AMRITA VISHWA VIDYAPEETHAM

श्रद्धावान् लभते ज्ञानम्

PROGRAM

DM PAEDIATRIC CARDIOLOGY

(Revised with effect from 2016-2017 onwards)

Contents

GOAL

The goal of postgraduate education for the award of the postdoctoral degree in Pediatric Cardiology (DM – Doctor of Medicine) is to bring out competent pediatric cardiologists who shall recognize the health needs of the society provide quality health care and carry out professional obligations ethically to fulfill the objectives of national health policy. Pediatric cardiology has evolved as a separate discipline in India over the last 10 years requiring a different set of clinical approach, diagnostic and management skills and research as compared to adult cardiology. This program shall primarily focus on training pediatricians (MD/equivalent degree) on scientific knowledge and management skills required to practice academic pediatric cardiology. During the training period they shall master the competencies in pediatric cardiology and basic medicine that are required for pediatric cardiology practice from the primary to tertiary level of health care system. In addition they should also acquire basic skills in teaching the medical and paramedical professionals, research skills, organizational competency and social health care capabilities. Thus the major components of the curriculum shall cover theoretical knowledge, practical and clinical skills, attitude skills and training in research methodology and social care.

Training programme

All the candidates joining the postgraduate course in DM Pediatric Cardiology shall work as fulltime residents during the whole 3 year period of training. They shall be given fulltime responsibility and assignments and their participation in all facets of the educational programme is assured. A structured training schedule shall be set up by an academic cell or curriculum committee constituted as follows:

Principal (chairman)

Head of department (convener)

2 senior faculty in Pediatric Cardiology and 2 senior faculty from related departments (eg. Pediatric Cardiac surgery; Pediatric Cardiac anesthesia and intensive care.) as members.

The committee shall meet at least once in a year and make necessary modifications in the training schedule based on the latest developments in the field of pediatric cardiology and health care needs of the society. The committee shall also monitor the implementation and running of the training programme.

Teaching schedule

The residency training programme shall include formal lectures in the subject and subspecialities, symposia, clinical discussions, training in diagnostic and therapeutic modalities, research, journal clubs / clinical clubs and teaching rounds. It shall also incorporate guest lectures, orientation classes, in-house quiz, training in computer / internet applications etc.

1. ***Clinical Case discussions***: Clinical discussion is the core of postgraduate programs like DM Pediatric Cardiology. On an average there shall be at least one case discussion per week. The discussion should cover all the aspects from basics to the latest advances. Active involvement of the faculty shall be encouraged to maintain a high standard of training.
2. ***Symposia and faculty lectures***: Symposia shall be much more frequent than formal lectures. Maximum involvement of students and faculty shall be ensured Formal lectures by faculty – senior and junior – on various subjects will be an integral part of the schedule. However the number of such lectures shall be minimized to encourage self learning. Instead lecture topics shall be assigned as home work also.
3. ***Hemodyanamics and Imaging rounds***: Discussions on hemodynamics, other diagnostic modalities and newer trends in Pediatric Cardiology shall be done once in a week (3D echocardiography, fetal echocardiography, Cardiac radiology including cMR and 64 slice CT). This is of great importance in view of the fast advances occurring in the field of Pediatric Cardiology.
4. ***Joint cardiac conference***: An integral component of a pediatric cardiology program is team-work, especially with cardiac surgery and anesthesia/intensive care. The residents will be encouraged to conduct a

formal joint cardiac conference with the allied specialties once a week where the surgical cases for the week will be formally discussed to formulate the management plan.

5. ***Journal clubs***: Journal club is an integral part of a postgraduate training programme. This helps the students and faculty to update their knowledge in the latest developments in the field of medicine. It not only imparts new information but also trains the candidates to objectively assess and criticize the various articles and studies which will be useful in ensuring practice of evidence based medicine.
6. ***Teaching rounds***: Teaching rounds shall be strengthened. A detailed teaching round at least once in a week improves the patient care in addition to enhancement of the clinical skills of the students as well as the faculty.
7. ***Guest lectures***: Guest lectures shall be arranged as frequently as possible. Senior faculty from other departments, faculty from other institutions in the state and visiting national and international faculty shall be invited for guest lectures or clinical discussions and demonstrations. The topics shall cover not only medical subjects but also other aspects like communication skills, social problems etc.

An example of teaching format is given below:

8 AM – 9AM (6 days a week)

- Seminar
- Journal club
- Case discussion.
- Hemodynamic/Angiographic discussion
- Advanced imaging session (3D echo, fetal echo, cardiac CT, cardiac MRI)
- Joint cardiac conference with CVTS and anesthesia.

Conferences and continuing medical education programmes

All postgraduate students shall be encouraged to attend and actively participate in conferences and CMEs. They should be trained to present as many papers as possible (at least one paper each in national and regional conferences-- grace marks shall be provided for the same in the internal assessment). During the three year training each candidate should attend at least two national conferences, two regional conferences and 15 hours of CME.

Research

Thesis - As per the common regulations. There will be a strong emphasis to convert thesis work into a research publication in an indexed journal and present the data in a national forum. There shall be a protocol presentation within 3 months of joining and a final thesis data presentation 3 months before the exit exam.

Log book

Each candidate shall maintain a systematic log book in which the academic, clinical and research work shall be neatly entered. Senior faculty may be entrusted to periodically evaluate the log book and assign scoring for the same. The log book shall be submitted after certification by the Head of Department in the final year practical examination for scrutiny by the examiners.

Involvement in teaching

Postgraduate students in pediatric cardiology shall be assigned the job of teaching medical undergraduate and postgraduate students and also students of paramedical courses.

Training in diagnostic modalities

In addition to acquiring skills in basic modalities of cardiac investigations like electrocardiogram and radiology, they should be given adequate training in various aspects of echocardiography (including transesophageal echo, fetal and 3D

echocardiography). Interventional cardiology is advancing at a fast pace and hence they should have enough exposure to invasive cardiology including interventional techniques (on-hand training shall be provided) such that at the end of the course they should have confidence in performing common cardiac interventions. They should also have adequate exposure to other areas like nuclear cardiology, CT imaging, MRI etc. Intensive care constitutes a very important area of modern pediatric cardiac care and the residents will be given sufficient exposure in managing post-operative patients in the ICU.

Social activities

By concentrating on the advanced aspects of clinical medicine, the present generation doctors are moving away from the basic aspect of medical care ie. social health. Hence the young doctors should be encouraged to get involved in social activities like participation in medical camps, relief works, rural care etc.

Periodic internal assessment

To improve the standards of the postgraduate training a periodic internal objective assessment is needed. A few such methods are

a) assessing grading score for the log book every 6 months
b) Theory and practical examination periodically – once a year.

Program Outcomes

PO1 Offer to the community, the current quality of 'standard of care' in Pediatric Cardiology diagnosis as well as therapeutics.

PO2 Utilize the knowledge and skills acquired in allied specialties such as Anatomy, Physiology, Biochemistry, Pharmacology, Pathology , Microbiology, and Pediatrics.

PO3 Competnecy in diagnosis and management processes

PO4 Keeping abreast of all recent developments and emerging trends in the field of Pediatric Cardiology

PO5 Evaluate own professional activities, educational needs and select appropriate learning resources periodically.

PO6 Contribute as an individual/ or in a group or institution towards the fulfillment of national objectives concerning diseases.

PO7 Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.

PO8 Effectively communicate with colleagues.

Program Specific Outcomes

PSO1 Ability to manage common emergencies.

PSO2 Perform out patient services including patient screening and disease determination.

PSO3 Participate in community out reach activities like camps, school screening and public education.

PSO4 Prescribe medications for various ailments and follow up patients to understand outcomes.

PSO5 Present academic papers in State/National conference.

PSO6 To participate in department research activities and clinical audit.

SYLLABUS

Theory

Students should acquire adequate theoretical knowledge in the following fields

1. Applied anatomy - cardiac anatomy and examination of cardiac specimens, embryology and development, pulmonary system , renal system and other organs.
2. Applied physiology – cardiac cycle, cardiac contraction, ionic basis, receptor concepts, hemodynamics, pulmonary circulation, electrophysiology, acid base balance, fetal and transitional circulation, physiology of exrtacorporeal circulation.
3. Genetics and molecular biology in the context of cardiac development.
4. Applied pathology –, rheumatic fever, valvular lesions, myocarditis, pericarditis, endocarditis, cardiomyopathies, cardiac tumors, immunological disorders, endomyocardail biopsy.
5. Pharmacology related to cardiovascular therapy and related disorders
6. Microbiology relevant to cardiovascular and related infections
7. Clinical cardiology – congenital heart diseases, valvular lesions, rheumatic fever, endocarditis, Kawasaki's disease , pericardial disease, myocardial diseases, cardiac failure, Conduction disorders and elctrophysiology, cardiac tumors, metabolic and nutritional cardiac disorders, fetal cardiac disorders, systemic hypertension, pulmonary hypertension, growth and nutrition, cardiac involvement in systemic illnesses, Cardiovascular surgery, Aortic disorders, immunological disorders, Cor Pulmonale, Coronary risk factors in childhood, Cardiac trauma and new entities
8. Investigations & instrumentation – basic investigations like biochemistry , clinical pathology and microbiology , electrocardiogrpathy, radiology, Echocardiography, including 3D, fetal, trans-esophageal and epicardial), cardiac catheterization and angiography including common interventions, radionucleide studies, cardiac CT, MRI, PET, electrical & radiation safety norms and any new modalities.
9. Cardiovascular therapy – pharmacotherapy, pacemakers, cardioverter defibrillator, cardiac interventions (congenital heart diseases, valvular heart

dieases), cardiovascular surgery including cardiac transplantation, stem cell therapy, gene therapy and new developments.

10. Preventive cardiology and cardiac rehabilitation.
11. Grown –up congenital heart disease (GUCH).
12. Update on advances in Pediatric cardiology.
13. Research methodology
14. Economics in cardiovascular management
15. Communicative skills, social medicine

II Practical syllabus

Ward	6 months
Outpatient care	6 months
Training in pediatric cardiac ICU	6 months
Noninvasive lab (echo) training	6 months
Invasive training (cath lab)	6 months
Cardiac surgery training	3 months
Research and statistics (first year)	1 month
Rural care / hospital administration	1 month
Examination	last month

Courses:

Course - I Basic Sciences (Code DMPC1)

CO1: Applied anatomy knowledge- cardiac anatomy and examination of cardiac specimens, embryology and development, pulmonary system , renal system and other organs.

CO2: Applied physiology knowledge: cardiac cycle, cardiac contraction, ionic basis, receptor concepts, hemodynamics, pulmonary circulation, electrophysiology, acid base balance, fetal and transitional circulation, physiology of exrtacorporeal circulation.

CO3: Knowledge in the genetics and molecular biology in the context of cardiac development.

CO4: Applied pathology knowledge–, rheumatic fever, valvular lesions, myocarditis, pericarditis, endocarditis, cardiomyopathies, cardiac tumors, immunological disorders, endomyocardail biopsy.

CO5: Knowledge of the pharmacology related to cardiovascular therapy and related disorders

CO6: Knowledge of the microbiology relevant to cardiovascular and related infections

Applications of anatomy including cardiac anatomy and examination of cardiac specimens, embryology and development, pulmonary system , renal system and other organs.

Relevant physiology such as cardiac cycle, cardiac contraction, ionic basis, receptor concepts, hemodynamics, pulmonary circulation, electrophysiology, acid base balance, fetal and transitional circulation, physiology of exrtacorporeal circulation.

Genetics and molecular biology in the context of cardiac development.

Pathological features of important diseases such as rheumatic fever, valvular lesions, myocarditis, pericarditis, endocarditis, cardiomyopathies, cardiac tumors, immunological disorders, endomyocardail biopsy.

Pharmacology related to cardiovascular therapy and related disorders

Microbiology relevant to cardiovascular and related infections

Course - II Clinical Paediatric Cardiology (Code DMPC2)

CO1: Knowledge about congenital heart diseases, valvular lesions, rheumatic fever, endocarditis and Kawasaki's disease.

CO2: Knowledge about pericardial disease, myocardial diseases, cardiac failure, Conduction disorders and elctrophysiology and cardiac tumors

CO3: Knowledge about metabolic and nutritional cardiac disorders, fetal cardiac disorders, systemic hypertension and pulmonary hypertension.

CO4: Knowledge about growth and nutrition, cardiac involvement in systemic illnesses, Cardiovascular surgery.

CO5: Knowledge about aortic disorders, immunological disorders, Cor Pulmonale, Coronary risk factors in childhood, Cardiac trauma and new entities.

Knowledge about important clinical conditions such as congenital heart diseases, valvular lesions, rheumatic fever, endocarditis, Kawasaki's disease , pericardial disease, myocardial diseases, cardiac failure, Conduction disorders and electrophysiology, cardiac tumors, metabolic and nutritional cardiac disorders, fetal cardiac disorders, systemic hypertension, pulmonary hypertension, growth and nutrition, New onset Bundle branch blocks, cardiac involvement in systemic illnesses, Cardiovascular surgery, Aortic disorders, immunological disorders, Cor Pulmonale, Breathlessness in Cardiology patients Coronary risk factors in childhood, Principles of management of cardiac pain, Cardiac trauma and new entities

Course - III Cardiac Investigations and Cardio Vascular Therapy (Code DMPC3)

CO1: Knowledge about basic investigations like biochemistry , clinical pathology and microbiology.

CO2: Competency in investigations like electrocardiograpthy, radiology, Echocardiography, including 3D, fetal, trans-esophageal and epicardial), cardiac catheterization and angiography including common interventions and radionucleide studies.

CO3: Knowledge about cardiac CT, MRI, PET, electrical & radiation safety norms and any new modalities.

CO4: Competency in pharmacotherapy, pacemakers, cardioverter defibrillator, cardiac interventions (congenital heart diseases, valvular heart dieases), cardiovascular surgery including cardiac transplantation, stem cell therapy, gene therapy and new developments.

CO5: Knowledge about preventive cardiology and cardiac rehabilitation.

CO6: Knowledge about grown up congenital heart disease.

Knowledge about basic investigations like biochemistry , clinical pathology and microbiology , electrocardiograpthy, radiology, Echocardiography, including 3D, fetal, trans-esophageal and epicardial), Details about the importance of

cardiac enzymes, cardiac catheterization and angiography including common interventions, radionucleide studies, cardiac CT, MRI, PET, electrical & radiation safety norms and any new modalities.

Details about cardiac biomarkers

Details about cardiovascular therapy including pharmacotherapy, pacemakers, cardioverter defibrillator, cardiac interventions (congenital heart diseases, valvular heart dieases), rate controlling drugs that are used in cardiology, cardiovascular surgery including cardiac transplantation, stem cell therapy, gene therapy and new developments.

Course - IV Recent Advances (DMPC4)

CO1: Updated knowledge of technologies and instrumentations used in Pediatric Cardiology.

CO2: Updated knowledge on the drugs used in the practice of pediatric cardiology.

CO3: Knowledge about the recent published research papers in pediatric Cardiology.

Knowledge about latest /Updated treatment modalities and publications in an international setting

Soft Skills (Code DMPC5) _ Elective Course

CO1: Competency to conduct a clinical research.

CO2: Acquisition of pedagogical skills for students (MBBS, Specialities)

CO3: Ability to work as a member of a healthcare team.

CO4: Communication skills with patients, caregivers and colleagues including non medical staff and an understanding of economics in cardiovascular management.

CO5: Attitude to be a lifelong learner.

Examination

As per the common regulations

4 papers of 3 hours duration with maximum marks of 100 each

Paper I – Basic sciences

Paper II –Clinical Pediatric cardiology

Paper III – Cardiac investigations and cardiovascular therapy

Paper IV – Recent advances

Practical

Clinical and viva voce

Long case x 1 -	1 hour
Short cases x 2	30 minutes each
Ward/ICU rounds	30 minutes
Viva voce	30 minutes

Criteria for declaring pass

Minimum (separate)
50% for theory (aggregate of four papers)
50% for clinical
50% for viva voce
Acceptance of thesis / dissertation

MODEL QUESTION

DM PEDIATRIC CARDIOLOGY – PAPER I

Basic sciences

Time 3 hours Max.marks 100

(all questions carry equal marks)

Discuss briefly the following

1. development of aortic arch and its clinical applications
2. Applied anatomy of ventricular septum.
3. microbiology of native valve endocarditis.
4. Phosphodiesterase inhibitors in pediatric cardiology.
5. Fetal circulation.
6. genetics of cardiomyopathy
7. physiology of pulmonary circulation
8. ionic basis of cardiac arrhythmias
9. pathology of cardiac tumors
10. Endothelin receptors.

MODEL QUESTION

DM PEDIATRIC CARDIOLOGY

Paper II – clinical cardiology

Time 3 hours Max.marks 100

(all questions carry equal marks)

1. Classification of double outlet right ventricle and discuss physiological implications.

2. Changing trends in rheumatic fever

3. Treatable cardiomyopathies in childhood.

4. Coronary involvement in Kawasaki's disease.

5. Coronary anatomy in transposition of great vessels.

6. Outline the localization of accessory pathway by surface ECG

7. Surgical management of single ventricle.

8. Pulmonary hypertension in children – causes and approach.

9. Outline the approach to cardiac malpositions

10. A 5-year old child with a background of arterial switch operation for TGA in newborn period needs to undergo a surgery for a urinary problem. You are asked to provide a pre-operative clearance. How will you proceed ?

MODEL QUESTION

DM PEDIATRIC CARDIOLOGY

Paper III – Investigations & cardiovascular therapy

Time 3 hours Max.marks 100

(all questions carry equal marks)

1. Trans-catheter management of ASD – case selection and technical issues.
2. Pacemaker therapy in children.
3. Arterial switch operation – case selection and outcomes in current era.
4. Non surgical management of PDA.
5. 25 year old primigravida, 32 weeks gestation, has a fetus with tachyarrhythmia and hydrops - outline the management strategy
6. Intracardiac echocardiography – current applications
7. Long-term outcomes after Senning's operation.
8. Discuss the applications of cardiac MRI in pediatric cardiac practice.
9. Anticoagulants in pediatric cardiology.
10. 3 D echo evaluation of common AV valve.

MODEL QUESTION

DM PEDIATRIC CARDIOLOGY

Paper IV – Recent advances

Time 3 hours Max.marks 100

(all questions carry equal marks)

1. Childhood atherosclerotic risk factors.
2. Role of ACE inhibitors in pediatric heart failure.
3. Short QT syndrome – discuss
4. Pediatric heart transplantation.
5. Changing trends in infective endocarditis prophylaxis – discuss
6. Newer therapeutic options for pulmonary hypertension.
7. Telemedicine in pediatric cardiac care.
8. Current recommendations for neonatal cardiac screening.
9. Radio-frequency ablation in pediatric age group.
10. Fetal cardiac interventions.

READING – RECOMMENDED BOOKS AND JOURNALS

BOOKS

Must read:

1. Heart disease in infants, children and adolescence – Moss, Adams: Baltimore, Williams & Wilkins.
2. Nadas Pediatric Cardiology. Keane JF, Lock JE, Fyler DC. Saunders.
3. Clinical recognition of congenital heart disease – Perolff .JK, Philadelphia, WB Saunders.
4. Congenital Diseases of the Heart: Clinical-Physiological Considerations Abraham Rudolph. 3rd Edition.
5. Echocardiography in Pediatric heart disease – Snider AR, Serwer GA, Ritter SB. Mosby.
6. Diagnostic and Interventional catheterization in congenital heart disease. James Lock et al 2nd edition.
7. Valvular heart disease**.** Joseph Alpert. 3rd Edition.
8. Essentials of Bedside Cardiology**.** Jules Constant. 2nd Edition.
9. The Natural and Modified History of Congenital Heart Disease

Robert M. Freedom, Shi-joon Yoo, Haverj Mikailian, William G. Williams. (2004)

Must refer:

1. Heart Disease – a text book of cardiovascular medicine; Zipes DP, E. Braunwald, Philadelphia, Elsevier Sauders.
2. The Heart – Fuster V , Mc Graw Hill Co.
3. Drugs for the Heart. Lionel H. Opie. 7th Edition.
4. Echocardiography, Feigebaum , William & Wilkins , Baltimore.
5. Echocardiography in congenital heart disease: A practical approach. Shrivatsava S, Radhakrishnan S, Tomar M. Siddharth Publications.

6. Percutaneous interventions for congenital heart disease. Sievert H, Qureshi SA, Wilson N, Hijazi ZM. Informa Healthcare.
7. Cardiac catheterization, angiogram and interventions- William Grossman, Philadelphia. Lea & Febiger.
8. Congenital heart disease. Textbook of angiocardiography. Freedom RM, Mawson JB, Yoo SJ, Benson LN. Futura publications.
9. Cardiac Arrhythmias in Children and Young Adults with Congenital Heart Disease. Edward P. Walsh, J. Philip Saul, John K. Triedman
10. Cardiac surgery – Kirklin JW , Barret Boyes ; New York , Churchill Livingston
11. Congenital Heart Disease in adults – Perloff JK , Philadelphia , WB Saunders.
12. Rheumatic fever. Narula J, Virmani R, Reddy KS, Tandon R. American Registry of Pathology 1999.
13. Medical statistics. Principles and methods. Sundaram KR . BI Publications 2010.
14. Pediatrics clinics of North America (PCNA)
15. Cardiology clinics

Journals

National:

1. Annals of Pediatric cardiology.
2. Indian Heart Journal
3. Indian Pediatrics.
4. Indian Journal of Pediatrics.

International:

1. Circulation
2. Journal of American College of Cardiology

3. American Heart Journal
4. European Heart Journal
5. Circulation Research
6. Progress in cardiovascular disease
7. Heart
8. Pediatric cardiology
9. New England Journal of Medicine
10. Lancet
11. J American Society of Echocardiography
12. Eur. J of Echocardiography
13. Hypertension
14. J. Thoracic and cardiovascular surgery
15. Annals of thoracic surgery.
16. Catheterization and cardiovascular interventions.

AMRITA VISHWAVIDYAPEEDOM

AMRITA INSTITUTE OF MEDICAL SCIENCES

DOCOR OF MEDICINE (D.M.) PEDIATRIC CARDIOLOGY

LOG BOOK

Cover page , inner page 1

Page 2

CERTIFICATE

Dr……. has completed the three year course in

Doctor of Medicine (D.M.) Pediatric Cardiology of Amrita Vishwavidyapeedom in Amrita Institute of Medical Sciences, Edapally, Kochi from …….to……..

His conduct and character are …….

Head of Department Principal Medical Director

STUDENT INFORMATION

Name Sex: M/F DOB

Father's name

Residential address

Permanent address

Contact number

E mail id

Academic qualifications

Degree	Year	Institution & University

Registration number

Service details (if any)

Achievements

Papers presented / published

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