Knowledge	Skills	Attitudes
<p>(i) Recognise when a patient is critically ill</p> <p>Learning methods a b d h Assessment methods 1 2 3 4 5 6</p>	<p>Know how life threatening emergencies present and how to treat them</p>	<p>Be able to: Rapidly perform an initial assessment Manage life threatening emergencies Recognise when to call for help from seniors or other specialties e.g. ICU</p>	<p>Keep calm</p> <p>Recognise priorities</p> <p>Respect the dignity of patients</p> <p>Keep relatives informed</p>
<p>(ii) Advanced life support</p> <p>Learning methods a b d e h Assessment methods 1 2 3 4 5 6</p>	<p>Know advanced life support algorithms</p> <p>Know the role and side effects of commonly used anti-arrhythmic and cardiac support drugs</p>	<p>Be able to: Establish vascular access in an emergency Recognise cardiac arrhythmias Perform emergency cardioversion/ defibrillation Carry out emergency endo-tracheal intubation</p>	<p>Display a calm and confident demeanour</p> <p>Appreciate the ethical and legal aspects of resuscitation</p>
<p>(iii) Lead a cardiac arrest team</p> <p>Learning methods a b d h Assessment methods 1 2 3 4 5</p>	<p>Understand the role and responsibilities of the team leader</p>	<p>Demonstrate safe and effective communication and delegation</p>	<p>Be calm and realistic</p>
<p>(iv) Do not resuscitate (DNR) orders</p> <p>Learning methods a b d h Assessment methods 1 2 3 4 5 7</p>	<p>Know local and national protocols for DNR orders</p> <p>Know the legal and ethical implications of DNR orders</p>	<p>Be able to explain the consequences of DNR orders with compassion and without giving undue hope</p>	<p>Act with empathy and sensitivity</p> <p>Support patients and their families</p>

d) Nutrition

Objective: To demonstrate effective management of nutrition

Subject	Knowledge	Skills	Attitudes
<p>(i) Nutritional status</p> <p>Learning methods a b d h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know the impact of disease on nutritional status</p> <p>Know the effect of malnutrition on clinical outcomes</p>	<p>Be able to assess nutritional status</p>	<p>Recognise cultural and religious issues</p>
<p>(ii) Nutrition support</p> <p>Learning methods a b d h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know the principles and routes of nutrition support</p> <p>Understand the role of nutrition support team (NST) and know when to ask for their assistance</p> <p>Know the indications and arrangements necessary for PEG tubes</p>	<p>Be able to insert naso-gastric tubes</p> <p>Be able to obtain central venous access</p> <p>Identify those needing nutrition support or advice and provide appropriate advice</p>	<p>Recognise the skills of others involved in nutrition support e.g. specialist nurses, pharmacists, dieticians</p>

PART 3 - CLINICAL LEARNING OBJECTIVES

1. Cardiovascular collapse in infancy

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of infants who present with cardiovascular collapse and plan surgery or other intervention when necessary</p> <p>Learning methods a b c g h Assessment methods 1 2 4</p>	<p>Know:</p> <p>How to distinguish cardiac and non-cardiac causes of cardiovascular collapse</p> <p>The cardiac causes of cardiovascular collapse and likely diagnoses on the basis of the timing of presentation</p> <p>The natural history, anatomy, physiology and clinical features of cardiac disorders that cause collapse in infancy</p> <p>The physiology of duct dependent systemic circulation</p> <p>The ECG, CXR and echocardiographic findings in congenital heart disease that presents with collapse in infancy</p> <p>The indications, limitations and risks of invasive and non-invasive investigation in infants that present with collapse</p>	<p>Be able to:</p> <p>Identify cardiovascular collapse and carry out or direct resuscitation, medical treatment and intensive care</p> <p>Take a relevant history and perform an appropriate examination</p> <p>Interpret ECG, CXR and blood results and appreciate their importance and limitations in reaching a diagnosis</p> <p>Use echocardiography to accurately diagnose abnormalities in cardiac structure or function</p> <p>Identify where information is incomplete and plan further investigation either by non-invasive imaging or cardiac catheterisation</p> <p>Make an accurate anatomical and physiological diagnosis on the basis of the clinical information and investigations</p>	<p>Recognise the role and importance of other members of the cardiac team: paediatric cardiac nurses, paediatric intensive care nurses, intensivists and paediatric cardiac surgeons</p> <p>Appreciate the concerns and anxiety of parents and other family members</p> <p>Recognise and respond appropriately to the urgency of the clinical situation</p>

	<p>Know the angiographic and haemodynamic findings at cardiac catheterisation in congenital heart disease that presents with collapse</p> <p>Know the indications and risks of catheter intervention and surgery in congenital heart disease that presents with collapse</p> <p>Know the impact of cardiovascular collapse on other organs</p>	<p>Initiate prostaglandin E where appropriate and know how to monitor its effect and when to alter the dose administered</p> <p>Plan and coordinate surgery or catheter intervention where necessary</p> <p>Identify compromise to other organs secondary to collapse and refer to other specialties where necessary</p> <p>Provide advice to referring paediatricians in respect of emergency management before transfer to the cardiac centre</p> <p>Counsel parents about the underlying cause of the collapse and give a realistic prognosis</p> <p>Outline a treatment plan in terms understood by the parents</p> <p>Plan and participate in outpatient follow-up</p>	
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2. Cardiac failure in infants and children

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of cardiac failure in infants and children and plan surgical intervention when necessary</p> <p>Learning methods a b c g h Assessment methods 1 2 4</p>	<p>Understand the physiology of cardiac failure caused by: pressure overload volume overload restriction to inflow reduced contractility</p> <p>Understand the physiology of pulmonary oedema</p> <p>Know:</p> <p>The clinical features of cardiac failure at different ages, from newborn to adult life</p> <p>And how to distinguish cardiac failure from other causes of increased respiratory effort</p> <p>The causes of cardiac failure and identify likely diagnoses on the basis of the timing of presentation</p> <p>The natural history, anatomy, physiology and clinical features of disorders that cause cardiac failure</p> <p>The ECG, CXR and echocardiographic findings in cardiac disorders that present with cardiac failure</p> <p>The indications, limitations and risks of invasive and non-invasive investigation in children that present</p>	<p>Be able to:</p> <p>Identify cardiac failure in patients of all ages</p> <p>Take a relevant history and perform an appropriate examination</p> <p>Interpret ECG, CXR and blood results and appreciate the importance and limitations of these investigations in diagnosing cardiac failure and elucidating its underlying cause</p> <p>Use echocardiography to diagnose abnormalities in cardiac structure or function</p> <p>Identify where information is incomplete and plan further investigation either by non-invasive imaging or cardiac catheterisation</p> <p>Make an accurate anatomical and physiological diagnosis of the cause of cardiac failure on the basis of the clinical information and investigations</p> <p>Institute appropriate drug therapy for cardiac failure and monitor its success and complications</p> <p>Optimise nutrition and manage failure to thrive caused by cardiac failure</p>	<p>Appreciate the concerns and anxiety of parents and other family members</p> <p>Consider the interaction of symptoms with the child's lifestyle</p> <p>Appreciate the role of cardiac nurses and cardiac community nurses in managing chronic cardiac failure</p>

	<p>with cardiac failure</p> <p>The angiographic and haemodynamic findings at cardiac catheterisation in congenital heart disease that presents with cardiac failure</p> <p>The indications, contraindications, action and side-effects of drug treatment for cardiac failure</p> <p>The indications and risks of catheter intervention and surgery in congenital heart disease that presents with cardiac failure</p>	<p>Plan and coordinate surgery or catheter intervention where necessary</p> <p>Counsel parents about the underlying cause of the cardiac failure, give appropriate advice to parents where cardiac failure is anticipated and give a realistic prognosis</p> <p>Outline a treatment plan in terms understood by the parents</p> <p>Provide advice to referring paediatricians managing children with cardiac failure</p> <p>Offer advice and support in respect of schooling and sporting activity</p> <p>Plan and participate in outpatient follow-up</p>	
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3. Cyanosis in the newborn period

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of cyanotic newborn infants and plan surgery or other intervention when necessary</p> <p>Learning methods a b c g h</p> <p>Assessment methods 1 2 4</p>	<p>Understand the physiology of cyanosis caused by: right heart obstruction with right to left shunting Parallel circulation Common mixing lesions</p> <p>Understand the physiology of duct dependent pulmonary circulation</p> <p>Know:</p> <p>How to distinguish cardiac and non-cardiac causes of cyanosis in the newborn period</p> <p>The cardiac causes of cyanosis in the newborn period</p> <p>The natural history, anatomy, physiology and clinical features of congenital heart disease that causes cyanosis in the newborn period</p> <p>The ECG, CXR and echocardiographic findings in congenital heart disease that presents with cyanosis in the newborn period</p> <p>The indications, limitations and risks of invasive and non-invasive investigation in newborns with cyanotic congenital heart disease</p>	<p>Be able to:</p> <p>Take a relevant history and perform an appropriate examination</p> <p>Interpret ECG, CXR and blood results and appreciate their importance and limitations in reaching a diagnosis</p> <p>Use echocardiography to accurately diagnose abnormalities in cardiac structure or function</p> <p>Identify where information is incomplete and plan further investigation either by non-invasive imaging or cardiac catheterisation</p> <p>Make an accurate anatomical and physiological diagnosis on the basis of the clinical information and investigations</p> <p>Initiate prostaglandin E where appropriate and know how to monitor its effect and when to alter the dose administered</p> <p>Plan and coordinate surgery or catheter intervention where necessary</p>	<p>Appreciate the concerns and anxiety of parents and other family members</p> <p>Recognise and respond appropriately to the urgency of investigation and treatment</p>

	<p>The angiographic and haemodynamic findings at cardiac catheterisation in congenital heart disease that presents with cyanosis in the newborn period</p> <p>The indications and risks of catheter intervention and surgery in congenital heart disease that presents with cyanosis in the newborn period</p>	<p>Counsel parents and give a realistic prognosis</p> <p>Outline a treatment plan in terms understood by the parents</p> <p>Provide advice to referring paediatricians in respect of emergency management before transfer to the cardiac centre</p> <p>Plan and participate in outpatient follow-up</p>	
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4. Cyanosis beyond the newborn period

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of cyanotic children presenting after the newborn period and plan surgical or other intervention where necessary</p> <p>Learning methods a b c g h Assessment methods 1 2 4</p>	<p>Know:</p> <p>How to distinguish cardiac and non-cardiac causes of cyanosis beyond the newborn period</p> <p>The cardiac causes of cyanosis presenting after the newborn period</p> <p>The natural history, anatomy, physiology and clinical features of congenital heart disease that presents with cyanosis after the newborn period</p> <p>The ECG, CXR and echocardiographic findings in congenital heart disease that presents with cyanosis after the newborn period</p> <p>The indications, limitations and risks of invasive and non-invasive investigation of congenital heart disease presenting with cyanosis after the newborn period</p> <p>The angiographic and haemodynamic findings at cardiac catheterisation in congenital heart disease that presents with cyanosis after the newborn period</p> <p>Know the indications and risks of catheter intervention and surgery in</p>	<p>Be able to:</p> <p>Take a relevant history and perform an appropriate examination</p> <p>Interpret ECG, CXR and blood results and appreciate their importance and limitations in reaching a diagnosis</p> <p>Use echocardiography to accurately diagnose abnormalities in cardiac structure or function</p> <p>Identify where information is incomplete and plan further investigation either by non-invasive imaging or cardiac catheterisation</p> <p>Make an accurate anatomical and physiological diagnosis on the basis of the clinical information and investigations</p> <p>Identify when there is cyanosis coupled with cardiac failure and initiate medical treatment when necessary</p> <p>Plan and coordinate surgery or catheter intervention where necessary</p> <p>Counsel parents and give a realistic prognosis</p>	<p>Appreciate the concerns and anxiety of parents and other family members</p>

	congenital heart disease that presents with cyanosis after the newborn period	<p>Outline a treatment plan in terms understood by the parents</p> <p>Provide advice to referring paediatricians in respect of management of children with cyanosis</p> <p>Offer advice and support in respect of schooling and sporting activity</p> <p>Plan and participate in outpatient follow-up</p>	
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5. Evaluation of a child with a cardiac murmur

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children with cardiac murmurs</p> <p>Learning methods a b h</p> <p>Assessment methods 1 2 4</p>	<p>Know:</p> <p>The physical signs that may be found on examination of the cardiovascular system and how to interpret those findings</p> <p>The characteristic clinical features of all congenital cardiac defects</p> <p>The characteristic features of innocent murmurs</p>	<p>Be able to:</p> <p>Obtain a relevant history and perform cardiac examination</p> <p>Discriminate innocent from pathological murmurs on examination</p> <p>Make a logical provisional diagnosis on the basis of physical examination</p> <p>Refine the diagnosis using ECG and CXR where appropriate</p> <p>Use echocardiography to accurately define cardiac structure and function</p> <p>Complete the assessment quickly in an outpatient setting</p> <p>Be able to confidently diagnose normality and explain the meaning of an innocent murmur</p> <p>Explain any abnormality, its prognosis, its relevance to lifestyle and the need for antibiotic prophylaxis</p>	<p>Appreciate the concerns of parents of children who have been referred for evaluation of a heart murmur</p> <p>Appreciate the need for accuracy and confidence in diagnosis</p> <p>Be able to deal with uncooperative young children and privacy issues in adolescence</p>

6. Evaluation of children and adolescents with chest pain, palpitations or syncope

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children and adolescents with chest pain, palpitations, presyncope or syncope</p> <p>Learning methods a g h Assessment methods 1 2 4</p>	<p>Know:</p> <p>The cardiac and non-cardiac causes of loss of consciousness</p> <p>The clinical features that discriminate between arrhythmias, vasovagal syncope and seizures in patients with loss of consciousness</p> <p>The clinical features that suggest an arrhythmia in patients with palpitations</p> <p>The causes of chest pain in childhood</p> <p>The clinical features that characterise the various causes of chest pain</p> <p>The types of structural heart disease that present with chest pain, palpitations or syncope</p> <p>The indications for an exercise test, ambulatory ECG, cardiac event recorder and tilt-table test in the investigation of these conditions</p>	<p>Be able to:</p> <p>Take an appropriate detailed history, eliciting all information that may help discriminate between cardiac and non-cardiac causes of chest pain, palpitations and syncope</p> <p>Make a logical provisional diagnosis on the basis of history and physical examination</p> <p>Identify features on the 12-lead ECG that suggest the substrate for an arrhythmia</p> <p>Identify ECG evidence of ischaemic heart disease and ventricular hypertrophy</p> <p>Use echocardiography to accurately define cardiac structure and function</p> <p>Make an appropriate plan for further investigation and follow-up</p> <p>Complete the assessment quickly in an outpatient setting</p> <p>Interpret exercise test, ambulatory ECG, cardiac event recorder and tilt-table test results in the context of the history</p> <p>Diagnose normality</p>	<p>Appreciate the concerns of children, adolescents and their parents</p> <p>Appreciate the need for accuracy and confidence in diagnosis</p> <p>Facilitate the involvement of adolescents in decision making</p>

		<p>Institute and monitor appropriate treatment for arrhythmias and vasovagal syncope</p> <p>Explain the plan for further investigation and the reasons for this line of investigation in terms understandable to the patient and parents</p> <p>Explain the likely diagnosis and its impact on lifestyle</p> <p>Provide reassurance where there is no organic cause for symptoms</p> <p>Refer appropriately to other specialties when a non-cardiac cause is likely</p>	
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7. Acyanotic congenital heart disease

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children, adolescents and adults with acyanotic congenital heart disease and plan surgical intervention where necessary</p> <p>Learning methods a b c d e f g h i Assessment methods 1 2 3 4</p>	<p>Know the embryology, detailed anatomy, physiology, epidemiology, natural history and genetic implications of all acyanotic congenital heart defects including:</p> <p>Atrial septal defect Ventricular septal defect Atrioventricular septal defect Patent arterial duct Aortopulmonary septal defect Coronary artery fistula Pulmonary stenosis Aortic stenosis Coarctation of the aorta Interrupted aortic arch Hypoplastic left heart syndrome</p> <p>Understand the impact of left to right shunts on pulmonary vascular resistance</p> <p>Know:</p> <p>The clinical presentation and ongoing pathophysiological changes of all acyanotic congenital heart defects</p> <p>The surgical and catheter intervention treatment options for each lesion and the relative advantages and disadvantages of each approach</p> <p>The success rates and complications of surgery and catheter intervention</p>	<p>Be able to:</p> <p>Make a provisional diagnosis and discriminate between the various acyanotic defects on the basis of presentation, clinical findings, ECG and CXR</p> <p>Accurately diagnose all acyanotic defects using echocardiography and use echocardiography to define the detailed anatomy and physiological characteristics of the defect</p> <p>Perform TOE to define the anatomical and physiological details of acyanotic defects</p> <p>Identify where information is incomplete and plan further investigation either by non-invasive imaging or cardiac catheterisation</p> <p>Perform diagnostic cardiac catheterisation, obtaining all necessary anatomical and physiological information</p> <p>Make an accurate anatomical and physiological diagnosis on the basis of the clinical information and investigations</p> <p>Stabilise infants with prostaglandin E2 in duct dependent lesions</p>	<p>Appreciate the concerns and anxiety of parents and other family members</p> <p>Appreciate the importance of close communication with referring paediatricians in managing children jointly with peripheral hospitals</p>

	<p>The normal course of postoperative recovery after surgery for each type of acyanotic cardiac defect</p>	<p>Plan and coordinate appropriate medical management, catheter intervention and surgery when necessary</p> <p>Counsel parents when acyanotic congenital heart disease has been diagnosed, explaining the anatomy, giving a realistic prognosis, explaining likely symptoms and outlining a management plan</p> <p>Communicate effectively with paediatric cardiology nursing staff, physiotherapists, dieticians, intensivists, surgeons and anaesthetists in coordinating management</p> <p>Offer advice and support in respect of schooling and sporting activity</p> <p>Plan and participate in outpatient follow-up</p>	
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8. Cyanotic congenital heart disease

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children, adolescents and adults with cyanotic congenital heart disease and plan surgical intervention where necessary</p> <p>Learning methods a b c d e f g h i Assessment methods 1 2 3 4</p>	<p>Know the embryology, detailed anatomy, physiology, epidemiology, natural history and genetic implications of all cyanotic congenital heart defects including:</p> <p>Pulmonary atresia with intact ventricular septum Pulmonary atresia with ventricular septal defect Critical pulmonary stenosis Tetralogy of Fallot Absent pulmonary valve syndrome Transposition of the great arteries with intact ventricular septum Transposition of the great arteries with ventricular septal defect Double outlet right ventricle Common arterial trunk Total anomalous pulmonary venous connection Univentricular atrioventricular connection Complex congenital heart disease associated with abnormalities of cardiac position and situs</p> <p>Know the clinical presentation all cyanotic congenital heart defects and the long term complications of cyanosis</p> <p>Understand the surgical and catheter intervention treatment options for each lesion and the relative</p>	<p>Be able to:</p> <p>Make a provisional diagnosis and discriminate between the various cyanotic defects on the basis of presentation, clinical findings, ECG and CXR</p> <p>Use echocardiography to accurately diagnose cyanotic defects and to define the detailed anatomy and physiological characteristics of the defect</p> <p>Perform TOE to define the anatomical and physiological details of cyanotic defects</p> <p>Identify where information is incomplete and plan further investigation either by non-invasive imaging or cardiac catheterisation</p> <p>Perform diagnostic cardiac catheterisation, obtaining all necessary anatomical and physiological information</p> <p>Provide emergency treatment for cyanotic spells</p> <p>Stabilise infants with prostaglandin E in duct dependent lesions</p> <p>Make an accurate anatomical and physiological diagnosis on the basis</p>	<p>Appreciate the concerns and anxiety of parents and other family members</p> <p>Appreciate the importance of close communication with referring paediatricians in managing children jointly with peripheral hospitals</p> <p>Recognise the wider management issues in children with complex cyanotic defects or syndromes and cooperate with other specialties</p>

	<p>advantages and disadvantages of each approach</p> <p>Know the success rates and complications of surgery and catheter intervention</p> <p>Know the normal course of postoperative recovery after surgery for each type of cyanotic cardiac defect</p>	<p>of the clinical information and investigations</p> <p>Plan and coordinate appropriate medical management, catheter intervention and surgery when necessary</p> <p>Counsel parents when cyanotic congenital heart disease has been diagnosed, explaining the anatomy, giving a realistic prognosis, explaining likely symptoms and outlining a management plan</p> <p>Offer advice and support in respect of schooling and sporting activity</p> <p>Communicate effectively with paediatric cardiology nursing staff, physiotherapists, dieticians, intensivists, surgeons and anaesthetists in coordinating management</p> <p>Plan and participate in outpatient follow-up</p>	
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9. Pulmonary hypertension

Objectives	Knowledge	Skills	Attitudes
To diagnose pulmonary hypertension(PH)	Physical signs	Make a competent physical examination	Be aware of the limitations
	Understand basic electrocardiography	Interpret ECG to diagnose PH	..
	Understand basic echocardiography and how to do an echocardiogram	Interpret echocardiogram to diagnose PH	Have an appropriate threshold for seeking advice
	Understand principles of cardiovascular physiology	Interpret cardiac catheterisation data to diagnose PH	Be able to relate findings to physical and ECG findings and be aware of inconsistencies
To understand management of PH	Understand the significance of PH in context of CHD, and in its absence	Be capable of integrating information from various investigations	Appreciate necessity of team work in assessing need for surgical /medical intervention and social implications
	To be informed about current therapies including lung transplanation To understand how to inform parents/patients about severe incurable disease	Learning by observation	Be aware of therapeutic limitations Appreciate sensitivity of issues and need for support in the community

10. Fontan circulation

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment, treatment and surgical referral of children, adolescents and adults who require or have a cavopulmonary circulation</p> <p>Learning methods a c d f g h Assessment methods 1 2 3 4</p>	<p>Understand the physiology of the Fontan circulation</p> <p>Know:</p> <p>The anatomical and physiological requirements necessary for a child to tolerate a cavopulmonary circulation</p> <p>The various surgical procedures used to create a Fontan circulation</p> <p>The complications of a Fontan circulation</p> <p>How to manage a Fontan circulation in the postoperative period</p>	<p>Be able to:</p> <p>Recognise when a biventricular repair cannot be achieved and palliation with a cavopulmonary circulation is appropriate</p> <p>Carry out echocardiography and cardiac catheterisation to determine whether a cavopulmonary circulation is possible</p> <p>Interpret clinical information and the results of non-invasive and invasive investigations to determine whether a cavopulmonary circulation is possible and the appropriate timing of surgery</p> <p>Recognise a failing Fontan circulation</p> <p>Evaluate the cause of inappropriately low oxygen saturation after a cavopulmonary circulation</p>	<p>Recognise the additional stress on parents where their child cannot undergo corrective surgery</p> <p>Recognise the need for close support of the family where the child has to undergo multiple procedures</p> <p>Appreciate the role of the cardiac liaison nurse and the ward nursing staff in the care of children who need repeated investigation and surgery</p> <p>Appreciate the need for continuity of care</p>

11. Inflammatory cardiovascular disease

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children with rheumatic fever, rheumatic heart disease, Kawasaki disease and other inflammatory diseases affecting the cardiovascular system</p> <p>Learning methods a c d g h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The pathology and natural history of rheumatic fever, Kawasaki disease and collagen vascular disease affecting the cardiovascular system</p> <p>The cardiac and non-cardiac manifestations of these disorders</p> <p>The echocardiographic features of these disorders</p> <p>The current recommendations for investigation and treatment of acute and chronic Kawasaki disease</p> <p>The current recommended drug therapy for acute rheumatic fever and the long term sequelae of acute rheumatic fever</p>	<p>Be able to:</p> <p>Recognise the clinical features of Kawasaki disease and carry out echocardiographic examination of the coronary arteries</p> <p>Advise on acute and long-term treatment for Kawasaki disease and arrange an appropriate programme of follow up</p> <p>Be able to perform coronary angiography in children</p> <p>Advise on acute treatment for rheumatic fever and recognise the indications for surgery or intervention in rheumatic heart disease</p> <p>Be able to identify the presence and severity of rheumatic heart disease on echocardiography</p>	<p>Understand the importance of primary and secondary prevention in rheumatic fever</p> <p>Recognise the anxiety of parents whose child is affected by Kawasaki disease and offer appropriate explanations and reassurance</p> <p>Cooperate with other specialties in investigating collagen vascular diseases with cardiovascular involvement</p> <p>Appreciate the need to coordinate joint care with the general paediatric team</p>

12. Cardiomyopathy and myocarditis

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children with cardiomyopathy and myocarditis</p> <p>Learning methods a c d g h</p> <p>Assessment methods 1 2 4</p>	<p>Know:</p> <p>The causes, physiology, pathology, natural history, prognosis and clinical features of dilated, hypertrophic and restrictive cardiomyopathy</p> <p>The causes, physiology, pathology, natural history, prognosis and clinical features of myocarditis</p> <p>The genetics of hypertrophic cardiomyopathy</p> <p>The indications for medical and surgical treatment in cardiomyopathy</p> <p>The available forms of circulatory support (LVAD, ECMO)</p> <p>The role of cardiac transplantation in end-stage cardiomyopathy</p>	<p>Be able to:</p> <p>Take a relevant history and perform an appropriate examination</p> <p>Recognise features in the history that suggest myocarditis</p> <p>Carry out a full echocardiographic evaluation of a child with myocarditis or cardiomyopathy, including an assessment of the coronary arteries</p> <p>Manage cardiac failure and low cardiac output caused by myocarditis or cardiomyopathy</p> <p>Involve the genetics team where appropriate</p>	<p>Show sensitivity in counselling parents with a child severely affected by cardiomyopathy</p> <p>Involve parents in decision making in planning management for end-stage cardiomyopathy</p> <p>Provide the family with a realistic prognosis</p> <p>Consider other aspects of disorders underlying the cardiomyopathy or other organs affected in planning for treatment in end-stage cardiomyopathy</p>

13. Prevention and management of infective endocarditis

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and treatment of children with infective endocarditis and to be able to provide advice in respect of prevention of endocarditis</p> <p>Learning methods a c d g h</p> <p>Assessment methods 1 2 4</p>	<p>Know:</p> <p>The epidemiology, pathophysiology, clinical manifestations, anatomical features, course and prognosis of various types of infective endocarditis</p> <p>Which cardiac lesions have the highest risk of endocarditis</p> <p>The role of blood cultures, inflammatory markers, transthoracic and transoesophageal echocardiography in diagnosing infective endocarditis</p> <p>The current recommended antibiotic regimes for endocarditis treatment and prophylaxis in children</p>	<p>Be able to:</p> <p>Take a relevant history and perform an appropriate examination</p> <p>Identify the extracardiac manifestations of endocarditis</p> <p>Interpret blood results and recognise echocardiographic manifestations of endocarditis and appreciate their importance and limitations in reaching a diagnosis</p> <p>Integrate clinical and laboratory findings to plan appropriate management</p> <p>Plan surgical management in patients with acute valvar insufficiency secondary to endocarditis</p> <p>Provide patient education in respect of antibiotic prophylaxis</p> <p>Provide support to paediatricians investigating pyrexia of unknown origin</p>	<p>Understand the importance of close cooperation with microbiologists in diagnosing and treating endocarditis</p>

14. Cardiovascular abnormalities in neonatal intensive care

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and advise on the treatment of cardiovascular problems commonly arising in the context of neonatal intensive care</p> <p>Learning methods a g h Assessment methods 1 2 4</p>	<p>Understand the physiology of transitional circulation</p> <p>Know:</p> <p>The pathophysiology, clinical manifestations, echocardiographic features and treatment of persistent pulmonary hypertension of the newborn</p> <p>The pathophysiology, clinical manifestations and echocardiographic features of patent arterial duct in the preterm child</p> <p>The indications and contraindications for medical and surgical treatment of patent arterial duct in the preterm child</p>	<p>Be able to:</p> <p>Differentiate PPHN from congenital heart disease using echocardiography</p> <p>Use echocardiography to exclude duct dependent systemic and pulmonary circulation when assessing an infant with a patent arterial duct</p> <p>Identify congenital heart disease in premature and low birth weight infants and make a management plan, including appropriate timing of surgery</p>	<p>Understand basic neonatal care and how sepsis, lung disease, neurological problems and genetic issues influence cardiac management</p>

15. Cardiovascular evaluation of children with genetic disorders and syndromes

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist cardiac assessment and treatment of children with genetic disorders and syndromes</p> <p>Learning methods a b h</p> <p>Assessment methods 1 2 4</p>	<p>Know the cardiac abnormalities found in common genetic disorders and syndromes including:</p> <p>Down syndrome Trisomy 18 Trisomy 13 22q11 deletion (DiGeorge) Turner syndrome Noonan syndrome William syndrome Alagille syndrome Marfan syndrome CHARGE association VACTER association Storage diseases Neuromuscular diseases Mitochondrial cytopathies Hyperlipidaemias Long QT syndrome</p> <p>Know the prognosis of genetic syndromes and their associated cardiac disorders</p>	<p>Be able to:</p> <p>Take a relevant history and perform an appropriate cardiac examination</p> <p>Use echocardiography to accurately diagnose abnormalities in cardiac structure or function</p>	<p>Recognise the importance of the genetics and paediatric team in coordinating overall management</p> <p>Recognise the impact of other features of the genetic disorder or syndrome on cardiac management</p> <p>Be willing to discuss the possibility of recurrence of the cardiac disorder in subsequent children but recognise the boundaries of expertise in paediatric cardiology</p> <p>Be aware of the need to offer fetal cardiology review for future pregnancies</p> <p>Discuss wider issues involving genetics with sensitivity when planning intervention or surgery for congenital heart disease with parents</p>

16. Cardiac evaluation of a child with stridor

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist cardiac assessment of children with stridor and referral for cardiac surgery where necessary</p> <p>Learning methods a c g h</p> <p>Assessment methods 1 2 4</p>	<p>Know:</p> <p>The embryology, anatomy and natural history of vascular rings and slings and their association with lung pathology</p> <p>How to perform an echocardiographic examination specifically for vascular rings and slings</p> <p>The limitations of echocardiography in identifying vascular rings</p> <p>The signs of vascular rings and slings on CXR and barium swallow</p> <p>The angiographic and MRI features of vascular rings and slings</p> <p>The surgical options for release of rings and slings</p>	<p>Be able to:</p> <p>Perform echocardiography to identify the presence of vascular rings and slings</p> <p>Select patients who merit further investigation by bronchoscopy or MRI and interpret the results of these investigations</p> <p>Be able to perform angiography to define aortic and pulmonary artery anatomy where MRI is not available</p> <p>Plan appropriate surgery for release of vascular rings or slings</p> <p>Discuss the causes of stridor with parents, offering reassurance where appropriate</p>	<p>Cooperate with paediatricians in planning management of children with stridor</p> <p>Be aware of the need to cooperate with thoracic surgeons in children with associated lung abnormalities</p>

17. Detection and management of fetal cardiac abnormalities

Objective	Knowledge	Skills	Attitudes
<p>To be able to advise on appropriate referral for fetal cardiac evaluation and to be able to advise parents on the timing and the limitations of antenatal diagnosis</p> <p>Learning methods a b c d e f g h i</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for a fetal cardiac assessment</p> <p>The limitations of fetal echocardiography</p> <p>The associations between fetal cardiac abnormality and genetic abnormalities</p>	<p>Be able to:</p> <p>Recognise when the heart is abnormal and identify common congenital heart defects and abnormal cardiac function in the fetus</p> <p>Recognise fetal tachyarrhythmias and fetal heart block using M mode or Doppler</p>	<p>Appreciate the importance of providing a realistic view of outcome when helping parents to make decisions in respect of the pregnancy</p> <p>Understand the anxiety and distress of parents presented with a fetal diagnosis of cardiac abnormality</p> <p>Appreciate the need for close communication with the obstetric team</p>

18. Adolescent and adult congenital heart disease

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out basic assessment and treatment of adolescents and adults with congenital heart disease</p> <p>Learning methods a b c d f g h i</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The natural history of congenital heart disease into adolescence and adult life</p> <p>The problems associated with unoperated congenital heart disease in adolescents and adults</p> <p>The long-term sequelae of surgery for congenital heart disease</p> <p>The implications of operated and unoperated congenital heart disease for contraception and pregnancy</p> <p>The cardiovascular contraindications to pregnancy</p> <p>The common rhythm disturbances in adult congenital heart disease and the treatment options</p> <p>The indications for non-invasive and invasive investigation in the adolescent and adult age group</p>	<p>Be able to:</p> <p>Carry out transthoracic and transoesophageal echocardiography in adolescent and adult patients</p> <p>Coordinate and interpret investigations</p> <p>Arrange for a smooth transition from the paediatric to the adult congenital service</p>	<p>Appreciate the worries and concerns of adolescent and adult patients with congenital heart disease</p> <p>Appreciate the need to shift responsibility for the decision making from the parents to the patient</p> <p>Appreciate the need for patient privacy</p> <p>Understand the need for genetic counselling</p> <p>Understand the need for assessment during pregnancy by the fetal cardiology service</p>

19. Arrhythmias

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out assessment and treatment of children and adult congenital heart disease patients with arrhythmias</p> <p>Learning methods a b c d e f g h i</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The various types of arrhythmia found in fetal life, infancy, childhood, adolescence and in adults with congenital heart disease</p> <p>The mechanisms involved in the genesis of cardiac dysrhythmias</p> <p>The natural history, presentation and clinical features of arrhythmias from fetal to adult life</p> <p>The types of structural heart disease and types of cardiac surgery associated with abnormalities in cardiac rhythm</p> <p>The genetic disorders associated with cardiac rhythm disturbance</p> <p>The causes, natural history and management of atrioventricular block</p> <p>The characteristic ECG findings in all forms of tachyarrhythmia and bradyarrhythmia</p> <p>The indications for exercise testing, ambulatory monitoring, cardiac event recorders, implantable loop recorders, invasive electrophysiology study, radiofrequency ablation and implantable cardioverter</p>	<p>Be able to:</p> <p>Take a history in a patient with palpitations and decide whether an arrhythmia is likely</p> <p>Form an appropriate plan of further investigation in a patient with suspected arrhythmias</p> <p>Recognise and manage SVT from fetal to adult life</p> <p>Identify the type of arrhythmia present from an event captured on ECG</p> <p>Process 24 hour tapes, including review and interpretation of the full record</p> <p>Carry out exercise tests and interpret the results</p> <p>Perform and interpret an ECG taken during an adenosine challenge</p> <p>Perform and interpret an ECG from atrial epicardial wires in the postoperative patient</p> <p>Interpret the results from cardiac event recorders, implantable loop recorders and pacemaker telemetry</p> <p>Manage temporary pacing, including</p>	<p>Appreciate the anxiety arrhythmias cause to patients and their parents</p> <p>Understand the importance of patient education in managing ongoing symptoms and determining the most appropriate treatment for each individual</p> <p>Involve the genetics team where there is a genetic component to the disorder</p>

	<p>defibrillators</p> <p>The classification, mechanism of action, interactions, side effects, contraindications and clinical use of antiarrhythmic drugs in paediatric patients</p> <p>The indications for permanent pacing, the types of cardiac pacing and the indications for each type of pacing in paediatric patients Know the indications for DC cardioversion</p> <p>The indications, limitations and risks of an invasive electrophysiology study and radiofrequency ablation</p>	<p>the use of epicardial wires in the postoperative cardiac patient</p> <p>Select appropriate drug treatment for tachyarrhythmias</p> <p>Perform vagal manoeuvres, overdrive pacing and DC cardioversion in the treatment of tachyarrhythmias</p> <p>Explain arrhythmias and their associated risks to patients and their parents</p> <p>Offer appropriate management options to the patient and family</p> <p>Provide advice in respect of sports and exercise</p>	
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20. Paediatric cardiac and cardiopulmonary transplantation

Objective	Knowledge	Skills	Attitudes
<p>To recognise when heart or heart-lung transplantation is indicated, to refer appropriately to a transplant centre and to provide local follow-up after transplantation</p> <p>Learning methods a c g h Assessment methods 1 2 4</p>	<p>Know:</p> <p>The indications and contraindications for cardiac transplantation</p> <p>The principles of recipient evaluation</p> <p>The principles of immunology and immunosuppression involved in cardiac transplantation</p> <p>The effects and side effects of immunosuppressive drugs used following cardiac transplantation</p> <p>The problems of infection, immunoproliferative disease, coronary arteriopathy and rejection following cardiac transplantation</p>	<p>Be able to:</p> <p>Realistically counsel the parents of children with terminal cardiac disorders about the possibility of cardiac transplantation, the prospects of success and the long-term outlook following transplantation</p> <p>Recognise potential clinical signs of cardiac graft rejection</p> <p>Communicate effectively with the transplant centre to plan further investigation</p>	<p>Be aware of the ethical and legal issues in respect of donor selection and management and organ procurement</p> <p>Refer appropriately to the transplant centre</p> <p>Appropriately refer in cases of possible graft rejection</p>

21. Nutrition and growth in congenital heart disease

Objective	Knowledge	Skills	Attitudes
<p>To be able to recognise nutrition and growth problems related to congenital heart disease and direct appropriate strategies to optimise nutritional intake and maximise growth</p> <p>Learning methods a h</p> <p>Assessment methods 1 2 4</p>	<p>Know:</p> <p>The causes of growth failure in congenital heart disease</p> <p>How to manage fluid and caloric intake in children with cardiovascular disease</p> <p>How to manage fluid balance after cardiac surgery</p> <p>The indications for parenteral nutrition</p> <p>How to reintroduce feeds after necrotising enterocolitis or other bowel damage</p> <p>The causes of chylothorax and when to introduce a medium chain triglyceride diet</p>	<p>Be able to:</p> <p>Recognise failure to thrive and be able to identify cardiac and non-cardiac causes</p> <p>Institute and monitor feeding regimes in children with cardiac failure</p> <p>Manage fluid intake and fluid balance after cardiac surgery</p> <p>Identify iron deficiency in patients with cyanotic congenital heart disease</p> <p>Identify when failure to thrive has not responded to optimising nutrition and decide on appropriate timing for surgical intervention in congenital heart disease patients</p>	<p>Recognise the importance of nursing staff and dieticians in supervising and advising on nutrition</p> <p>Be aware of the complications of parenteral nutrition</p> <p>Provide information to parents about feeding regimes</p>

22. Assessment of children prior to cardiac surgery

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment of children requiring cardiac surgery and to plan the nature and timing of cardiac surgery in conjunction with the paediatric cardiac surgery team</p> <p>Learning methods a c d f g h Assessment methods 1 2 4</p>	<p>Know:</p> <p>The principles of cardiopulmonary bypass and the risks involved</p> <p>The risks and benefits of various types of pump and non-pump surgery</p> <p>Factors that place a child at increased risk from cardiac surgery</p>	<p>Be able to:</p> <p>Take account of the cardiac status and non-cardiac pathology in selecting the most appropriate timing for surgery</p> <p>Present relevant details of the cardiac condition and the results of investigations to the cardiac surgeons to reach a joint plan on surgery</p>	<p>Have a multi-disciplinary approach to preoperative assessment</p> <p>Appreciate the technical limitations of surgery</p>

23. Care of children following cardiac surgery

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out and direct intensive care, ward-based care and outpatient care following paediatric cardiac surgery</p> <p>Learning methods a b c g h</p> <p>Assessment methods 1 2 4</p>	<p>Know:</p> <p>The postoperative problems caused by cardiopulmonary bypass</p> <p>The particular problems associated with cardiac surgery for the various types of congenital heart defect</p> <p>The problems in managing a cavopulmonary circulation</p> <p>How to manipulate pulmonary vascular resistance and how to prevent and treat pulmonary hypertensive crises</p> <p>How to assess cardiac output and tissue oxygen delivery</p>	<p>Be able to:</p> <p>Secure arterial access and peripheral and central venous access</p> <p>Interpret readings from intracardiac and intravascular pressure lines</p> <p>Manage fluid balance, electrolyte balance, coagulation abnormalities and inotropic support</p> <p>Manage rhythm abnormalities</p> <p>Recognise signs of cerebral damage and seizures and arrange for appropriate investigation and treatment</p> <p>Detect when there are markers of sepsis, take appropriate measures to identify the source and select effective antibiotic treatment</p> <p>Use echocardiography to evaluate the results of surgery, assess cardiac function and identify pericardial effusions, pleural effusions, and intracardiac and great vessel thrombus</p> <p>Identify when further evaluation is required by cardiac catheterisation</p> <p>Identify when there are undiagnosed lesions or residual lesions that need further surgical intervention</p>	<p>Understand the concerns and anxiety of parents and other family members</p> <p>Appreciate the importance of good communication and collaboration between different disciplines</p> <p>Understand the importance and role of paediatric cardiac intensive care nursing staff</p> <p>Deal sympathetically with bereavement</p>

		<p>Outline an intensive care treatment plan in terms understood by the parents</p> <p>Counsel parents about the results of surgery and the child's current status</p> <p>Give a realistic prognosis when there have been postoperative cardiac problems or problems with other organ systems</p> <p>Respond quickly and efficiently to sudden haemodynamic instability</p>	
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24. Assessment of children with cardiac disease prior to non cardiac surgery

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment of children with cardiac disease prior to non-cardiac surgery</p> <p>Advise on fitness for such surgery and any precautions or cardiac treatment required</p> <p>Learning methods a h Assessment methods 1 2 4</p>	<p>Know the cardiac disorders associated with a higher risk for general anaesthesia</p>	<p>Be able to:</p> <p>Take a relevant history and perform an appropriate examination, noting in particular any change in cardiac status</p> <p>Select patients who require further investigation by ECG, CXR or echocardiography</p> <p>Determine the physiology of the cardiac abnormality and the cardiac reserve using ECG, CXR and echocardiography</p> <p>Identify patients who are at increased risk from anaesthesia and recommend appropriate precautions</p> <p>Recommend an appropriate fluid regime and how cardiac drugs are to be administered in the perioperative period</p> <p>Answer questions from patients and their parents about the impact of their cardiac condition on the safety of anaesthesia and surgery</p>	<p>Be aware of the need to inform the anaesthetist and surgeon of the cardiac status and any particular precautions required</p> <p>Appreciate the importance of chronic antibiotic therapy in selecting appropriate antibiotic prophylaxis</p>

25. Management of critically ill children with cardiovascular compromise

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out assessment and treatment of children who are critically ill with severe haemodynamic disturbance</p> <p>Learning methods a g h Assessment methods 1 2 4</p>	<p>Understand the principles of oxygen supply and demand</p> <p>Understand the factors controlling cardiac output</p> <p>Understand compensatory mechanisms maintaining cardiovascular homeostasis</p> <p>Know the common causes of haemodynamic instability during childhood and know how to differentiate sepsis, hypovolaemia, cardiac failure, cardiac tamponade and hypotension secondary to cardiac rhythm disturbances</p>	<p>Be able to:</p> <p>Recognise the clinical signs of low cardiac output and the clinical signs of progression to shock</p> <p>Recognise the biochemical markers of low cardiac output</p> <p>Use echocardiography to assist in determining the cause of haemodynamic instability</p> <p>Appropriately use fluid administration and inotropic support to optimise cardiac output and tissue oxygen delivery</p> <p>Initiate intensive care support for children with haemodynamic instability</p>	<p>Recognise the importance of cooperation with intensivists and other paediatric specialties</p> <p>Have sufficient communication skills to sensitively discuss problems of critically ill children with parents and relatives</p> <p>Be able to break bad news</p>

PART 4 - INVESTIGATIONS AND PROCEDURES

1. 12 lead ECG

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out and interpret a 12 lead ECG in all age groups</p> <p>Learning methods a b c g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know</p> <p>The standard lead placement for paediatric ECG recording and lead placement for dextrocardia</p> <p>Age related changes in ECG wave forms</p> <p>How to evaluate rhythm, hypertrophy, ischaemia, injury and infarction on ECG</p>	<p>Be able to:</p> <p>Interpret ECG in relation to age related changes</p> <p>Recognise and interpret abnormal QRS axis, atrial enlargement, normal and abnormal patterns of atrial depolarisation, ventricular hypertrophy, normal and abnormal patterns of ventricular depolarisation, normal and abnormal ventricular repolarisation, bundle branch block, heart block, preexcitation and tachyarrhythmias on the ECG</p> <p>Perform an atrial wire ECG using epicardial pacing wires</p>	<p>Appreciate the limitations of an ECG</p>

2. Ambulatory ECG

3. Exercise tests

4. Cardiac event recording

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out and interpret the following investigations for diagnosis and assessment of children with cardiac disease and adult congenital heart disease patients: ambulatory ECG exercise test cardiac event recorder</p> <p>Learning methods a g h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for an ambulatory ECG, exercise test and cardiac event recorder</p> <p>The normal range of findings on a paediatric 24 hour ECG</p> <p>The physiology of cardiovascular response to exercise</p> <p>The contraindications to exercise testing in children</p> <p>The methodology of a treadmill test</p> <p>The normal heart rate and blood pressure response to exercise</p>	<p>Be able to:</p> <p>Scan a complete 24 hour tape, select appropriate highlights and produce an accurate report</p> <p>Interpret the results of a 24 hour tape</p> <p>Perform an exercise test and obtain exercise data free of artefact</p> <p>Interpret changes in heart rate, blood pressure and oxygen saturation during an exercise test</p> <p>Interpret changes in the ECG during the exercise test</p> <p>Interpret the results of a cardiac event recorder</p>	<p>Appreciate the limitations of these non-invasive investigations</p> <p>Appreciate the sensitivity, specificity and predictive accuracy of exercise ECG</p>

5. ECG with adenosine challenge

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out and interpret an ECG taken during an adenosine challenge</p> <p>Learning methods g h Assessment methods 1 2 3 4</p>	<p>Know the indications for adenosine challenge and how to acquire an ECG of optimum quality</p>	<p>Be able to:</p> <p>Acquire an ECG during an adenosine challenge with appropriate monitoring and resuscitation equipment available</p> <p>Diagnose the mechanism of an arrhythmia based on the result of the adenosine challenge</p>	<p>Help teach paediatric staff the correct method of ECG acquisition during adenosine cardioversion</p> <p>Provide explanation to patients and parents about the effect of adenosine administration</p>

6. Chest X-Ray

Objective	Knowledge	Skills	Attitudes
<p>To be able to interpret a CXR to assist diagnosis and assessment of cardiac disease at all ages</p> <p>Learning methods a b c h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The principles of radiation protection</p> <p>The classical abnormalities in cardiac silhouette produced by congenital heart defects</p> <p>The characteristic CXR appearances of high and low pulmonary blood flow, pulmonary oedema and pulmonary vascular disease with pulmonary hypertension</p>	<p>Be able to:</p> <p>Diagnose abnormalities in cardiac position and identify when great artery arrangement is abnormal on CXR</p> <p>Interpret patterns of pulmonary vasculature on CXR</p> <p>Recognise lung pathology on CXR</p> <p>Use information on the CXR to assist in making an anatomical and physiological diagnosis in congenital heart disease</p>	<p>Appreciate the limitations of the CXR in diagnosing and assessing congenital heart disease</p>

7. Tilt testing

Objective	Knowledge	Skills	Attitudes
<p>To be able to interpret tilt table tests in evaluating patients with syncope</p> <p>Learning methods a g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The physiological principles of tilt table testing</p> <p>The indications for tilt table testing</p> <p>The methodology of tilt table testing</p>	<p>Be able to:</p> <p>Supervise a tilt table test</p> <p>Resuscitate a child during a tilt table test</p> <p>Interpret the results of a tilt table test</p>	<p>Appreciate the sensitivity and specificity of a tilt table test</p>

8. DC cardioversion

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform elective and emergency DC cardioversion</p> <p>Learning methods e g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for synchronised and unsynchronised DC cardioversion</p> <p>The safety precautions necessary for protection of patients and staff during DC cardioversion</p>	<p>Be able to:</p> <p>Operate various types of equipment for DC cardioversion</p> <p>Select an appropriate energy for DC cardioversion for different arrhythmias at different ages</p> <p>Carry out DC cardioversion as part of emergency resuscitation</p>	<p>Appreciate the possibility of underlying abnormalities in cardiac rhythm, structure or function causing abrupt haemodynamic deterioration after cardioversion and make appropriate preparations for resuscitation</p>

9. Basic cardiac pacing

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform temporary pacing and acquire basic skills in pacemaker monitoring</p> <p>Learning methods a e g h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>Electrophysiology and cardiac anatomy relevant to pacing</p> <p>The indications for temporary and permanent pacing</p> <p>How to carry out temporary pacing using epicardial or oesophageal wires following cardiac surgery</p> <p>The principles of monitoring, interrogating and programming pacemakers</p>	<p>Be able to:</p> <p>Insert a temporary pacing wire in a child or adult</p> <p>Carry out single and dual chamber pacing using epicardial wires in postoperative patients</p> <p>Carry out overdrive pacing to treat tachyarrhythmias</p>	<p>Appreciate the anxiety often suffered by children with pacemakers and their parents</p> <p>Understand the importance of growth in pacemaker implantation</p> <p>Have appropriate self-confidence and recognise personal limitations when monitoring of permanent pacemaker function</p>

10. Pericardiocentesis

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform pericardiocentesis safely and effectively</p> <p>Learning methods g h Assessment methods 1 2 3 4</p>	<p>Know the indications for pericardiocentesis</p>	<p>Be able to:</p> <p>Identify when pericardiocentesis can be performed safely and the most effective approach</p> <p>Carry out pericardiocentesis on children of all ages</p>	<p>Appreciate the risks of pericardiocentesis</p>

11. Balloon atrial septostomy

Objective	Knowledge	Skills	Attitudes
<p>To be able to assist in balloon atrial septostomy safely and effectively</p> <p>Learning methods g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for balloon atrial septostomy</p> <p>The risks of balloon atrial septostomy</p>	<p>Be able to:</p> <p>Perform transthoracic echocardiography to guide balloon atrial septostomy</p> <p>Supervise the care of an infant after balloon atrial septostomy</p> <p>Counsel the parents in respect of the risks and benefits of the procedure</p>	

TRANSTHORACIC ECHOCARDIOGRAPHY

13. Praecordial echocardiography

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform echocardiography in all ages from newborn to adult to diagnose and assess all forms of congenital and acquired heart disease</p> <p>To be able to perform and evaluate the results of echocontrast studies</p> <p>Learning methods a b c d e f g h i Assessment methods 1 2 3 4</p>	<p>Know and understand:</p> <p>The physics of echocardiography, colour Doppler and spectral Doppler</p> <p>The factors determining image quality and resolution</p> <p>The function of the controls on machines used for echocardiography and Doppler</p> <p>The echocardiographic characteristics of all congenital heart defects and how to assess the physiology of shunting defects</p> <p>How to assess valve stenosis and regurgitation</p> <p>How to assess ventricular function</p> <p>The indications for echocontrast studies</p>	<p>Be able to:</p> <p>Manipulate the image to obtain optimal image quality</p> <p>Obtain all appropriate views during an echocardiographic examination and produce a structured record of the examination</p> <p>Obtain all possible information in the examination of a child with congenital or acquired heart disease</p> <p>Interpret the significance and reliability of the information obtained by echocardiography</p> <p>Perform and interpret echocontrast studies to identify abnormal venous connections and to assess right to left shunts</p>	<p>Demonstrate ability to work with and where appropriate educate echocardiography technicians</p> <p>Be aware of the limitations of echocardiography and Doppler</p> <p>Have appropriate self-confidence and recognise personal limitations in echocardiography skills</p>

14. Transoesophageal echocardiography

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform transoesophageal echocardiography in all ages to diagnose and assess congenital and acquired heart defects</p> <p>Learning methods a b c g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for and risks of transoesophageal echocardiography</p> <p>The echocardiographic planes required to display various cardiac structures</p> <p>The transoesophageal echocardiography appearance of congenital cardiac defects</p>	<p>Be able to perform transoesophageal echocardiography:</p> <p>In the diagnosis of complex congenital cardiac defects</p> <p>To evaluate adolescent and adult congenital heart disease</p> <p>To guide catheter interventions</p> <p>Intraoperatively to guide surgical repair</p>	<p>Have appropriate self-confidence and recognise personal limitations</p>

15. Cardiac catheterisation

Objective	Knowledge	Skills	Attitudes
<p>To be able to interpret the results of diagnostic cardiac catheterisation in children and adults with cardiac disease</p> <p>Learning methods a b c g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for diagnostic cardiac catheterisation</p> <p>How to interpret haemodynamic data</p> <p>The principles of protection from ionising radiation, attend the mandatory course on protection from ionising radiation and acquire certification</p> <p>The indications for considering the following common interventions:</p> <ul style="list-style-type: none"> (i) Occlusion of patent arterial duct (ii) Balloon dilation of pulmonary valve (iii) Balloon dilation of aortic valve (iv) Pulmonary artery angioplasty (v) Recoarctation angioplasty <p>The basic principles of less common interventions</p>	<p>Be able to:</p> <p>Plan and supervise pre and post catheter management</p> <p>Interpret clinical information and the results of non-invasive investigations to decide what information must be acquired by cardiac catheterisation</p>	<p>Appreciate the importance of providing detailed information about the procedure and its potential complications to patients or their parents</p> <p>Appreciate the importance of team work with radiologists, catheter lab staff, anaesthetists and technical staff</p>

16. Cardiac MRI, Thoracic CT and Radionuclide imaging

Objective	Knowledge	Skills	Attitudes
<p>To be able, with appropriate consultation, to interpret the results of the following investigations for the diagnosis and assessment of children with cardiac disease and adult congenital heart disease patients:</p> <p>Radionuclide imaging Cardiac MRI Thoracic CT</p> <p>Learning methods a b c e h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for:</p> <ul style="list-style-type: none"> (i) first pass RNA scan (ii) gated RNA scan (iii) ventilation/perfusion scan <p>Indications and contraindications for cardiac MRI and CT of the thorax</p> <p>The basics of MR safety</p> <p>The fundamentals and limitations of MR image acquisition</p> <p>The information that can be obtained by MRI including:</p> <ul style="list-style-type: none"> (i) static and dynamic imaging of the heart and great vessels (ii) functional information such as flow, velocity, perfusion and ventricular function 	<p>Be able to:</p> <p>Interpret basic results of RNA scans, perfusion scans and radionuclide tests of myocardial perfusion, recognising when expert help is required</p> <p>Interpret basic MR and CT images of the heart and great vessels, recognising when expert help is required</p> <p>Plan and supervise the pre and post investigation management of cardiac MR patients, particularly GA.</p> <p>Interpret clinical information and the results of other investigations to decide what information must be acquired by cardiac MRI</p> <p>Interpret images from basic MR sequences</p> <p>Interpret cardiac MR reports and their application to clinical management</p>	<p>Be aware of the limitations of non-invasive imaging</p> <p>Appreciate the importance of understanding cardiac anatomy in 3-dimensions</p> <p>Have an appropriate threshold for seeking expert advice</p> <p>Appreciate the importance of providing detailed information about the procedure and its' potential complications to patients or their parents</p> <p>Understand the importance of an accurate record of the procedure and findings</p> <p>Appreciate the importance of team work with radiologists, radiographers, anaesthetists and technical staff</p> <p>Appreciate the importance of being involved in national audit in cardiac MR</p>

17. Radiation use and safety

Objectives	Knowledge	Skills	Attitudes
<p>Be able to use radiation equipment appropriately and safely for the diagnosis, assessment and treatment of patients with cardiac disease according to the regulations IRR 99 and IRMER 2000 or their successors.</p> <p>Learning methods e h Assessment methods 1 2 3 4</p>	<p>Define the physics and hazards of ionising radiation to patients and staff.</p> <p>the current statutory requirements concerning the medical use of ionising radiation.</p> <p>Know how to operate the equipment involved in the use of ionising radiation.</p> <p>Define the factors that affect radiation exposure to both patients and staff.</p> <p>Know the important aspects of cardio-radiology.</p>	<p>Be able to operate radiation equipment safely and effectively.</p> <p><i>Has successfully completed a period of practical supervised training in the use of radiation equipment</i></p>	<p>Appreciate the risks and benefits to patients and staff of using ionising radiation.</p>

PART 5 - SUBSPECIALTY TRAINING

1. Fetal cardiology

Specialists who wish to subspecialise in fetal cardiology need a detailed knowledge of the indications for fetal cardiac assessment. Communication and counselling skills are of utmost importance, as is an appreciation of the importance of multidisciplinary team discussion and decisions on management during pregnancy and in the neonatal period.

It is envisaged that a one year program of subspecialist training will be necessary in order to achieve the competencies set out in the curriculum. During this 1 year period the trainee should retain a close involvement with the clinical activities of the department, including a regular on call commitment.

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out specialist assessment and counselling of women referred for fetal cardiac evaluation</p> <p>Learning methods a b c d e f g h i</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for a fetal cardiac assessment</p> <p>How the natural history of cardiac lesions may differ in the fetal compared to the postnatal population</p> <p>How to perform a fetal echocardiographic examination, including knowledge of its limitations</p> <p>The risks and natural history of fetal arrhythmias</p> <p>The associations between fetal cardiac abnormality and genetic abnormalities</p> <p>The causes of fetal hydrops and its natural history when associated with cardiac abnormality</p>	<p>Be able to:</p> <p>Produce standard echocardiographic views of the fetal heart at various gestational ages</p> <p>Recognise when the heart is abnormal and identify common congenital heart defects and abnormal cardiac function in the fetus</p> <p>Detect fetal tachyarrhythmias and fetal heart block using M mode or Doppler</p> <p>Interpret the significance of fetal karyotype results and genetic analysis</p> <p>Make an appropriate management plan when the fetus has congenital heart disease, including where the child should be delivered</p>	<p>Appreciate the importance of providing a realistic view of outcome when helping parents to make decisions in respect of the pregnancy</p> <p>Understand the anxiety and distress of parents presented with a fetal diagnosis of cardiac abnormality</p> <p>Understand the importance of ongoing support during the pregnancy and detailed discussions to explain the diagnosis and prognosis</p> <p>Appreciate the need for close communication with the obstetric and neonatology teams</p>

2. Specialist imaging Cardiac MRI, Radionuclide Imaging and Thoracic CT

At present the mainstay of specialist imaging in congenital heart disease is MRI, but it will be essential for those specialising in MRI to have sound knowledge of the alternative and complementary roles of other imaging modalities such as radionuclide and CT scanning.

Specialists who wish to run a cardiac MR program need a detailed knowledge of the specialty. This extends to both the role of MR in the management of congenital heart disease, but also the technical aspects of how to obtain high quality information for all the different indications and how to process and report the scans.

Objectives

Sub-specialty training in magnetic resonance imaging aims at equipping the trainee to provide the lead in MR application in the centre in which he works. As a consultant the trainee may provide the sole expertise within his department or operate in collaboration with other imaging specialists. As a consultant the trainee will work with radiographers and radiologists within his Trust. It is probable that the trainee will retain links with his training centre as well as make further contacts leading to a specialist network.

Entry Requirements

It is envisaged that entry to cardiac MR sub-specialty training will be near or after completion of the three year core training in paediatric cardiology. It is assumed that the trainee will already have a detailed knowledge of the anatomy and physiology of native and operated congenital heart disease before embarking on training in cardiac MR.

Duration of Training

Cardiac MR reflects a significant departure from the techniques with which paediatric cardiology trainees will become familiar during their core training. It is a fast evolving specialty with rapid developments in hardware and particularly software (imaging sequences). In order to utilise cardiac MR the trainee must acquire a detailed understanding of the types of sequence available, the strengths and limitations of each sequence, and the complex web of parameters which must be optimised for each sequence, all allied with an understanding of the physics of MRI and how it impinges on the clinical process. This knowledge cannot be acquired during the core training. It is envisaged that a two year program of clinical training will be necessary in order to allow the trainee to independently manage a cardiac MR service.

Research and Audit

It is envisaged that trainees would undertake research and audit within the cardiac MR department. The pursuit of a higher degree (MSc, MD or PhD) is desirable but not compulsory. Time spent solely in research may not count towards clinical competency in the sub-specialty.

Clinical experience

It is envisaged that trainees will be predominantly involved in the clinical provision of the MR service. This will involve organising MR lists and liaising with other members of the clinical congenital heart disease team. The trainee will oversee MR lists and report on scans with supervision. It is important that the trainee retains a close involvement with the clinical activities of the department, being closely involved with the combined cardiac-surgical meeting. During this 2 year period the trainee should retain a close involvement with the clinical activities of the department, including a regular on call commitment.

Objective	Knowledge	Skills	Attitudes
<p>To equip the trainee to independently support all aspects of a clinical MR service within their unit.</p> <p>Learning method a b c d e f g h i j l</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The imaging and functional characteristics of different congenital and acquired cardiac abnormalities.</p> <p>Indications for, and contra-indications to, the application of cardiac MR</p> <p>Magnetic resonance physics and a basic understanding of the physics of the various MR sequences</p> <p>Comprehension of the various imaging sequences; their strengths, weaknesses and application and optimisation.</p> <p>Comprehension of various imaging protocols for different clinical application/disease entities</p> <p>Understanding of MR artefacts; they're influence on interpretation and minimisation</p> <p>Detailed knowledge of the different image processing tools both for analysis of functional data and for reformatting structural data.</p>	<p>To be able to:</p> <p>Set up and organise a cardiac MR service including general anaesthetic list for infants and young children</p> <p>develop MR study protocols (a set of specific sequences) for particular conditions and adapt them to specific patients</p> <p>optimise and acquire MR sequences which provide the best image/functional information</p> <p>perform post-processing on MR data for image presentation and quantification of physiological data</p> <p>interpret and report MR structural and functional data</p> <p>provide training to radiographers and other clinical staff such as paediatric cardiology/radiology trainees in all of the above</p>	<p>Appreciate the importance of good communication skills with other members of the clinical team as well as patients and parents of patients</p> <p>Appreciate the importance of good organisational skills in running a cardiac MR service to ensure effective service delivery and in particular in timely and accurate reporting/presentation of the scans</p> <p>Appreciate the importance of understanding individual limitation and need for expert/outside advice</p> <p>Appreciate the rapidly changing nature of cardiovascular MR and by keeping abreast of these changes optimising the service provided</p>

	<p>Practical knowledge of image formats; their characteristics and limitations, and the ability to interchange data between them</p> <p>risks and complications of MR scan particularly with respect to consent issues</p> <p>safety in the MR scanner suite</p> <p>relationship of MR with other imaging modalities for complex physiological measurements and interventions</p> <p>the use of phantom models to assess imaging and measurement under controlled conditions</p>		
<p>To be able to interpret the results of the following investigations for the diagnosis and assessment of children with cardiac disease and adult congenital heart disease patients:</p> <p>Radionuclide imaging Thoracic CT</p> <p>Learning methods a b c e h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for:</p> <ul style="list-style-type: none"> (i) first pass RNA scan (ii) gated RNA scan (iii) ventilation/perfusion scan <p>Indications for CT of the thorax</p>	<p>Be able to:</p> <p>Interpret the results of the RNA scans, perfusion scans and radionuclide tests of myocardial perfusion</p> <p>Interpret CT images of the heart and great vessels</p>	<p>Be aware of the limitations of non-invasive imaging</p> <p>Appreciate the importance of understanding cardiac anatomy in 3-dimensions</p>

3.Cardiac Catheterisation

Specialists who wish to subspecialise in cardiac catheterisation need a detailed knowledge of the indications and contraindications for catheterisation as well as knowledge of and competence in dealing with complications. An appreciation of the importance of multidisciplinary team discussion and decisions on the relative and complementary roles of therapeutic catheterisation and surgery is of prime importance. The concept of life long learning is of particular importance in this field; collaborative working with senior colleagues after appointment as a consultant is likely to be in the best interest of the patient, the individual's professional development and clinical governance when dealing with infrequently performed or very complex interventions.

It is envisaged that a two year program of subspecialist training will be necessary in order to achieve the competencies set out in the curriculum. During this 2 year period the trainee should retain a close involvement with the clinical activities of the department, including a regular on call commitment.

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform and interpret the results of diagnostic cardiac catheterisation in children and adults with cardiac disease</p> <p>For those also performing therapeutic catheterisation, to be able to perform the commoner therapeutic procedures independently, and to be able to carry out the rarer and more complex procedures in liaison with the lead clinician for therapeutic catheterisation</p> <p>Learning methods a b c g h Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The indications for diagnostic cardiac catheterisation</p> <p>What equipment is necessary for each procedure</p> <p>How to set up image intensifier angles, magnification and coning for angiogram acquisition</p> <p>The appropriate amount and rate of contrast delivery for angiography</p> <p>How to acquire and interpret haemodynamic data</p> <p>The principles of protection from ionising radiation, attend the mandatory course on protection from ionising radiation and acquire certification</p> <p>The indications, contraindications, technique and complications of the following common interventions:</p> <p>(i) Coil and plug duct occlusion (ii) Balloon dilation of pulmonary valve (iii) Balloon dilation of aortic valve (iv) Pulmonary artery angioplasty (v) Recoarctation angioplasty and stenting</p> <p>The principles of less common interventions.</p>	<p>Be able to:</p> <p>Plan and supervise pre and post catheter management</p> <p>Interpret clinical information and the results of non-invasive investigations to decide what information must be acquired by cardiac catheterisation</p> <p>Form a detailed plan of how diagnostic catheterisation is to be performed and how important information is to be obtained</p> <p>Acquire vascular access in all ages, manage anticoagulation, choose appropriate catheters and catheter routes, manipulate catheters successfully and safely, acquire appropriate haemodynamic data and perform angiography</p> <p>React quickly and appropriately to adverse changes in rhythm or haemodynamics</p> <p>Carry out haemodynamic calculations and interpret angiographic images correctly</p> <p>Carry out, as first operator, the more common interventions such as occlusion of the arterial duct, balloon dilation of pulmonary or aortic valve and angioplasty of pulmonary artery or recoarctation</p> <p>To carry out less common interventions with assistance</p>	<p>Appreciate the importance of providing detailed information about the procedure and its potential complications to patients or their parents</p> <p>Understand the importance of an accurate record of the procedure and findings</p> <p>Have appropriate self-confidence and recognise personal limitations</p> <p>Appreciate the importance of team work with radiologists, catheter lab nursing staff, anaesthetists and technical staff</p> <p>Appreciate the importance of being involved in national audit in therapeutic catheterisation</p>

4. Cardiac pacing and electrophysiology

Specialists who wish to subspecialise in pacing and electrophysiology need a detailed knowledge of the mechanisms and treatment of arrhythmias and of antiarrhythmic drug therapy as well as the indications for and complications of invasive electrophysiology. It is envisaged that a two year programme of subspecialist training will be necessary in order to achieve the competencies set out in the curriculum. During this 2 year period the trainee should retain a close involvement with the clinical activities of the department, including a regular on call commitment.

Objective	Knowledge	Skills	Attitudes
<p>To be able to perform permanent single and dual chamber pacemaker implantation and monitoring</p> <p>To be able to perform invasive electrophysiological investigation of tachy- and brady-arrhythmias</p> <p>To be able to carry out radiofrequency ablation for tachyarrhythmias</p> <p>To be able to provide specialist advice relating implantable defibrillators and to be able to implant such a device</p> <p>Learning methods a e g h</p> <p>Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>Electrophysiology and cardiac anatomy relevant to pacing</p> <p>The indications for temporary pacing and different modes of permanent pacing</p> <p>The principles and practice of monitoring, interrogating and programming pacemakers</p> <p>The mechanisms of brady- and tachy-arrhythmias and their anatomical substrates</p> <p>The indications for radiofrequency ablation and implantable defibrillators.</p>	<p>Be able to:</p> <p>Insert a single or dual chamber permanent pacemaker</p> <p>Carry out single and dual chamber pacing using epicardial wires in postoperative patients</p> <p>Carry out overdrive pacing to treat tachyarrhythmias</p> <p>Carry out and interpret invasive electrophysiological testing using right and left heart electrode placement in children and adults with congenital heart disease, carry out radiofrequency ablation of accessory pathways, the atrioventricular node and ectopic foci</p> <p>Implant an implantable defibrillator as first operator</p>	<p>Appreciate the anxiety often suffered by children with pacemakers and their parents</p> <p>Appreciate the size limitations when choosing pacemaker systems</p> <p>Understand the importance of growth in pacemaker implantation</p> <p>Have appropriate self-confidence and recognise personal limitations in implantation of permanent pacemakers</p> <p>Appreciate the different approaches to invasive electrophysiology in the very young</p> <p>Appreciate the psychological difficulties faced by patients with an implanted defibrillator</p>

5. Adolescent and adult congenital heart disease

More patients, with more complex disease survive to adulthood because of advances in neonatal and paediatric cardiac surgery and intervention. Furthermore, they survive with surgically modified disease which may be associated with an entirely different pathophysiology to that with which they were born. The majority require lifelong specialist follow up. As a result there is a growing need for specialist cardiologists with appropriate training in ACHD, so that patients are able to continue to receive expert care as they move from paediatric to adult services.

There is a need for 2 types of ACHD cardiologist. Type 1 will practice ACHD in one of a small number of specialist ACHD Units as part of a team which includes specialist ACHD cardiac surgeons. Type 2 will practice cardiology with a special interest in ACHD in non-specialist units. The principle difference in the training of Type 1 and Type 2 ACHD cardiologists is in the depth of knowledge required. The curriculum below applies to both types of ACHD training; the 2 types will be differentiated in the competencies expected and assessed. It is expected that Type 1 trainees will achieve their competencies over a 2 year training period and Type 2 trainees will require a 1 year ACHD training period, leaving them time to train in modules from other subspecialties such as non-invasive imaging.

The subspecialty curricula are dynamic and will evolve as the subspecialties develop. It is envisaged that subspecialty trainees will be able to take modules from other subspecialties. For example, an electrophysiology trainee may wish to extend their knowledge of ACHD to enhance their understanding of and their ability to manage arrhythmias in ACHD.

An ACHD training centre should have the following:

At least one full time ACHD consultant cardiologist

At least one specialist ACHD cardiothoracic surgeon

Specialist ACHD interventional catheterisation

Pacing and electrophysiology services equipped for patients with complex ACHD

Access to cardiothoracic transplant services

A high risk obstetric service

Close links with a paediatric cardiac centre with which a collaborative transition service operates.

An ACHD trainer should practice in a training centre as described above, and spend the majority of their time in ACHD.

Objective	Knowledge	Skills	Attitudes
<p>1. To be able to apply appropriately to the management of ACHD:</p> <ul style="list-style-type: none"> (i) a knowledge of the substrate of congenital heart disease (CHD) (ii) the knowledge that CHD is a lifelong condition (iii) a knowledge of the natural and unnatural (operated) history of simple and complex CHD 	<p>Define the anatomy of the heart and great vessels.</p> <p>Have a detailed understanding of cardiac embryology and development.</p> <p>Define both common and rare congenital defects, their morphology and nomenclature.</p> <p>Know that CHD is a continuum from fetal life through childhood and throughout adult life.</p> <p>Define the natural history of simple and complex congenital cardiac conditions.</p> <p>Define the unnatural (operated) history of simple and complex CHD</p>	<p>Be able to take a relevant history and perform an appropriate examination</p> <p>Be able to interpret paediatric, and to perform and interpret adult congenital echocardiograms. To be able to use echo to analyse the morphology and physiology of simple and complex CHD.</p> <p>Demonstrate the ability to educate adolescents and young adults about their condition and its impact on their life.</p> <p>Be able to communicate with the parents and carers of adolescents and young adults, whilst respecting patient confidentiality</p>	<p>Appreciate the importance of the management of patients during the transition from paediatric to adult clinics.</p> <p>Recognise the importance of a multidisciplinary team in the managements of adolescents and young adults.</p> <p>Through attendance at paediatric and adult CHD clinics, recognise how CHD develops and may become modified throughout life</p> <p>Recognise which patients with CHD need lifelong specialist follow up</p>
<p>2. To be able to apply appropriately the knowledge that the management of ACHD requires a multidisciplinary approach</p>	<p>Know that CHD has a psychosocial as well as physical impact on the patient and their family</p> <p>Be able to identify the ways in which CHD may impact on patients' lifestyle</p> <p>Be able to explain how patient education can empower young adults to take responsibility for their health</p>	<p>Be able to communicate effectively within a multidisciplinary team</p> <p>Be able to communicate sensitively with adolescents and young adults.</p> <p>Be able to explain the impact of CHD on adolescent and young adults' leisure and work activities</p>	<p>Appreciate the social and emotional difficulties encountered by patients with CHD</p> <p>Appreciate the psychological impact of ACHD on patients and their families.</p> <p>Appreciate the complex relationships that sometimes exist between patients with ACHD and their parents.</p>

<p>3. To apply a thorough understanding of CHD to the investigation of ACHD</p>	<p>Know how to investigate patients with CHD including the use and interpretation of non-invasive investigations such as echo and MRI, and invasive investigations such as cardiac catheterisation and TOE. Know the extended role of MRI in the management of patients with ACHD.</p>	<p>Be able to perform and interpret echocardiograms, including TOE, of patients with ACHD. Be able to interpret cardiac MRI images.</p> <p>Be able to undertake diagnostic cardiac catheterisations in patients with CHD.</p>	<p>Recognise the different and complementary contributions of different imaging modalities in the assessment of individual congenital cardiac lesions</p>
<p>4. To apply appropriately a knowledge of CHD to its medical and surgical treatment</p>	<p>Know that congenital cardiac lesions and previous surgery may be associated with specific arrhythmias.</p> <p>Know the indications for first time and repeated cardiac surgery for ACHD</p> <p>Identify potential complications faced by patients with CHD undergoing non-cardiac surgery.</p>	<p>Be able to manage patients with arrhythmias and CHD. Be able to recognise the arrhythmias that are peculiar to some forms of CHD. Be able to evaluate patients at particular risk from arrhythmia</p> <p>Be able to oversee the peri-operative care of patients having surgical correction of congenital heart defects and recognise the post operative and iatrogenic complications faced by patients with complex disease.</p> <p>Be able to assess the risk of non-cardiac surgery and provide appropriate advice on peri-operative management to avoid iatrogenic complications; especially the special risks faced by patients with complex disease.</p>	<p>Recognise the urgency of treatment of arrhythmia in some patients with ACHD</p> <p>Recognise the need for first time and repeat operations in ACHD</p> <p>Appreciate the need for effective communication with healthcare professionals involved in the care of ACHD patients undergoing non-cardiac surgery</p>
<p>5. To be able to apply appropriately a knowledge of CHD to catheter based treatment of ACHD</p> <p>(Specific example: performing and assessing suitability for device closure of atrial septal defect (ASD) or patent foramen ovale: Type 1 trainees)</p>	<p>Know that patent foramen ovale and secundum ASD defect may not exist in isolation. Know that both are associated with other lesions that may need simultaneous device closure or may make the index defect unsuitable for device closure</p> <p>Know that the severity of coexistent acquired lesions such as mitral valve disease may be underestimated in the presence of ASD</p>	<p>To be assessed as competent in diagnostic ACHD cardiac catheterisation before performing interventions.</p> <p>Be able to undertake catheter based interventions, including joint procedures with paediatric interventional cardiologists for complex interventions.</p> <p>Be able to perform and analyse TOE to identify different types of ASD and assess suitability for closure.</p>	<p>Recognise the need to audit all CHD activity.</p> <p>Recognise the need to contribute data on all CHD interventions to the national CHD database</p> <p>Recognise the desirability of a team approach to complex CHD interventions</p> <p>Recognise the need for continuous TOE or intracardiac echo monitoring during</p>

	<p>Be able to define and identify the different types of interatrial communication</p>	<p>Be able to identify contraindications to device closure. Be able to evaluate MV disease in the presence of ASD.</p> <p>Be able to assess pulmonary vascular resistance in the presence of a shunt. Be able to interpret pulmonary haemodynamic data in evaluating the suitability of an intracardiac defect for device closure</p>	<p>device closure of cardiac defects</p>
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Pregnancy & sexual health

It is appropriate for the specialist in adult congenital heart disease to be fully informed of the training requirements for care of pregnancy in patients with heart disease, although not all adult congenital cardiologists will necessarily be taking charge of this aspect of service.

Introduction

Heart disease is the single commonest cause of maternal death in the UK. Care has been assessed as being substandard in 40% of maternal deaths. This, in combination with the trend towards older maternal age and the increasing population of adult women with congenital heart disease surviving to have pregnancies, has led to a recognition of the need to improve and formalise training in cardiac disease in pregnancy.

Women with both acquired and congenital heart disease are at risk from pregnancy. However, the growing population of women with congenital heart disease means that any cardiologist with a special interest in cardiovascular disorders of pregnancy needs a sound training in adult congenital heart disease (see separate curriculum).

Aims

The aim of this curriculum is to describe the main areas of learning that will equip the trainee to manage independently the cardiological aspects of pregnancy and contraception in heart disease

Objective	Knowledge	Skills	Attitudes
<p>1. To be able to carry out appropriate assessment and treatment of women with chronic cardiac disease who are or who are planning to become pregnant</p> <ul style="list-style-type: none"> • Corrected and uncorrected congenital heart disease • Ventricular dysfunction • Pulmonary hypertension • Rheumatic heart disease • Ischaemic heart disease • Marfan's syndrome • Artificial heart valves • Arrhythmias 	<p>To describe how pregnancy, delivery and the post partum period may affect cardiac function in normal women and in those with pre-existing cardiac disease</p> <p>Define the risks of pregnancy for the mother and fetus for different cardiac disorders.</p> <p>Define the risks of recurrence of congenital heart disease in the fetus of mothers with congenital heart disease.</p>	<p>Be able to take a relevant history and perform an appropriate examination</p> <p>Be able to assess cardiac patients' risk of becoming pregnant.</p> <p>To be able to explain the increased risks of pregnancy in women with heart disease</p> <p>To explain the increased risk of congenital heart disease in the fetuses of women with congenital heart disease</p>	<p>Appreciate the increased anxiety experienced by pregnant women with cardiac disease.</p> <p>To recognize the role of cardiologists in the management of women preconception, during pregnancy and post partum</p> <p>To recognize the role of multidisciplinary care of women with heart disease and in particular liaison with obstetricians, midwives, haematologists, obstetric anaesthetists and intensivists.</p>
	<p>To list the possible adverse effects of drug treatment on both the woman and her fetus</p> <p>Define the implications of anticoagulation during pregnancy.</p>	<p>Be able to offer ante-natal care, often in the setting of a joint obstetric clinic.</p> <p>As part of a multispecialty team, be able to manage women with heart disease throughout pregnancy, delivery and the post-natal period</p> <p>Be able to counsel and manage women who require anticoagulation throughout pregnancy and the perperium</p>	<p>To understand the importance of formulating an agreed flexible management plan for delivery</p>

<p>2. To be able to carry out appropriate assessment of, and provide contraceptive advice to, women with cardiac disease</p>	<p>Know which contraceptive methods are safe and effective in women with different cardiac disorders</p>	<p>To be able to provide appropriate contraceptive advice to women with cardiac disease</p>	<p>Recognise the need to address and offer contraceptive advice to women with heart disease</p>
<p>3. To be able to carry out appropriate assessment and treatment of women with pregnancy induced cardiac disease</p>	<p>Know the risk factors for and presenting features of peripartum cardiomyopathy. Know the risk of recurrence of peripartum cardiomyopathy in subsequent pregnancies</p> <p>Know the presenting features, appropriate investigation and management of cardiovascular emergencies during pregnancy including pulmonary embolism, aortic dissection and myocardial infarction.</p>	<p>Initiate investigations to explore the differential diagnosis of peripartum cardiomyopathy</p> <p>To be able to explain the diagnosis and prognosis of peripartum cardiomyopathy to the patient and her relatives</p> <p>To be able to investigate and treat appropriately cardiovascular emergencies in pregnancy</p>	<p>Recognize the need for urgent joint assessment between multispecialty teams.</p>

6. Pulmonary hypertension

Specialists who wish to play a major part in running the UK Service for the Care of Children and Young People with Pulmonary Hypertension will need a detailed knowledge of this branch of Medicine in order to help their patients, take advantage of new therapies and treatment modalities and initiate advances in therapy. They will also have a considerable teaching commitment to inform paediatric cardiologists, neonatal, respiratory and general paediatricians about the condition and possibilities of treatment.

Objectives

To train paediatric cardiologists in the diagnosis and management of Pulmonary Hypertension to a level which enables them to lead a multi-disciplinary team of nurses and carers in a Trust to which these patients are referred and to be part of the National Clinical Network. A greater emphasis on the necessity of working in a team may be required for those entering with a background in adult cardiology.

Entry Requirements

The trainee will have completed the three year core training programme in Paediatric Cardiology. It is assumed therefore that the trainee will have a basic knowledge of cardiovascular anatomy and physiology and investigative techniques (including imaging) and be familiar with the natural history of the different types of cardiac anomaly, unoperated and operated.

The recommendations for training presented in this document apply primarily to those who have done the core training programme in paediatric cardiology. For those trained initially in adult cardiology, some adjustments would be required to ensure a basic knowledge of paediatric cardiology-possibly by doing one year of the core training programme in paediatric cardiology.

Duration of Training

Pulmonary hypertension can exist as Idiopathic Pulmonary Arterial Hypertension, is an integral part of paediatric cardiology and is a major component of other conditions such as respiratory and connective tissue disorders. Until the recent introduction of effective medical therapies patients were generally left to die. Now comprehensive investigation is mandatory, including cardiac catheterisation and the use of sophisticated imaging techniques in order to plan effective management, whether medical (monotherapy or combination therapy), surgical treatment or with increasing frequency, a combined medical and surgical approach. Trainees specialising in pulmonary hypertension are unlikely to be fully trained in cardiac catheterisation; the need for invasive assessment of pulmonary hypertension and its response to treatment as well as the occasional need for therapeutic catheterisation such as atrial septostomy will dictate collaborative working with the department's lead clinician for cardiac catheterisation. The current relentless introduction of new medicines makes an understanding of pharmacodynamics, pharmacokinetics and clinical trial methodology essential. The recognition of genetic mutations and deletions as causative in the pathogenesis of several forms of pulmonary hypertension indicate the need for instruction in this area, with a view to appropriate genetic counselling and screening of family members.

It is envisaged that a two-year programme of clinical training will be necessary to equip the trainee manage a Pulmonary Hypertension Service independently within their Trust and to play an active role in the UK Clinical Network.

Research

It is necessary for the trainee to undertake research in this rapidly evolving field of medicine. Obtaining a higher degree is desirable but not essential. According to the nature of the research interest, time spent on research may not count towards training in clinical competency.

Flexible Training

The requirements for flexible training will be in-line with those of the core curriculum.

Knowledge	Skills	Attitudes
<p>Making a comprehensive diagnostic and hemodynamic assessment.</p> <p>Knowing indications for/against catheterisation/ septostomy and procedural risk(s)</p> <p>Understand physiology and clinical status</p> <p>Understand pathobiology</p> <p>Comprehension of various imaging techniques, knowing which to request and how to interpret data</p>	<p>To be proficient in:</p> <p>i) Carrying out and interpreting cross sectional and transoesophageal echocardiography</p> <p>*ii) Cardiac catheterisation and atrial septostomy</p> <p>iii) Exercise testing</p> <p>iv) Assessing pulmonary vascular disease</p> <p>To be able to:</p> <p>i) select with appropriate specialist advice the optimal imaging studies required</p> <p>ii) work with clinical</p>	<p>Appreciate others' skills and own limitations. Acquiring vital skills in interpreting data of referred patients'</p> <p>Appreciate input of expert knowledge</p>

<p>Know how to assess causality, and need for family screening, counselling</p>	<p>geneticists specialising in PH</p>	<p>Appreciate input of expert knowledge</p>
<p>Know how to use current therapies and how to safely explore use of potential therapies</p>	<p>iii) understand pharmacology of current and potential PH drugs and help design and run a clinical trial</p>	<p>Appreciate necessity of practising evidence-based medicine and keeping up to date</p>
<p>Know how to assess need for and timing of transplantation</p>	<p>v) make appropriate referral for lung/heart lung transplantation</p>	<p>Understand cost:benefit of transplantation and appreciate family sensitivities</p>
<p>Know how to assess need for and timing of transplantation</p>	<p>vi) organise community and palliative care</p>	<p>Appreciate necessity of optimising quality of life</p>
<p>Knowledge of local and national professional and voluntary networks</p>	<p>vii) run a multi-disciplinary team of clinical nurse specialists, trainees, pharmacists, psychologists</p>	<p>Appreciate importance of an integrated care package and smooth team-working.</p>
<p>Know how to organise team-working to optimise patient care and individual input</p>	<p>vii) collaborate with PH specialists, and with cardiologists and other specialists in own and other Trusts</p>	<p>Appreciate the importance of good communication and organisational skills and advice of others</p>
<p>Know how to be part of a larger team and make a contribution to the wider world</p>		

7. Transplantation cardiology

Specialists who wish to subspecialise in heart failure and transplantation need a detailed knowledge of the underlying causes of heart failure as well as the medical and surgical approaches to treatment and the indications for and complications of transplantation.

It is envisaged that a two year program of subspecialist training will be necessary in order to achieve the competencies set out in the curriculum. Additional practical skills such as invasive measurement of haemodynamics or myocardial biopsy will need to be acquired in collaboration with the clinical lead for cardiac catheterisation.

During this 2 year period the trainee should retain a close involvement with the clinical activities of the department, including a regular on call commitment.

Objective	Knowledge	Skills	Attitudes
<p>To be able to carry out comprehensive assessment and treatment of children and adolescents and adults with end stage congenital or acquired heart disease</p> <p>Learning methods a b c d f g h i Assessment methods 1 2 3 4</p>	<p>Know:</p> <p>The natural history of congenital heart disease into adolescence and adult life</p> <p>The long-term sequelae of surgery for congenital heart disease</p> <p>The implications of operated and unoperated congenital heart disease for contraception and pregnancy</p> <p>The indications for non-invasive and invasive investigation in the adolescent and adult age group</p> <p>The indications for and techniques of therapeutic catheterisation in adults with congenital heart disease</p>	<p>Be able to:</p> <p>Devise and implement a comprehensive management plan</p> <p>Counsel patients with cardiac disease regarding employment</p> <p>Counsel patients about exercise</p> <p>Carry out transplant assessment cardiac catheterisation and endomyocardial biopsy</p>	<p>Appreciate the worries and concerns of adolescent and adult patients with congenital heart disease</p> <p>Appreciate the need to shift responsibility for the decision making from the parents to the patient</p> <p>Understand the need for assessment during pregnancy by the fetal cardiology service</p>