



الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Pediatric Cardiology



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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CONTRIBUTORS

Writing committee members

- Dr. Abdullah Alwadai , MD
- Dr. Abdullah Alhuzaimi, MD
- Dr. Dhafer Alshahrani
- Dr. Riyadh Abu-Sulaiman, MD
- Dr. Abdulmajeed Alotay, MD

Supervisors (Curriculum Specialist)

- Prof. Zubir Amin
- Dr. Sami Alshammari

Reviewers (Pediatric Cardiology Scientific Committee)

- Dr. Abdulmajeed Alotay
- Dr. Riyadh Abu-Sulaiman
- Dr. Fahad Alhabshan
- Dr. Mohammad Alhabdan
- Dr. Abdullah AlGwaee
- Dr. Naif AlKhushi

Curriculum Review Committee members:

- Dr .Ali AlAssiri MD, MME, FRCSC
- Dr. Sakra Balhareth, Pharm.D., BCPS, BCACP
- Dr. Ali AlShehri MBBS, Msc.MedEd. FRCSC, FACS

Approved by Head of Curriculum Review Committee:

- Dr.Ali Alassiri , MBBS, Msc.MedEd. FRCSC, FACS

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INTRODUCTION

History of the program

Pediatric cardiology training first started as a center-based fellowship in the early 1990s prior to the establishment of the Saudi Commission for Health Specialties (SCFHS). The training centers were the Prince Sultan Cardiac Center (PSCC) and King Faisal Specialist Hospital and Research Center (KFSH&RC), both in Riyadh. In the early 2000s, the King Abdulaziz Cardiac Center started a training program. Between 2005 and 2008, both the PSCC and King Saud University have combined training programs. Each center graduated many pediatric cardiologists who are practicing all over the Kingdom and in other Gulf countries.

As the SCFHS became more established, the training program directors of the three training centers met several times between 2006 and 2008 to arrange for a pediatric cardiology fellowship program curriculum under the authority of the SCFHS. The program started in 2009, and its first batch of graduates completed their training in December 2011.

There are six accredited training centers in Saudi Arabia as of 2021:

- 1- Prince Sultan Cardiac Center (Prince Sultan medical military city), Riyadh
- 2- King Faisal Specialist Hospital & Research Center, Riyadh
- 3- King Abdulaziz Medical City (National Guard Health Affairs), Riyadh
- 4- King Abdulaziz University Hospital, Jeddah joined with King Faisal Specialist Hospital & Research Center, Jeddah
- 5- Prince Sultan Cardiac Center, Qassim
- 6- King Fahad Medical City, Riyadh

Currently, the training centers accept 16 new fellows, and currently, there are 28 fellows in all 3 years of training, mostly from Saudi Arabia, with some from Bahrain, the United Arab Emirates, Yemen, Syria, Jordan, and Sudan.

We would also like to acknowledge that the CanMEDS framework is a copyright of the Royal College of Physicians and Surgeons of Canada, and many of the description's competencies have been acquired from their resources (Please refer to: CanMEDS 2015 physician competency framework; Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.).

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FOREWORD

In this updated curriculum, we adopt the CanMEDS framework (Copyright © 2013 The Royal College of Physicians and Surgeons of Canada. Referenced and produced with permission.. It is an innovative, competency-based framework that describes the required core knowledge, skills, and attitude of physicians. The curriculum projects a broad framework for fellows and faculty to focus on all aspects of teaching, learning, clinical experience, and professional development during the training program. This does not intend to be the sole source of defining what is to be gained during training. Fellows are expected to acquire knowledge and skills, develop appropriate attitudes and behaviors, and take personal responsibility for their learning. They must learn from every patient encounter, regardless of whether that particular condition or disease is included in the curriculum.

This curriculum is part of the strategic planning of SCFHS to review and update the curricula of training programs. It was developed and reviewed by the Scientific Council of Saudi Paediatrics Board, Scientific Committee of the Paediatric Cardiology Program, fellow representatives, and international and local advisors.

The Saudi Commission for Health Specialties, represented by the scientific committee of the Paediatric Cardiology Program and Central Accreditation Committee, is committed to providing full support for the implementation of the curriculum by way of allocating necessary resources, providing faculty development, and establishing a monitoring system. Further reinforcements and continuous quality improvement processes through feedback from fellows, trainers, and program directors, as well as site visits will be conducted by the Central Accreditation Committee and the Paediatric Scientific Board.

CONTEXT OF PRACTICE

Pediatric Cardiology is the branch of medicine concerned with the study of congenital cardiac malformations, acquired heart diseases, and abnormalities of the systemic and pulmonary circulations in pediatric patients. The incidence of severe congenital heart disease (CHD) among the Saudi population has increased to 5.4/1000 live birth/year according to local study by Almesned et al. (Cong Heart Dis. 2012). This situation exceeds international figures. With nearly 30% of the Saudi population under 14 years of age, this trend is expected to continue in the future. It is clear that having well-trained pediatric cardiologists is an essential part in maintaining a high-quality health service for the Saudi community, and this cannot be achieved without excellent training programs.

Enrolled fellows in this program, which is recognized by the SCFHS, must become familiar with the CanMEDS framework. It will be utilized in the training and upon completion of training and will be expected to be competent specialists in pediatric cardiology capable of assuming a consultant's role in the specialty. Fellows must acquire knowledge of the theoretical basis of the specialty, including its foundations in the basic medical sciences and research. Fellows must demonstrate the requisite knowledge, skills, and attitudes for effective patient-centered care and services for a diverse population.

Structure of the fellowship training program

The pediatric cardiology fellowship is a stand-alone 3-year training program after the candidate has completed pediatric residency. In cases where there is a shortage of an essential rotation (such as electrophysiology, adult congenital, or advanced imaging), it is mandatory that the fellow from that center should rotate to another center for that specific rotation. Other than



that, any other external rotation is optional to the fellow as long as it complements the training and is approved by the program director.

Each year has 13 rotations, each of which is composed of 4 weeks. A rotation will not be considered complete unless the trainee completes a minimum of 3 weeks.

In small centers, the volume does not permit the whole day full of service in a specific rotation (like outpatient service); it is the right of the program director to combine two rotations together or ask the fellow to cover other areas for maximum utilization of the training time.

The trainee is eligible for a 4 weeks' vacation each year that can be taken as one block (as long as the workload allows at the training center).

In case of extra time because of dividing the vacation in weekly blocks, that extra rotation is recommended to be spent on electives.

The rotations for the 3-year program are as follows:

Echocardiography	7 blocks
Catdiac catheterization	5 blocks
Electrophysiology	3 blocks
Outpatient clinic	5 blocks
Inpatient and consult	7 blocks
ICU	3 blocks
Adult congenital	1 blocks
Advanced imaging	1 blocks
Research	2 blocks
Elective	2 blocks
Vacations	3 blocks

Rotation name	F1	F2	F3	Duration
Echocardiography	3	2	2	7
Cardiac catheterization	1	2	2	5
Electrophysiology	1	1	1	3
Outpatient clinic	1	2	2	5
Inpatient and consult	3	2	2	7
Intensive care unit	1	1	1	3
Adult congenital			1	1
Advanced imaging		1		1
Research	1	1		2
Elective		1	1	2
Vacations	1	1	1	3
Total	13	13	13	39

Differences between previous and current curriculum

Philosophical orientations

Competency-based



Graded responsibility for the physicians

Better supervisory frameworks

Clearer demarcation of the expectations at each stage of training

Core curriculum with elective options

Independent learning within a formal structure

Expanded range of competencies

Balanced representation of knowledge, skills, and professionalism

Incorporation of new knowledge and skills

Evidence-based approach

Demographic data (e.g., disease prevalence)

Practice data (e.g., procedure performed)

Patient profile (e.g., outpatient vs. inpatient)

Catering to future needs

Holistic assessment

Higher emphasis on continuous assessment

Balanced assessment methods

Portfolio and logbook to support learning and individualized assessment

Built-in formative assessment

Definitions used

Assumed Knowledge: Subjects during undergraduate program, including gained knowledge and skills

Attitude: “A relatively enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant objects, groups, events or symbols” (Hogg & Vaughan, 2005, p. 150)

“A psychological tendency that is expressed by evaluating a particular entity, with some degree of favor or disfavor” (Eagly & Chaiken, 1993, p. 1)

Behavior: An observable activity, the aggregate of responses to internal or external stimuli. The observed action or reaction of a material under the given circumstances

Competency: Possession of required skill, knowledge, or qualification Core (skills, knowledge, and professional behavior): Specific knowledge or skill or professional behavior that is specific and essential to pediatrics.

Knowledge: Familiarity with someone or something including facts, information, descriptions, or skills acquired through experience or education

Mastery: Expert skill or knowledge

Portfolio: A brief case of personal documents/data required and obtained skills and knowledge during the training program, including a logbook

Skills: Competence in performance, expertness, and dexterity

Universal: Knowledge, skill, or professional behavior that is universal for the practice of clinical medicine

Outcomes and Competencies

Rationale

The Saudi Board of Pediatric Cardiology Program aims to provide high-level, state-of-the-art clinical training, education, and research in the field of pediatric cardiology in accordance with the international educational standard to graduate a qualified and safe pediatric cardiologist.

Overall Goal

To provide pediatric cardiology fellows with educational experiences to obtain the necessary knowledge, skills, and attitudes to become well-rounded pediatric cardiologists, and prepare them to be competent pediatric cardiologists who are able to achieve, develop, and provide appropriate care while maintaining a high degree of professionalism and ethical standards in developing patient-physician relationships

Learning Outcomes

Successful fellows will acquire a broad understanding of the principles, philosophy, core knowledge, skills, and attitudes of pediatrics. By the end of their training, they should be able to achieve the following competencies:

Trainee Role	Goals and Objectives
Medical Expert	- Function effectively, integrating all the CanMEDS roles to provide optimal, ethical, and patient-centered medical care. - Establish and maintain clinical knowledge, skills, and attitudes appropriate to their level of practice. - Perform complete and appropriate patient assessment - Use preventive and therapeutic interventions effectively. - Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic. - Seek appropriate consultation from other health professionals, when needed, recognizing the limits of their expertise.
Communicator	- Develop rapport, trust, and ethical therapeutic relationships with patients and families. - Accurately elicit and synthesize relevant information and perspectives of patients and families, colleagues, and other professionals. - Accurately convey relevant information and explanations to patients and families, colleagues, and other professionals. - Develop a common understanding on issues, problems and plans with patients and families, colleagues, and other professionals to develop a shared plan of care.

Trainee Role	Goals and Objectives
	Convey effective oral and written information about a medical encounter.
Collaborator	- Participate effectively and appropriately in an interprofessional healthcare team. - Effectively work with other health professionals to prevent, negotiate, and resolve interprofessional conflicts.
Manager	- Participate in activities that contribute to the effectiveness of their healthcare organizations and systems. - Manage their practice and career effectively. - Allocate finite healthcare resources appropriately - Serve in administration and leadership roles, as appropriate.
Health Advocate	- Respond to individual patient health needs and issues as part of patient care. - Respond to the health needs of the communities that they serve. - Identify the determinants of health of the populations that they serve. - Promote the health of individual patients, communities, and populations.
Scholar	- Maintain and enhance professional activities through ongoing learning. - Critically evaluate information and its sources, and apply this appropriately in decision-making. - Facilitate the learning of patients, families, students, residents, other health professionals, the public, and others, as appropriate. - Contribute to the creation, dissemination, application, and translation of new medical knowledge and practices. - Participate in scientific research.
Professional	- Demonstrate a commitment to their patients, profession, and society through ethical practice. - Demonstrate a commitment to their patients, profession, and society through participation in profession-led regulation.



Continuum of Learning

Fellows-in-training will see children under a wide variety of conditions. As pediatric cardiology fellows progress in their training, they will accept increasing responsibilities in pediatric management. The first-year fellow is primarily responsible for ongoing assessment and daily care for the patient on the pediatric cardiology floor; they will be exposed to new skills that they have to master to help them in managing children with cardiac problems, including echocardiography, cardiac catheterization, exercise tests, electrocardiogram, Holter monitoring, and advanced cardiac imaging. These exposures will be supervised senior fellows and full-time consultants. Second-year fellows will have more opportunities to strengthen their knowledge and sharpen their skills in all procedures, and will be given the chance to work semi-independently at the end of the second year, while under appropriate supervision. Third-year fellows will have greater responsibility for the supervision of other fellows, and full-time consultants will conduct daily teaching rounds.

This short section shows the expected learning in each stage of progression within the pediatric specialty. The role changes between junior (F1), medium (F2), and senior (F3) levels, as detailed below:

F1 (junior)	F2 (medium)	F3 (senior)
Obtain fundamental knowledge related to core clinical problems in pediatric cardiology.	Apply knowledge to provide appropriate clinical care related to core clinical problems of the specialty.	Apply knowledge to provide appropriate clinical care related to core clinical problems of the specialty.
Develop clinical skills, such as physical examination and practical procedures, related to the core presenting problems and procedures in pediatric cardiology.	Analyze and interpret the findings from clinical skills to develop appropriate differential diagnoses and management plan for the patient.	Analyze and interpret the findings from clinical skills to develop appropriate differential diagnoses and management plan for the patient.

F1 (junior)	F2 (medium)	F3 (senior)
Direct supervision is immediately available.	The fellow will be given the chance to work semi-independently at the end of the second year, under appropriate supervision.	The fellow is expected to practice independently the skills learned at junior and medium levels.
If indirect supervision is provided, such supervision must be consistent with training policies and specific criteria that junior fellows must meet.	Should be involved in teaching the junior fellows	Supervise the routine activities of the junior fellows. Coordinate the care of multiple patients on the team assigned.
Examples of tasks that are expected at junior level: perform a history and physical order medications and diagnostic tests, collect and analyze test results communicate those to the other members of the team and faculty, obtain informed consent, perform simple procedures such as doing a normal study echocardiography, should be able to perform a complete assessment of the patient going to cath procedure and expect the outcome perform other invasive procedures such as line insertion in the cath lab under the direct supervision of the senior fellows at the discretion of	Should be able to do full echocardiography study independently, and be able to generate a report that is revised by the faculty Should be able to do a diagnostic cath study under direct supervision of the faculty	Senior fellows may perform some procedures with indirect supervision (such as full echo study for a complex congenital heart diseases) once competency has been documented according to established criteria. Senior fellows can perform more complex procedures, such as pericardiocentesis, under direct supervision of the faculty. Should be given the chance to do full diagnostic procedure in the cath lab Should be given the chance to participate in performing interventional procedures in the cath lab under faculty supervision



F1 (junior)	F2 (medium)	F3 (senior)
the responsible faculty member		
The fellow is expected to exhibit dedication to the principles that the patient is the ultimate focus of care.	Should be given a chance to initiate the management plan for the patient with indirect supervision of the faculty	Senior fellows should be able to demonstrate continued sophistication in the acquisition of knowledge and skills and further ability to function independently in evaluating patient problems and developing a plan for patient care.
With the assistance of an assigned mentor or the program director, a junior fellow must develop and implement a plan for study, reading, and research of selected topics that promotes personal and professional growth and be able to demonstrate successful use of the literature in dealing with patients.	Should concentrate on building a strong background of the knowledge related to the field	Senior fellow may respond to consults and learn the elements of an appropriate response to consultation in conjunction with the faculty member.
The fellow should be able to communicate with patients and families about the disease process and the plan of care as outlined by the attending physician.	The fellow should take a leadership role in teaching rotating residents and junior fellows	The fellow should take a leadership role in teaching rotating residents and medical students the practical aspects of patient care The fellow should be able to explain complex diagnostic and therapeutic procedures to the patient and family.

F1 (junior)	F2 (medium)	F3 (senior)
The fellow should be adept at the interpersonal skills needed to handle daily situations.	The fellow should be adept at the interpersonal skills needed to handle situations that are more difficult	The fellow should be adept at the interpersonal skills needed to handle situations that are more difficult.
The fellow is expected to demonstrate an understanding of the socioeconomic, cultural, and managerial factors inherent in providing cost-effective care.	The fellow is expected to demonstrate an understanding of the socioeconomic, cultural, and managerial factors inherent in providing cost-effective care.	The fellow is expected to demonstrate an understanding of the socioeconomic, cultural, and managerial factors inherent in providing cost-effective care.

Core Conditions

Major conditions in pediatric cardiology in Saudi Arabia:

Below is a list of the major conditions/diseases presented in the three major care sites in Saudi Arabia: outpatient, emergency rooms, and inpatients. The intention is to provide trainees with specific areas on which to focus during their training and to help them identify the disease process and presentations that must be mastered on a priority basis.

Outpatients Referral	Emergency Visits	Inpatients Admissions
Ventricular Septal Defect	Acute Heart Failure	Cyanotic Babies
Atrial Septal Defect	Cardiogenic Shock and Coarctation	Complex Congenital Heart Diseases
Atrioventricular Septal Defect	Infant Cyanosis	Post-Cardiac Surgery Complications
Tetralogy of Fallot	Tachycardias	Post-Cath Interventions
Heart Murmur	Myocarditis	Infective endocarditis



Outpatients Referral	Emergency Visits	Inpatients Admissions
Palpitations	Bradycardia and Heart Block	Kawasaki Disease
Rheumatic Heart Diseases	Syncope	Rheumatic fever
Chronic Heart Failure	Pericardial effusion and Tamponade	Arrhythmia
Cardiomyopathy		
Patent Ductus Arteriosus		
Chest Pain		

General Competencies:

In addition to the above competencies the fellow, the following are specific competencies that the pediatric cardiology fellow should complete by the end of their training especially as a medical expert:

Apply knowledge of the clinical, socio-behavioral, and fundamental biomedical sciences relevant to pediatric cardiology, including the following aspects:

- Clinical features, including presenting signs and symptoms, natural history, prognosis, genetic implications, and lifestyle effects of all major structural and acquired heart diseases
- Clinical course of diseases in related organ systems that may impact the cardiovascular system
- Embryological development of the cardiovascular system and pathogenesis of congenital malformations
- Gross and microscopic anatomy of the cardiovascular system, associated vascular trunks, and muscular and fibrous supports
- Cardiac muscle anatomy, composition, and physiology

- Mechanism underlying the resting membrane potential, conduction of an action potential, and transmission of electrical stimuli through myocytes
- Intracellular ion transport
- Cardiac enzymes, including their interaction, distribution and timing in myocardial injury
- Anatomy, function, and disorders of the pericardium/coronary arterial flow and oxygen delivery to myocytes
- Disorders of coronary arterial formation, including position and distribution, that may lead to myocardial ischemia
- Abnormalities and disorders of the immune system and infectious processes that may influence the myocardium or vascular system
- Role of exercise in changing cardiac physiology
- Influence of teratogens, such as infection and drugs, on fetal heart development
- Indications, mechanisms of action, and side effects of medications used in the therapy of cardiac disorders
- The importance of a healthy lifestyle in the prevention of cardiovascular disease, including the role of smoking, lipids, diet, and exercise
- Role and influence of heredity, gene disorders, and other biochemical and metabolic disturbances that may influence cardiac development and/or function
- Influence of therapies for other medical conditions, such as malignancies, which may have important secondary effects on myocardial function
- General principles of cardiopulmonary bypass and extracorporeal cardiac support and their long-term impact on neurodevelopment
- General principles, cardiac surgeries, cardiac structures, and various types of reconstruction
- Role of cardiac transplantation and other myocardial support devices in end-stage cardiac failure treatment
- Indications for the use of pacemakers and implantable cardio-defibrillators



Demonstrate effective, appropriate, and timely interpretation and application of results of the following diagnostic and therapeutic procedures:

- Electrocardiography
- Ambulatory monitors (Holter and loop recorders)
- Echocardiography (M-mode, 2D, Doppler, stress, transthoracic [TTE], transesophageal [TEE])
- Pericardiocentesis
- Temporary transvenous pacemakers
- DC cardioversion and defibrillation
- Balloon atrial septostomy
- Exercise (stress) testing
- Permanent pacemakers and implanted devices
- Invasive electrophysiology studies
- Cardiac catheterization (including right and left heart catheterization, hemodynamics, angiography, interventional catheterization)
- Other modalities of cardiac imaging (chest X-ray, computed tomography [CT] scan, magnetic resonance imaging [MRI])
- Rest and stress perfusion imaging

The fellow should also

- Obtain appropriate informed consent for the procedures.
- Document and disseminate information and outcomes of performed procedures.
- Ensure adequate follow-up for all procedures performed.

Subspecialty main Rotations Competencies and Specific rotations objectives

1. Echocardiography and Exercise Testing.

Introduction:

Fellows in pediatric cardiology should spend a minimum of seven blocks of echocardiography, including an echo lab for outpatient, inpatient portable

echo, and TEE. The training aims to provide the fellow with sufficient knowledge and experience to become proficient in performing and interpreting echocardiographic studies.

Minimum Requirements:

During the fellowship training, each fellow is expected to perform at least 250 TTE and 30 TEE studies.

Medical Expert:

By the end of the program, the pediatric cardiology fellows should understand the principles of echo and Doppler, become proficient in performing and interpreting transthoracic, and have enough knowledge to be able to deal with common problems in transesophageal and fetal echocardiograms for patients with congenital and acquired pediatric heart disease.

The fellows will be given didactic lectures, and will have hands on training in the echo lab, OR, and portable cases both by the echo staff and sonographers; however, they are also required to perform self-learning reading and discuss cases with the echo cardiographers if needed.

- Echocardiography rotations include all of the following: echo lab, portable echo, TEE, and echo performed during on-call, unless specified.
- Each group of objectives is assigned by the period matching the level of training that is expected to be mastered within the period.
- The level of training chosen to master each objective is based on the average, which means that the same objective can be mastered at an earlier level for some, and for those who could not master at the suggested level, they need to work harder to compensate before the next level is over.



F1

- Describe the indications, contra indications, benefits, limitations, and possible complications of different echocardiography studies (such as TEE and bubble studies).
- Perform a pre-sedation assessment for patients requiring sedation. Learn the indications, contraindications, and side effects of sedative drugs used for procedures.
- Become familiar with the basic principles of echocardiography and Doppler, transducer selection, and operation of the equipment.
- Obtain basic transthoracic echocardiographic views and measurements.
- Assess independently: systolic ventricular function, pericardial effusion, situs, and simple forms of congenital heart disease.
- Become familiar with the basic principles of exercise testing in children and adolescents.
- Learn the protocol of complete study and perform full normal study.

F2

- Assess the more complex types of congenital and acquired heart disease.
- Increase the number and quality of studies performed.
- Read and report echocardiograms with the pediatric echo reviewer (MD).
- Supervise performance of standard and cardiopulmonary exercise tests in children and adolescents.
- Understand indications for transthoracic echocardiography and exercise testing in patients with congenital or acquired cardiovascular disease
- Learn transesophageal echocardiography techniques in the OR and perform the basic views

F3

- Independently perform a complete complex CHD study during on-call and manage accordingly.
- Learn the techniques of fetal echocardiography.
- Understand fetal cardiac physiology, as defined by ultrasonography and Doppler techniques.

- Perform a full TEE assessment in the operating room and cardiac catheterization laboratory and be able to provide recommendations about the results under the supervision of the attending physician.
- Learn the technique of stress Dobutamine echocardiography.
- Assist to levels 1–2 pediatric cardiology fellows in obtaining transthoracic echocardiograms.
- Interpret standard and cardiopulmonary exercise tests in children and adolescents.

Communicator

- Document the pertinent medical history for the optimal performance of an echocardiography.
- Communicate effectively with patients and families about the procedure (such as sedated TTE, TEE, or stress echo) and explains the benefits and risks in order to obtain informed consent.
- Communicate actively with members of the echocardiography department and know when to ask for help from senior echocardiography technicians when needed.
- Communicate effectively with team members in inpatient and outpatient departments to coordinate the prioritization of studies and deliver complete and accurate information.
- Echocardiography reports should be completed and made available to the medical team within the same day.

Professional:

- General professional competencies should apply.
- Fellows should demonstrate accountability and professional behavior toward patients, families, and medical teams while observing ethical standards.
- Fellow must provide honest and compassionate care with respect, honesty and humility.
- The fellow should respect patient diversity and confidentiality.



- The fellow should demonstrate full commitment toward excellence in patient care, patient safety, quality improvement, and academic practice.

Collaborator:

- General collaboration competencies should apply.
- Know and all the members and players of patient care and their roles.
- Keep good relationships with physicians and other colleagues toward improving patient care, negotiating shared responsibilities, and managing conflicts in a professional manner.

Leader

- General leadership competencies should apply.
- Effective time management
- Participate in prioritization of procedures and understand waiting lists and risk stratification

Health advocate

- General competencies should apply.
- Identify health risk factors and advise patients toward healthy lifestyles and behaviors.
- Incorporate health promotion and prevention into daily practice.
- Understand patient social and home situation toward optimizing health.

Scholar

- General scholar competencies should apply.
- Fellow should learn how to find up to date evidence based references for his rotation
- Present echocardiography during morning meeting and cardiac surgical meeting
- Participate during Journal club and participate in other academic activities of the department.
- Recognize knowledge gaps and limitations and work on them.

- Participate in teaching of echo technicians, junior fellows, and healthcare team members

2. Cardiac Catheterization

Introduction:

Pediatric cardiology fellows should spend a minimum of five blocks in cardiac catheterization. During that, he/she should participate in a minimum of 75 catheterizations, including satisfactory numbers of mandatory interventions (e.g., atrial septostomy and pericardiocentesis).

Cardiac catheterization training aims to help the fellow acquire sufficient knowledge and experience to become proficient in performing and interpreting diagnostic cardiac catheterizations.

Medical Expert:

F1

- Recognize the basics of radiation safety
- Describe the indications, contraindications, and complications of diagnostic cardiac catheterization for pediatric and adult congenital heart disease.
- Describe the normal hemodynamic pressures, resistance and waveforms of pressure in different chambers.
- Apply the physiological basis and methods of cardiac output measurements using the Fick principle or thermos dilution.
- Apply the physiologic basis and formulas for measurement of pulmonary vascular resistance and systemic vascular resistance

F2 and F3

- Describe the normal anatomy of the vascular structure, including systemic veins, pulmonary veins, aorta and its branches, ventricular or atrial septal defects, valvular or subvalvular stenoses, and others. (F2-F3)



- Perform standard views for routine angiography and ventriculography and be able to interpret angiography by identifying catheter course, catheter location, projection, and findings
- Recognize the indications, complications of common interventional cardiac procedures such as transcatheter PDA closure, ASD closure, VSD closure, balloon valvuloplasty, stenting of arteries, and occlusion of collaterals.
- Describe the protocol of assessment of single ventricle physiology before and after surgery(such as pre-Fontan and pre-Glenn study)
- Describe the protocol of diagnostic coronary angiography, and protocol of pulmonary hypertension assessment.
- Describe the approach to systemic venous desaturation in single ventricle patients.
- Fellow must be familiar with vascular access complications management.

Skills:

F1

- Able to take informed consent (diagnostic procedure)
- know how to perform vascular access, including the femoral, jugular, and umbilical arteries or veins.
- Recognize the basics of radiation safety, including steps to minimize radiation exposure to patients and the operator.
- Recognize the difference between common types of catheter and wires.

F2 and F3

- Able to take informed consent (interventional procedure)
- Perform straightforward diagnostic cardiac catheterization (including right and left heart studies).
- Fellow must know how be able to perform balloon atrial septostomy.
- Fellows must be able to recognize the indications and contraindications of pericardiocentesis.

Communicator

- Document detailed history, assessment and plan in the chart.
- Able to communicate with patients and families about the procedure and explain the benefits and risks of obtaining informed consent. In addition, the ability to communicate actively with all medical team members about findings and plans after the procedure.
- Able to communicate effectively with team members in the catheterization suite to coordinate scheduling of patients and deliver complete and accurate information.
- Cardiac catheterization reports should be completed and made available to the medical team within the same day of the procedure.

Professional

- General professional competencies should apply.
- Fellows should demonstrate accountability and professional behavior toward patients, families, and medical teams while observing ethical standards.
- Fellow must provide honest and compassionate care with respect, honesty and humility.
- The fellow should respect patient diversity and confidentiality.
- The fellow should demonstrate full commitment toward excellence in patient care, patient safety, quality improvement, and academic practice.

Collaborator

- General collaboration competencies should apply.
- Know and all the members and players of patient care and their roles.
- Maintain good relationships with physicians and other colleagues toward improving patient care, negotiating shared responsibilities, and managing conflicts in a professional manner.

Leader

- General Leadership competencies should apply.
- Effective time management.



- Participate in prioritization of procedures and understand waiting lists and risk stratification.

Health advocate

- General competencies should apply.
- Identify health risk factors and advise patients toward healthy lifestyles and behaviors.
- Incorporate health promotion and prevention into daily practice.
- Understand patient social and home situation toward optimizing health.

Scholar

- General scholar competencies should apply.
- Fellow should learn how to find evidence-based references.
- Present during Journal club and participate in other academic activities of the department.
- Recognize knowledge gaps and limitations and work on them.
- Participate in teaching junior fellows and other healthcare team members.

3. Clinical pediatric cardiology (Inpatient and Outpatient Rotations)

Introduction:

The clinical pediatric cardiology rotation will include all rotations that deal with the clinical care of the patient with CHD while admitted in the regular ward or as a consult service to other subspecialties or as outpatient care in the clinic or emergency department.

The duration for all these services should be 11 blocks during the entire program, and the suggested distribution is

Inpatient and Consult Rotations: 7 blocks

Outpatient Rotations: 4 blocks

However, this may differ to some extent from center to center, depending on the internal arrangement of each training center.

Medical Expert

- Be proficient in taking cardiac history and physical examination and demonstrating relevant cardiac clinical signs.
- Recognize the approach to cardiac murmurs, cyanosis, abnormal heart sounds, and other common cardiac presentations such as chest pain, syncope, dizziness, etc.
- Describe the basic principles of the anatomy, physiology, and embryology of the cardiovascular system and its implications for disease development and management.
- Describe the natural and modified history of each cardiac lesion and be able to counsel patients (and their families) toward management options and long-term prognosis.
- Describe the normal fetal and perinatal circulation, the expected circulation changes after birth, understanding the pathophysiology of left-to-right shunt lesions, cyanotic heart lesions, and the pathophysiology of obstructive and valvular regurgitation lesions.
- Recognize the common genetic syndromes associated with CHD and the principles of genetic testing and counseling.
- Recognize common rhythm abnormalities and manage them.
- Participate in medical decision-making.
- Recognize postoperative cardiac complications (such as pericardial effusion, chylothorax, arrhythmia, etc.)
- Apply the physiologic basis and diagnostic workup methods for all cardiac medical conditions, including:
 1. Pulmonary hypertension workup
 2. Heart failure in children
 3. Infective endocarditis
- Recognize the cardiac medications, class and mechanism of action, indications, and side effects.
- Describe the complications of Fontan and treatment strategies for Fontan failure.



- Describe the radiological signs of cardiac and respiratory diseases on chest x-ray.
- Recognize the indications and advantages of advanced imaging such as cardiac CT 3D echocardiography and cardiac MRI.

Skills:

- Perform and utilize different diagnostic tests such as 12-lead ECG, Holter monitoring, exercise testing, and event monitors.
- Describe the indications and participate in performing therapeutic procedures such as pericardiocentesis, temporary pacing, DC cardioversion, defibrillation, and balloon atrial septostomy.

Communicator:

- Chart detailed patient histories, assessments, and plans.
- Perform a consultation in appropriate manner and communicate effectively with consulting services.
- Communicate with patients and families, explaining the benefits and risks of obtaining informed consent for procedures. Develop the ability to communicate actively with all medical team members.
- Able to communicate effectively with medical team members to coordinate the care of patients and deliver complete and accurate information.
- Complete reports of diagnostic tests including ECG, 24-hour Holter, and exercise tests

Collaborator:

- General collaboration competencies should apply.
- Recognize all the members and players of patient care and their roles.
- Involve other specialties as needed and participate effectively in multidisciplinary meetings.
- Keep good relationships with physicians and other colleagues toward improving patient care, negotiating shared responsibilities, and managing conflicts in a professional manner.

Manager:

- General leadership competencies should apply.
- Effective time management during round and educational activities: Participate in the prioritization of procedures and understand waiting lists and risk stratification
- Participate in decision regarding admission, transfer and discharge patients to help management of priorities
- Participate in administrative meetings of the department and collaborate with others to achieve the objectives of the department.

Health Advocate:

- General competencies should apply.
- Identify health risk factors and advise patients toward healthy lifestyles and behaviors.
- Demonstrate knowledge about genetic counselling and explain it to patients.
- Describe how to counsel families about the natural history of the disease and possible interventions in the future.
- Recognize the barriers to for healthcare and help patients to overcome them.

Scholar

- General scholar competencies should apply.
- Describe how to find up to date evidence based references
- Recognize how to ask a learning question.
- Present during Journal club and participate in other academic activities of the department.
- Recognize knowledge gaps and limitations and work on them.
- Participate in teaching junior fellows and other healthcare team members.

Professional

- General professional competencies should apply.



- Fellows should demonstrate accountability and professional behavior toward patients, families, and medical teams while observing ethical standards.
- Fellow must provide honest and compassionate care with respect, honesty and humility.
- The fellow should respect patient diversity and confidentiality.
- The fellow should demonstrate full commitment toward excellence in patient care, patient safety, quality improvement, and academic practice.
- Fellows should respond to the ethical issues arising in patient care, whether from patients, relatives, or medical staff.

4. Pediatric Cardiac Electrophysiology

Introduction:

Fellows in pediatric cardiology should spend a minimum of three blocks of cardiac electrophysiology training. The main goal of EP rotation is to acquire background knowledge and experience, which is necessary for the practice of electrophysiology in pediatric patients. This includes dealing with emergency arrhythmia management, cardioversion, selection of patients for EP studies, or ablation and emergency pacing.

Minimum Requirements:

The fellow must participate in the following procedures by the end of training:

- EP procedures (6 cases)
- Pacemaker and ICD interrogations (15 cases)
- Temporary pacemaker adjustment (15 cases)
- Tilt table test (6 cases)

Medical expert:

F1

- Describe the anatomy and histology of the normal conduction system.
- Describe the normal electrophysiologic properties of different conduction structures.

- Describe the phases of cardiac action potential.
- Describe the basics of development of normal cardiac conduction system.
- Describe the approach and treatment of cardiac and non-cardiac syncope.
- Describe the approach to cardiac channelopathies including long QT and sudden death.
- Describe the Vaughan-Williams classification of anti-arrhythmic drugs, mechanism of action, and side effects of antiarrhythmic drugs.
- Describe the indications for pacing and implantable cardioverter-defibrillators (ICD) in the pediatric population.
- Describe the approach to wide and narrow complex tachycardia, including emergency management and cardioversion/defibrillation.
- Describe the indications, contraindications for exercise testing, and understanding of normal exercise responses.

F2-F3

- Describe the role of head-up tilt testing in the diagnosis of syncope in pediatric patients
- Understand indications, limitations, complication of catheter ablation.
- Diagnose and treat common rhythm disorders.
- Describe the indications of EP and Ablation studies.
- Describe the principles of reading the intra-cardiac tracing and interpret common abnormalities.
- Recognize the abnormalities of the conduction system in abnormal hearts (e.g., tricuspid atresia , TGA)
- Diagnose and start initial treatment of fetal arrhythmia.

Skills

- Perform and fully interpret 12-lead ECG.
- Interpret 24-hour Holter monitoring.
- Supervise and interpret tilt table tests.
- Supervise and interpret exercise testing
- Interrogate and troubleshoot pacemaker, ICD, and loop recorder devices.



- Get oriented to temporary pacemaker devices and change settings as required.
- Perform electrical cardioversion.
- Place temporary RV pacemaker lead, test pacing threshold and sensitivity and adjust pacemaker.
- Attend EP studies and place catheters in the atrium, ventricle, coronary sinus, and HIS positions, and read normal intracardiac signals in those places.

Communicator

- Document detailed history, assessment and plan in the chart.
- Communicate with patients and families to explain the benefits and risks of obtaining informed consent for EP procedures
- Develop the ability to communicate actively and effectively with all medical team members.
- Communicate effectively with medical team members to coordinate the care of patients and deliver complete and accurate information.
- Complete reports of diagnostic tests including ECG, 24-hour Holter and exercise tests.

Professional

- General professional competencies should apply.
- Demonstrate accountability and professional behavior toward patients, families, and medical teams while observing ethical standards
- Provide honest and compassionate care with respect, honesty and humility.
- Respect patient diversity and confidentiality.
- Demonstrate full commitment toward excellence in patient care, patient safety, quality improvement, and academic practice.

Collaborator

- General collaboration competencies should apply.
- Recognize members and players of patient care and their roles.

- Keep good relationships with physicians and other colleagues toward improving patient care, negotiating shared responsibilities, and managing conflicts in a professional manner.

Leader

- General Leadership competencies should apply.
- Effective time management
- Participate in prioritization of procedures and understand waiting lists and risk stratification

Health advocate

- General competencies should apply.
- Identify health risk factors and advise patients toward healthy lifestyles and behaviors.
- Incorporate health promotion and prevention into daily practice.
- Understand patient social and home situation toward optimizing health.

Scholar

- General scholar competencies should apply.
- Describe how to find up to date evidence based references for his rotation
- Present during Journal club and participate in other academic activities of the department. .
- Recognize knowledge gaps and limitations and work on them.
- Participate in teaching junior fellows and other healthcare team members.

5. Adult Congenital Heart Disease:

Introduction

Pediatric cardiology fellows should spend a minimum of one block of adult CHD during training. The main goal of this rotation is to provide the fellow with the insight and experience necessary for the management of adult patients with congenital heart disease.

Medical Expert

- Describe the differences between adult and pediatric patients in terms of physiology, clinical presentation, and management of specific lesions.
- Describe how to utilize diagnostic tools (such as TEE, CT, or MRI) in adult patients with CHD
- Describe the indication of interventions (surgical or transcatheter) in CHD among adults
- Describe the principles of counseling women with CHD regarding pregnancy (risk stratification) and contraceptive options.
- Describe the long-term outcomes and complications of simple and complex CHD.
- Describe the principles of the management of cyanotic adult patients (e.g., Eisenmenger syndrome).
- Appropriately manage pulmonary vascular obstructive disease cases.
- Indications and interpretation of the 6-minute walk test.

Communicator

- Document detailed history, assessment and plan in the chart.
- Communicate with patients and families to explain the benefits and risks of obtaining informed consent for EP procedures Communicate actively with all medical team members.
- Communicate effectively with medical team members to coordinate the care of patients and deliver complete and accurate information.
- Complete reports of diagnostic tests including ECG, 24-hour Holter, and exercise tests

Professional

- General professional competencies should apply.
- Demonstrate accountability and professional behavior toward patients, families, and medical teams while observing ethical standards
- Provide honest and compassionate care with respect, honesty and humility.
- Respect patient diversity and confidentiality.

- Demonstrate full commitment toward excellence in patient care, patient safety, quality improvement, and academic practice.

Collaborator

- General collaboration competencies should apply.
- Collaborate with adult cardiology and obstetrics services to provide quality of care.
- Keep good relationships with physicians and other colleagues toward improving patient care, negotiating shared responsibilities, and managing conflicts in a professional manner.

Leader

- General leadership competencies should apply.
- Effective time management
- Participate in prioritization of procedures and understand waiting lists and risk stratification

Health advocate

- General competencies should apply.
- Describe health risk factors among adult patients with CHD and advise patients toward healthy lifestyles and behaviors.
- Incorporate health promotion and prevention into daily practice.
- Understand patient social and home situation toward optimizing health.

Scholar

- General scholar competencies should apply.
- Describe how to find up to date evidence based references
- Present during Journal club and participate in other academic activities of the department. .
- Recognize knowledge gaps and limitations and work on them.
- Participate in teaching junior fellows and other healthcare team members.



TEACHING AND LEARNING ACTIVITIES

Trainees will achieve the competencies described in the curriculum through a variety of learning methods. There will be a balance between different modes of learning from formal teaching programs to experiential learning. The training center should utilize the following framework for education:

1. Formal Teaching and Learning Activities:

- Core specialty topics (70%)
- Universal topics (10%)
- Fellow's selected topics (20%)

2. Practice-Based Learning (PBL):

- Morning report case presentations (optional)
- Morbidity and mortality review
- Journal club
- Case presentation
- Grand round/guest speakers on core specialty topics
- Joint specialty meeting

3. Work-Based Learning (WBL):

- Daily-round-based learning
- On-call-based learning
- Clinic-based learning
- Workshops and courses

4. Self-directed Learning

5. Half-Day Release Course(HDRC)

a. Formal Teaching and Learning Activities:

Core Specialty Topics (70%)

Formal teaching was utilized during the fellowship program for 1–2 hours per week. Topics might include interactive lectures, case discussions, quizzes, or videos. This ensures that Fellows become well versed in important pediatric cardiology topics/clinical problems.

1. Universal Topics (10%):

The Saudi Commission for Health Specialties intends to develop an e-learning platform to deliver high value, interdisciplinary topics of the utmost importance to the trainee to ensure that they all receive high-quality teaching and develop essential core knowledge. These topics are common to all specialties and are delivered in a modular fashion. At the end of each learning unit, there was an online formative assessment. Upon completion of all topics, trainees undertake a combined summative assessment in the form of context-rich multiple-choice questions (MCQs) in which they must attain minimum competency.

Topics meet one or more of the following criteria:

- **Impactful:** These are common or life-threatening topics
- **Interdisciplinary:** Hence, topics that are difficult to teach in a single discipline.
- **Orphan:** Topics poorly represented in undergraduate curricula
- **Practical:** topics that trainees encounter in hospital practice.

The following are recommended modules to be completed:



Module 1: Introduction

- Safe drug prescription
- Hospital-acquired infections
- Sepsis, systemic inflammatory response syndrome (SIRS), and disseminated intravascular coagulation. DIC
- Antibiotic stewardship
- Blood transfusion

Safe drug prescription: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Recognize the importance of safe drug prescription in healthcare
2. Describe various adverse drug reactions with examples of commonly prescribed drugs that can cause them
3. Apply the principles of drug–drug interactions, drug–disease interactions, and drug–food interactions in common situations
4. Apply the principles of prescription drugs in special situations such as renal failure and liver failure
5. Apply the principles of prescribing drugs in elderly, pediatric, pregnant, and lactating patient groups
6. Promote evidence-based, cost-effective prescription
7. Discuss the ethical and legal frameworks governing safe-drug prescription in Saudi Arabia

Hospital-acquired infections (HAIs): Upon completion of the learning unit, the fellow should be able to perform the following:

1. Discuss the epidemiology of HAI with special reference to Saudi Arabia
2. Recognize HAI as one of the major emerging threats in healthcare
3. Identify the common sources of and circumstances surrounding HAI

4. Describe the risk factors for common HAIs such as ventilator-associated pneumonia, methicillin-resistant *Staphylococcus aureus*, central line-associated bloodstream infections, and vancomycin-resistant *Enterococcus*.
5. Identify the role of healthcare workers in the prevention of HAI
6. Determine appropriate pharmacological (e.g., selected antibiotics) and nonpharmacological (e.g., removal of indwelling catheters) measures in the treatment of HAI
7. Propose a plan to prevent HAI in the workplace

Sepsis, SIRS, and DIC: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Explain the pathogeneses of sepsis, systemic inflammatory response syndrome (SIRS), and disseminated intravascular coagulation (DIC)
2. Identifying patient-related and nonpatient-related predisposing factors for sepsis, SIRS, and DIC
3. Recognize patients at risk of developing sepsis, SIRS, and DIC
4. Describe the complications of sepsis, SIRS, and DIC
5. Apply the principles of management of patients with sepsis, SIRS, and DIC
6. Describe the prognosis of sepsis, SIRS, and DIC

Antibiotic Stewardship: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Recognize antibiotic resistance as one of the most pressing global public health threats
2. Describe the mechanism of antibiotic resistance
3. Determine appropriate and inappropriate use of antibiotics
4. Develop a plan for safe and proper antibiotic use that includes correct indications, duration, types, and discontinuation.
5. Be aware of local guidelines for the prevention of antibiotic resistance



Blood transfusion: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Review the different components of blood products available for transfusion
2. Recognize the indications and contraindications of blood product transfusion
3. Discuss transfusion benefits, risks, and alternatives
4. Obtain consent for specific blood product transfusion
5. Perform the necessary steps for safe transfusion
6. Develop an understanding of the special precautions and necessary procedures during massive transfusions
7. Recognize transfusion-associated reactions and provide immediate management

Module 5: Acute care

- Preoperative assessment
- Postoperative care
- Acute pain management
- Chronic pain management
- Management of fluid in hospitalized patients
- Management of acid-base and electrolyte imbalances

Preoperative assessment: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Describe the basic principles of preoperative assessment
2. Perform preoperative assessment in uncomplicated patients, with a special emphasis on
 - i. General health assessment
 - ii. Cardiorespiratory assessment
 - iii. Medications and medical device assessment

- iv. Drug allergy
 - v. Pain relief requirements
3. Categorize patients according to risk

Postoperative care: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Devise a postoperative care plan including monitoring vital signs, pain management, fluid management, medication, and laboratory investigations
2. Handover patients properly to appropriate facilities
3. Describe the process of postoperative recovery
4. Identify common postoperative complications
5. Monitor patients for possible postoperative complications
6. Institute immediate management of postoperative complications

Acute pain management: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Review the physiological basis of pain perception
2. Identify patients who might be in acute pain proactively
3. Assess patients experiencing acute pain
4. Apply the various pharmacological and nonpharmacological modalities available for acute pain management
5. Provide adequate pain relief for uncomplicated patients with acute pain
6. Identify and refer patients experiencing acute pain who may benefit from specialized pain services

Chronic pain management: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Review biopsychosocial and physiological bases of chronic pain perception
2. Discuss the various pharmacological and nonpharmacological options available for chronic pain management



3. Provide adequate pain relief for uncomplicated patients with chronic pain
4. Identify and refer patients experiencing chronic pain who may benefit from specialized pain services

Management of fluids in hospitalized patients: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Review the physiological basis of water balance in the body
2. Assess patients' hydration status
3. Recognize patients who are dehydrated or overhydrated
4. Order fluid therapy (oral and intravenous) for hospitalized patients
5. Monitor fluid status and response to therapy via history, physical examination, and selected laboratory investigations

Management of acid-base and electrolyte imbalances: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Review the physiological basis of electrolyte and acid-base balance in the body
2. Identify diseases and conditions that are associated with or likely to cause acid-base and electrolyte imbalances.
3. Correct electrolyte and acid-base imbalances
4. Perform careful calculations, checks, and other safety measures while correcting the acid-base and electrolyte imbalances.
5. Monitor patient response to therapy via history, physical examination, and selected laboratory investigations

Module 7: Ethics and healthcare

- Occupational hazards for healthcare workers (HCWs)
- Evidence-based approach to smoking cessation
- Patient advocacy
- Ethical issues: transplantation, organ harvesting, and withdrawal of care
- Ethical issues: treatment refusal and patient autonomy

- **The role of doctors in death and dying**

Occupational hazards for HCWs: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Recognize common sources of and risk factors for occupational hazards in HCWs
2. Describe common occupational hazards in the workplace
3. Develop familiarity with the legal and regulatory frameworks governing occupational hazards in HCWs
4. Develop a proactive attitude to promoting workplace safety
5. Protect yourself and colleagues against potential occupational hazards in the workplace

Evidence-based approach to smoking cessation: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Describe the epidemiology of smoking and tobacco use in Saudi Arabia
2. Review the effects of smoking on smokers and their family members
3. Use pharmacological and nonpharmacological measures to treat tobacco use and dependence effectively
4. Effectively use pharmacological and nonpharmacological measures to treat tobacco use and dependence in special population groups, such as pregnant women, patients with psychiatric disorders, and adolescents

Patient advocacy: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Define patient advocacy
2. Recognize patient advocacy as a core value that governs medical practice
3. Describe the role of patient advocates in the care of the patients
4. Develop a positive attitude toward patient advocacy
5. Be a patient advocate in conflictive situations
6. Be familiar with local and national patient advocacy groups



Ethical issues: transplantation, organ harvesting, and withdrawal of care:

Upon completion of the learning unit, the fellow should be able to perform the following:

1. Apply the key ethical and religious principles governing organ transplantation and withdrawal of care
2. Be familiar with the legal and regulatory guidelines regarding organ transplantation and withdrawal of care
3. Counsel patients and their families in the light of applicable ethical and religious principles
4. Guide patients and their families in making informed decisions

Ethical issues: Treatment refusal and patient autonomy: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Predict situations in which patients or their family members are likely to refuse prescribed treatment
2. Describe the concept of the “rational adult” in the context of patient autonomy and treatment refusal
3. Analyze key ethical, moral, and regulatory dilemmas in treatment refusal
4. Recognize the importance of patient autonomy in the decision-making process
5. Counsel patients or family members who refuse medical treatment in the best interest of patients

Role of doctors in death and dying: Upon completion of the learning unit, the fellow should be able to perform the following:

1. Recognize the important role a doctor can play during the dying process
2. Provide emotional and physical care to dying patients and their families
3. Provide appropriate pain management in dying patients
4. Identify suitable patients and refer them to palliative care service

The fellows are encouraged to log on to the SCFHS website and go over these universal topics through the link:

<http://www.scfhs.org.sa/MESPS/Documents/Universal%20Topics.pdf>

a. PBL:

1. Morning report case presentations (for new admitted cases)
2. Morbidity and mortality review
3. Journal club
4. Case presentation
5. Grand round/guest speakers on core specialty topics
6. Cardio surgical meeting

b. WBL:

1. Daily round-based learning
2. On-call-based learning
3. Clinic-based learning
4. Workshops and courses
5. Hands-on learning during echocardiography, cardiac catheterization, and other procedures.

c. Self-directed learning

The fellow is expected to cover all topics of general pediatric cardiology. Basic knowledge can be obtained by covering a complete specialty textbook (such as Moss and Adam) in addition to other textbooks pertinent to subspecialties (as needed), up to date articles, review articles, international guidelines, and others.

Fellow-selected Topics (20%)

1. Trainees will be given choice to develop a list of topics on their own.
2. They can choose any topics relevant to their needs.
3. All these topics must be planned and cannot be random.
4. All the topics need to be approved by the local education committee.
5. Institution might work with trainees to determine the topics as well.



PRACTICE-BASED LEARNING

Practice-Based Learning	Objective	Competencies
Morning Report	- Educate all attending staff, monitoring pediatric cardiology patient care, and reviewing management decisions and their outcomes. - Develop competence in short presentation of all admitted pediatric cardiology patients in a scientific and informative fashion. - Generate appropriate differential diagnosis and proper management plan.	Manager Medical Expert Professional Scholar
Morbidity and Mortality Report	- Identify areas of improvement for clinicians involved in the case management. - Prevent errors that lead to complications. - Modify behavior and judgment based on previous experiences. - Identify systems issues that may affect the pediatric cardiology patient care and improve them.	Professional Manager Medical Experts
Grand Rounds/ Guest Speaker Lectures.	- Increase physician's medical knowledge and skills, and ultimately, improve patient care. - Understand and apply current practice guidelines in the field of pediatric cardiology. - Describe the latest advances in the field of pediatric cardiology. - Identify and explain areas of controversy in the field of pediatric cardiology.	Medical Expert Professional
Case Presentation	- Formulate list of all problems identified in the history and physical examination. - Develop a proper differential diagnosis for each problem. - Formulate a diagnosis/treatment plan for each problem.	Medical Expert Scholar

Practice-Based Learning	Objective	Competencies
	▪ Present a follow-up patient's case, in a focused, problem-based manner that includes pertinent new findings and diagnostic and treatment plans. ▪ Demonstrate a commitment to improving case presentation skills by regularly seeking feedback on presentations. ▪ Accurately and objectively record and present data.	
Journal Clubs, Critical Appraisal and Evidence-Based Medicine	▪ Promote continuing professional development. ▪ Keeping up -to-date with the literature. ▪ Disseminating information on and build up debate about good practice. ▪ Ensuring that professional practice is evidence based. ▪ Learning and practicing critical appraisal skills. ▪ Providing an enjoyable educational and social occasion.	Medical Expert Scholar Health Advocate
Joint specialty meetings.	▪ Provide the knowledge, technical skills and experience necessary for pediatric cardiology fellows to interpret and correlate clinical finding, echocardiography, and angiography and advanced imaging with the clinical and physiological changes. ▪ Promote effective communication and sharing of expertise with peers and colleague.	Medical Expert Communicator Collaborator Manager



Work-based learning	Objectives	Competencies
Daily Rounds-Based Learning	- Present a focused history and physical examination finding to the rounding team. - Document historical and physical examination findings according to accepted formats, including a complete written database and problem list. - Develop a patient management plan in consultation with others	Medical Expert Communicator Health Advocate Professional
On-Call Duty-Based Learning	- Elicit a comprehensive history and perform a complete physical examination on admission, write clearly the pediatric cardiac patient's assessment and differential diagnosis and initiate the plan of management. - Discuss the plan of management, including investigations and treatment plan with the seniors. - Communicate the plan to the nurse assigned to the patient care. - Perform the basic procedures necessary for diagnosis and management. - Attend to consultations within and outside the department, including emergency consultations and other specialties. - Perform and interpret diagnostic tests such as ECG, echocardiography and arrange for emergency cardiac catheterization such as septostomy or urgent surgeries.	Medical Expert Scholar Health Advocate Professional
Clinic-based learning	- Elicit a focused history and physical examination under the supervision of the consultant - Present briefly the clinical findings, ECG and Echo findings to the attending consultant - Discuss the differential diagnosis and the management plan with the attending consultant	Medical Expert Communicator Health Advocate

Work-based learning	Objectives	Competencies
	▪ Discuss with consultant the need for specialized procedures. ▪ Write the patient's assessment and differential diagnosis, and the plan of management. ▪ Supervise the resident's notes, orders, and management of the attending resident, Interpret and discuss the laboratory results with residents.	
Reporting-based Learning	• Review and report transthoracic and trans esophageal echocardiography studies and work as reporting consultant under supervision. • Report ECGs, Holter and stress exercise test under supervision and guidance from consultant • Report hemodynamic and angiographic results of cardiac catheterization under supervision	Medical Expert Communicator Professional

	Objectives	CanMEDS
Self-Directed Learning	▪ Maintenance of personal portfolio (self-assessment, reflective learning, personal development plan) ▪ Achieving personal learning goals beyond the essential, core curriculum ▪ Reading, including web-based material ▪ Reading journals ▪ Audit and research projects ▪ Attendance at national and international conferences	Professional Medical Expert Scholar

Example of weekly program

	Morning		Noontime	Afternoon	
Day	07:45-08:00	08:00-08:45	12:00-13:00		15:00-16:00
Sunday	Morning report	Cardio-surgical meeting			
Monday	Morning report	Journal Club		Core Curriculum academic half day	
Tuesday	Morning report	Grand round			Echo rounds
Wednesday	Morning report	Cardio-surgical meeting			Cath Lab
Thursday	Morning report	Scientific update			
Friday					
Saturday	Joint educational activities, workshops and courses				

Half-Day Academic Activity:

There should be one weekly 3-hour session in which fellows should be released from their commitment in quotations and block courses.

Objectives

- To link pediatric cardiology groups in hospital medicine
- To enable trainees to acquire up-to-date knowledge and exchange information and experience with their colleagues and trainers.
- To incorporate pediatric cardiology approach to clinical problem management
- To acquire skills important for cardiologists (problem solving, teamwork, consultation skills, and presentation skills)

Guidelines

- Main theme: Presentations by trainees, small groups, and workshops facilitated by trainers These should be presented in line with the problem-solving approach in the Pediatric Cardiology Group, with information given as much evidence-based as possible.
- To ensure the maximum benefit of these sessions, the trainer must contribute actively to the session.
- Yearly elective sessions to improve certain skills of the fellow in an enjoyable way. Priorities and selection should be based on trainees' needs.
- HDRC content should consider the three-year cycle to accommodate learning needs as well as curriculum requirements.

Regulations

The Academic Half-Day program is a mandatory component of the fellowship program. This is meant to complement the clinical experience that fellows gain during their clinical rotations. Substantial efforts should be made to make these sessions interesting and relevant.

- For each session, there will be one resident and one trainer responsible for conducting and organizing the whole session. Residents should work under trainer supervision.
- The entire group should participate actively in preparation and during the activities.
- Details of each HADA should be sent to all fellows at least one week before the presentations.
- A trainer should supervise each trainee during the preparation of the presentation
- The trainees should contact their supervisors at least 2–3 weeks before the presentation to discuss the timetable, presentation(s), methods of learning, and topics for discussion. (If the trainees have difficulty contacting their supervisors, they should contact the program secretary.)



- The supervisor trainer should attend the presentation with the trainees to facilitate the session.
- Educational activities should have different educational methods and strategies, but passive learning methods, such as lecturing, should be avoided. These methods include, but are not restricted to, problem solving, case discussion, interactive mini lectures, group discussion, role play, tutorials, workshops, and assignments.
- In all educational sessions, emphasis should be placed on important issues of ethics, evidence-based medicine, practice management, disease prevention, health promotion, proper communication skills, and professionalism. Please adhere to the training program mission and the Saudi Commission manual.

Simulation and Workshops

The implementation is based on logistic feasibility in the training center, and attending such workshops can be in national and international events.

Suggested Workshop:

- All fellows should attend the **pediatric advanced life support (PALS)**, which is provided by the training center.
- **Cardiac Morphology Workshop**, this workshop addresses the details of the anatomy of the heart that help the trainee to understand the three-dimensional view of the heart to be able to do and interpret the different modules of cardiac evaluation tools such as echocardiography, catheterization, CT, or MRI, which are available in PSCC and also in other centers outside, such as in the UK and USA.
- **ECG workshops**, recommended to be taken early in the fellowship as it helps to understand the cardiac lesions and treat the patients in a better way; this workshop is usually provided by the training centers in the first few months of each year.
- **ECHO workshops**, recommended to be taken early in the fellowship as it helps to understand the cardiac lesions and treat the patients in a better way; this workshop is usually provided by the training centers in the first

few months of each year.

- **The Pediatric Cardiology Fellow Review** Course helps prepare for an exam, where it gives very condensed information and review questions in most of the topics; it is provided every year from October to November in one of the training centers, as well as many similar courses conducted in other centers outside the Kingdom.
- **Medical research and statics workshops** available in most training centers and outside centers, even though there are online training courses that help trainees improve their research skills.

Mentorship

Mentor is an assigned faculty supervisor responsible for the professional development of fellows under his/her responsibility. Mentoring is the process by which mentors provide support to others. A mentee is a fellow under the supervision of the mentor.

Nature of Relationship

Mentorship is a formal, yet friendly relationship. This is a partnership between the mentor and fellow (i.e., the mentee). Fellows are expected to take mentoring opportunities seriously and help the mentor to achieve the outcomes. Mentors should receive a copy of any adversarial report by other faculty members about the fellow.

Goals

- Guide fellows towards personal and professional development through continuous monitoring of progress
- Early identification of struggling fellows as well as high achievers
- Early detection of fellows who are at risk of emotional and psychological disturbances
- Provide career guidance

Each new fellow entering the program will be asked to select a faculty mentor who will be available to them while they are in the Fellowship Program.



Fellows should choose their mentor in the first six months of training; otherwise, they will be assigned a mentor by the program director.

The following is a summary of the mentor role, as well as the principles outlining the way the mentorship system should operate.

Roles of the Mentor:

- The mentor's main responsibility will be to assist the fellow in making decisions regarding training issues as well as career choices. The mentor should be supportive of the fellow and take on the role of the fellow's advocate.
- While the frequency of meetings between fellow and mentor may vary, the mentor should meet with each mentee a minimum of three times per academic year.
- The mentor should review rotation evaluations on a regular basis and discuss pertinent weaknesses/strengths with the mentee to improve academic standing. The same applies to the performance on in-training exams.
- The mentor is encouraged to review each mentee's rotations/electives annually such that they meet educational and research objectives and ensure that exposure to a broad range of pediatric cardiology is achieved at the completion of the program.

Roles of the fellow

- Submits resume at the start of the relationship
- Provide mentor with medium and longer term goals
- Takes primarily responsibility in maintaining the relationship
- Schedule regular meetings with mentors in a timely manner; do not request ad hoc meetings, except for emergencies
- Recognize self-learning as an essential element of fellowship training
- Report any major events to the mentor in a timely manner

Note: If fellows require help to approach a mentor or feel like they need to change mentors, they need to contact the Director of the Training Program.

ASSESSMENT

The Assessment System

There will be an end-of rotation evaluation form where the fellow can sit with the evaluator and discuss the progress during the rotation. Each rotation should have an assigned evaluator familiarity with the evaluation form. Mid rotation “check” on the fellow to ensure that he/she is on the right track is preferable.

Fellows should also have a chance to confidentially evaluate the consultants.

The purpose of the assessment system is to:

- Enhance learning by providing formative assessment, enabling trainees to receive immediate feedback, measure their own performance, and identify areas for development.
- Drive learning and enhance the training process by clarifying what is required of trainees and motivating them to ensure that they receive suitable training and experience.
- Provide robust summative evidence that trainees meet the curriculum standards during the training program.
- Ensure trainees are acquiring competencies within the domains of good medical practice.
- Assess trainees’ actual performance in the workplace.
- Ensure that trainees possess the essential knowledge, skills, and attitudes required for their specialty.
- Identify trainees who should be advised to consider a career change.

Assessment Methods

The following assessment methods are used in the integrated assessment system:



1 formative Assessment:

1.1 Direct Observation of Procedural Skills (DOPS)

This assessment is conducted at the beginning of fellowship training.

The procedure form should be filled out at the beginning of the two months of training (appendix 2)

The trainee will perform procedures under the supervision of the attending consultant and receive immediate feedback.

Each trainee shall do at least three procedures of each of the following:

- Echocardiography study

- Venous and arterial access at the beginning of the catheterization

- 12-leads ECG

Successful completion of the DOPS form is necessary for the fellows before starting the logbook.

The failure to submit this form to the local training committee within two months of training should be discussed with the local training program director.

1.2 Logbook and portfolio

It is now a requirement that SCFHS have the trainee documenting all skills he/she learned or procedures he/she performed during the program, which is of importance not only to be able to revise for the final exam but, more importantly, for the trainee to make sure that he or she has achieved the competencies that are needed to be ready to work as an independent consultant in the field of pediatric cardiology.

All trainees are required to keep a logbook (Appendix 3) during training (electronic records are highly recommended).

Successful completion of the DOPS form is necessary for fellows before starting the logbook.

The purposes of the logbook are to:

Monitor trainees' performance on a continual basis

Maintain a record of procedures and technical intervention performed

Enable the trainee and supervisor to determine the learning gaps

Provide a basis of feedback to the trainee

The scientific committee is working to issue a standard form for logging all procedures that are taught during training. It is the responsibility of the trainee to keep his/her record updated in the form of a logbook and portfolio. The logbook should be verified by the program director on a regular basis.

The log book should contain the documentation for

1. Transthoracic echocardiographic studies: 250 cases
2. TEE: 30 Cases.
3. Cardiac catheterizations: 75 cases.
4. ECG interpretations: 200 study.
5. EP studies: 6 studies.
6. Pacemaker and ICD interrogations: 15 studies
7. Cases of temporary pacemaker adjustments: 15 studies
8. Tilt table test: 3 tests

Procedure table: to help guide the fellow to achieve the required number over the training period (the number is cumulative over the three years)



Procedures	Recommended number at completion		
	F1	F2	F3
Transthoracic echocardiographic studies. (250)	100	200	250
TEE. (30)	0	20	30
Cardiac catheterizations (75)	25	50	75
ECG interpretations (200)	100	150	200
EP studies (6)	2	4	6
Pacemaker and ICD interrogations (15)	5	10	15
Temporary pacemaker adjustments (15)	5	10	15
Tilt table test (3)	1	2	3

- The completed logbook will be countersigned by the program director.
- The logbook should be submitted within 4 weeks before the final written exam.
- Failure of submission shall be discussed with program director and scientific committee.
- The completion of the logbook is included in the end-of-year total score for first- and second-year trainees.

1.3 ITER (In training Evaluation Report)

This assessment was conducted at the end of each training rotation throughout the academic year.

To fulfill the CanMEDS competencies based on the end of rotation evaluation, the Fellow's performance will be evaluated jointly by relevant staff for the following competencies (Appendix 4):

- Performance of the trainee during daily work.
- Performance and participation in academic activities.
- Performance in a 10-to 20-minute direct observation assessment of trainee-patient interactions Trainers are encouraged to perform at least one assessment per clinical rotation, preferably near the end of the rotation. Trainers should provide timely and specific feedback to the trainee after each assessment of a trainee-patient encounter (Mini-

Clinical Evaluation Exercise [Mini-CEX] and case-based discussion [Appendix 5 and 6]).

- Performance of diagnostic and therapeutic procedural skills by the trainee.

The CanMEDS-based end-of-rotation evaluation form must be completed within two weeks following the end of each rotation (preferably in an electronic format) and signed by at least two consultants. The program director will discuss the evaluation with the Fellow as necessary. The evaluation form will be submitted to the local training supervisory committee of the SCFHS within four weeks following the end of the rotation.

Annual promotion depends on satisfactory annual overall evaluation and passing, and the average score for all rotations will not be less than 60%.

1.4 Research

All the fellows are required to conduct a research project during training.

In each academic year, two research days are held: a mid-year research day and an end-year research day where the research project for each fellow is evaluated.

Research duration, Components and Presentation

During the 3 years of the pediatric cardiology training fellowship program, a total of two protected months in the first two years and it is expected from the fellow to have the concept of longitudinal research throughout the whole third year to be able to complete the individual fellow research project.

F1: Case report or IRB for a project in pediatric cardiology field

F2: Manuscript for a paper in pediatric cardiology

F3: The research must be submitted for publication.

1.5 End-of-year assessment Written Examination

The end-of-year written exam will be held at the end of the academic year.

The exam is held a once a year.

Objectives

An assessment of specialty knowledge.

Using theoretical data to determine the candidate's ability to think logically, solve problems, apply basic medical science to clinical problems, and make judgments with valid comparisons.

Exam eligibility:

Exam for F1 and F2 will be conducted by the scientific committee for eligible fellows

Exam format

As per SCFHS General Exam rules and Regulations (scfhs.org.sa).

1.5.1 Written examination: MCQs: At least 100 to 120 MCQs with one single best option type. The examination shall contain K1 cognitive level questions (recall and comprehension) and K2, usually delivered as questions with scenarios (interpretation, analysis, decision making, reasoning, and problem solving) according to the test blueprint. The questions should test knowledge related to basic sciences, such as anatomy, physiology, pharmacology, pathophysiology, imaging, and clinical sciences.

In addition, the Modified Essay Question (MEQ), which tests deeper knowledge of a given subject area, may be incorporated.

1.5.2 Clinical Examination: Clinical Examination will be in the form of a multi-station OSCE and structured oral examination. SOE should be based on a predefined patient management problem. Both OSCE and SOE may include relevant images, ECHO, and real or simulated patients.

Passing score

The passing score will be in accordance with the commission's training and examination rules and regulations. There will be no negative marking according to the rules of the SCFHS.

Components of promotion requirement:

- 1- Knowledge: The final written exam that comprises 30% of the final passing score
- 2- Skills: which form 40% of the final passing score and has two parts
 - 2.1- OSCE (25%)
 - 2.2- DOPS (10%)
 - 2.3- Charity and Community Services (5%)
- 3- Attitude: which carry a 30% of the final score based on periodic evaluations

The scoring marks for the performance percentage are fixed, while it is variable for the knowledge and skills based on the level of training as follows:

1. Knowledge:

For F1 and F2 levels:

1.A Passing the final written exam:

Level	Passing score
F1	≥ 50
F2	≥ 55



1.B Passing Case based discussion for different rotations for F1 and F2

2. Skills:

A. F1 and F2 levels:

A.1. DOPS (ECHO and Cath.) and passing the OSCE exam at the end of year:

Level	Passing score
F1	≥ 50
F2	≥ 55

A.2. Charity and Community services in pediatric cardiology

Research: is a prerequisite to set for the exam at all levels

Level	achievement
F1	Case report / series or IRB approval for a research project
F2	The satisfaction shown by the trainee supervisor in the researcher's progress in his/her scientific paper
F3	A submitted manuscript for publication*

* It is a required criterion for the completion of the training exam

1. Attitude:

Based on "In Training Evaluation Reports" (ITER) for all level as approved in One 45 system.

4- Summative assessment:

Final exam eligibility:

As per SCFHS General Exam rules and Regulations (scfhs.org.sa) for the fellow to be able to set for the final exam, he/she should achieve the following:

- a. Successful completion of the required period of fellowship training.
- b. Agreement issued by the local supervisory committee based on a satisfactory FITER report.
- c. Complete logbook
- d. Research publication or manuscript submitted for publication.

Academical activities: Attending conferences, presenting in a conference/ Grand round.

Contribution in field of pediatric cardiology: awareness days and health education/ charity

2.1 Final Saudi Board Written Examination

The final Saudi Board Written Exam will be held at the end of the academic year.

The exam is held a once a year.

Objectives

An assessment of specialty knowledge.

Using theoretical data to determine the candidate's ability to think logically, solve problems, apply basic medical science to clinical problems, and make judgments with valid comparisons.

Exam eligibility:

Exam for F3 will be conducted by the scientific committee for eligible fellows

Exam format

As per SCFHS General Exam rules and Regulations (scfhs.org.sa).

The Written Exam: composed of MCQs: At least 100 to 120 MCQs with one single best option type. The examination shall contain K1 cognitive level questions (recall and comprehension) and K2, usually delivered as questions with scenarios (interpretation, analysis, decision making, reasoning, and problem solving) according to the test blueprint. The questions should test knowledge related to basic sciences, such as anatomy, physiology, pharmacology, pathophysiology, imaging, and clinical sciences.

In addition, the Modified Essay Question (MEQ), which tests deeper knowledge of a given subject area, may be incorporated.

Clinical examination: Clinical examination will be in the form of a multi-station OSCE and structured oral examination. SOE should be based on a predefined patient management problem. Both OSCE and SOE may include relevant images, ECHO, and real or simulated patients.

Passing score

The passing score will be in accordance with the commission's training and examination rules and regulations. There will be no negative marking according to the rules of the SCFHS.

2.2 Final Saudi Board Clinical Examination

The clinical exam will be conducted at the end of the third academic year. The exam was held once a year.

The final clinical exam was restricted to third-year fellows after passing the final written exam.

Successful candidates will be awarded "Saudi Board of Pediatric cardiology"

Objectives

Determine the ability of the candidate to practice as a specialist and provide consultation in the general domain of his/her specialty for other healthcare professionals or other bodies that may seek assistance and advice.

Ensure that the candidate has the necessary clinical competencies relevant to his/her specialty, including but not limited to history taking, physical examination, documentation, procedural skills, communication skills, bioethics, diagnosis, management, investigation, and data interpretation.

All competencies contained within the specialty core curriculum were included in the examination.

1. Certification

A certificate of training completion will only be issued upon Fellow's successful completion of all program requirements. Candidates that passed the final written and clinical examinations were awarded the "Saudi Board of Pediatric cardiology" certificate.

Suggested learning resources

Textbooks:

- Moss & Adams' Heart Disease in Infants, Children, and Adolescents (Recommended Textbook)
- Pediatric Cardiology Textbook (by Robert H. Anderson)
- The Natural and Modified History of Congenital Heart Disease (by Robert Freedom)

Other suggested books:

- Pediatric ECG Interpretation: An Illustrative Guide
- How to Read Pediatric ECGs
- Echocardiography in Pediatric and Congenital Heart Disease: From Fetus to Adult
- Echocardiography in Congenital Heart Disease Made Simple
- Diagnostic and Interventional Catheterization in Congenital Heart Disease
- Congenital Heart Disease: The Catheterization Manual
- Chest Radiographic Interpretation in Pediatric Cardiac Patients
- Drugs for The Heart
- Feigenbaum's echocardiography



- The Echo Manual
- The Echocardiographer's Pocket Reference
- The Nuts and Bolts of Cardiac Pacing

Journals:

- Circulation: Cardiovascular Interventions
- Circulation: Heart Failure
- JACC: Journal of the American College of Cardiology
- Journal of the American Society of Echocardiography
- JACC: Cardiovascular Imaging
- American Heart Journal
- European Heart Journal
- Heart
- Journal of Heart and Lung Transplantation
- Heart Rhythm
- Journal of Thoracic and Cardiovascular Surgery
- Europace
- Pediatric Cardiology
- Cardiology in the Young
- The Annals of Pediatric Cardiology

Others:

- AHA Guidelines and Statements
- American College of Cardiology Guidelines
- VIRTUAL TEE university of Toronto website:
<https://pie.med.utoronto.ca/TEE/>
- A detailed content outline for pediatric cardiology can be obtained from the American Board of Pediatric Website:
https://www.abp.org/sites/abp/files/pdf/pediatric_cardiology_content_outline.pdf.

APPENDIXES:

Application process:

The required documents and conditions required for admission to this course are posted on the website of the SCFHS through the link:

<http://www.scfhs.org.sa/MESPS/TrainingProgs/Pages/Requirements.aspx>

This explains the applicants' processes and how to apply electronically through the link:

<http://matching.scfhs.org.sa/>

Other important links for the trainee:

<http://www.scfhs.org.sa/MESPS/TrainingProgs/Documents/Matching%20System%20Manual.pdf>

<http://www.scfhs.org.sa/MESPS/TrainingProgs/Documents/Portfolio%20Submission%20Regulations%20and%20Guidelines.pdf>



Final In Training Evaluation Report (FITER)

PEDIATRIC CARDIOLOGY

Name of the Resident:

SCFHS registration #:

Training Center

Address:

Evaluation covering the last year as a fellow (F3)

In the view of the Residency Program Committee, this resident has acquired the competencies of the specialty/subspecialty as prescribed in the Objectives of Training and is competent and board eligible.

The following sources of information were used for this evaluation (underlines are mandatory):

- ☐ Written examinations
- ☐ Oral presentations
- ☐ Clinical observations (ITERs; in-training evaluation report) from the faculty
- ☐ Feedback from health care professionals
(e.g., multi-source feedback from allied health professionals)
- ☐ Completion of a scholarly project
- ☐ Pediatric Cardiology-FITER (Final In-training Evaluation Report)
- ☐ other evaluations.....

Program Director Signature Date

Name of Resident Signature Date

Identification number:

RESIDENT'S COMMENTS

Note: If during the period from the date of signature of this document to the completion of training, the Residency Program Committee judges that the candidate's demonstration of competence is inconsistent with the present evaluation, it may declare the document null and void and replace it with an updated FITER. Eligibility for the examination would be dependent on the updated FITER.

PEDIATRIC CARDIOLOGY ITER

	
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	N/A (0)	Clear Fail (1)	Border line (2)	Clear Pass (3)	Exceed Expectations (4)
*A. MEDICAL EXPERT:					
History & Physical Examination:					
1. Comprehensive, accurate & concise with all relevant details	☐	☐	☐	☐	☐
*Diagnostic Tests:					
2. Used in a cost-effective manner & understands limitations & predictive value.	☐	☐	☐	☐	☐
*Clinical Decision:					
3. Able to formulate appropriate differential diagnosis.	☐	☐	☐	☐	☐
*Medical Knowledge:					
4. Broad Clinical & Basic knowledge of a wide variety of medical problems	☐	☐	☐	☐	☐



	N/A (0)	Clear Fail (1)	Border line (2)	Clear Pass (3)	Exceed Expectatio ns (4)
and develops a plan of secondary prevention.					
*Emergency Management:					
5. Able to identify and respond appropriately to urgent cases	○	○	○	○	○
*Evidence-based Practice/Critical Appraisal Skills:					
6. Aware of the role of evidence in clinical decision-making.	○	○	○	○	○
*7. Demonstrates knowledge of medications used, mechanisms of action, clinically relevant pharmacokinetics, indications, contraindications, and adverse effects.	○	○	○	○	○
*Procedural Skills:					
4. Perform diagnostic & therapeutic procedures, understands indications, limitations & complications.	○	○	○	○	○
*B. COMMUNICATOR					
9. Communicates effectively with patients, their families, and HCPs.	○	○	○	○	○
*10. Able to maintain clear, accurate & appropriate records.	○	○	○	○	○
*11. Discharge summaries are concise & completed promptly.	○	○	○	○	○
*C. COLLABORATOR:					
12. Works effectively in a team environment with attending, juniors &	○	○	○	○	○

	N/A (0)	Clear Fail (1)	Border line (2)	Clear Pass (3)	Exceed Expectations (4)
nursing staff.					
*D. MANAGER :					
13. Serves in administration and leadership roles as appropriate.	☐	☐	☐	☐	☐
*14. Appropriate & efficient use of healthcare resources.	☐	☐	☐	☐	☐
*E. SCHOLAR :					
15. Attends and contributes to rounds, seminars, and other learning events.	☐	☐	☐	☐	☐
*16. Accepts and acts on constructive feedback.	☐	☐	☐	☐	☐
*17. Contributes to the education of patients, junior residents, house staff, and students.	☐	☐	☐	☐	☐
*18. Contributes in scientific research.	☐	☐	☐	☐	☐
*F. HEALTH ADVOCATE :					
*19. Offers advocacy on behalf of patients at practice and general population levels.	☐	☐	☐	☐	☐
*G. PROFESSIONAL :					
20. Delivers the highest quality of care with integrity & compassion. Recognizes limitations and seeks advice and consultations when necessary.	☐	☐	☐	☐	☐



- Comments (areas of strengths/areas for improvement).

*Did you have an opportunity to meet with this resident to discuss their performance? ☐ Yes ☐ No

Appendix

Saudi Commission for Health Specialties - Pediatric Cardiology Fellowship Research Manual

Definition of research

Research is a systematic, rigorous investigation of a situation or problem to generate new knowledge or validate existing knowledge. Research in healthcare takes place in a variety of areas and has many potential benefits, including professional practice, environmental issues affecting health, vitality, treatments, theory development, healthcare economics, and many others. Most of the research conducted in the field of health is called clinical research.

Clinical research is a branch of healthcare science that determines the safety and effectiveness (efficacy) of medications, devices, diagnostic products, and treatment regimens intended for human use. These may be used for prevention, treatment, diagnosis, or for relieving the symptoms of a disease.

Type of researches

- Basic medical research: Areas tackled in the most fundamental parts of medical research include cellular and molecular biology, medical genetics, immunology, neuroscience, and psychology.
- Preclinical research: Pre-clinical research covers research that prepares the ground for clinical research with patients. Typically, the work requires

no ethical approval (although some work with animals does), is supervised by people with PhDs rather than medical doctors, and is carried out in a university or company rather than a hospital or surgery.

- Clinical research: Clinical research was carried out with patients. It is generally supervised by doctors in a medical setting, such as a hospital, and requires ethical approval.
- The clinical phase of drug testing is called Clinical trial.

Types of clinical study Designs

- Meta-Analysis. A method of combining data from different research studies: A method of combining data from many different research studies. Meta-analysis is a statistical process that combines findings from individual studies.
- Systematic review: A summary of clinical literature A systematic review is a critical assessment and evaluation of all research studies that address a particular clinical issue. Researchers use an organized method of locating, assembling, and evaluating a body of literature on a particular topic using a set of specific criteria. A systematic review typically includes a description of the findings of a collection of research studies.
- Randomized controlled trial: A controlled clinical trial that randomly (by chance) assigns participants to two or more groups. There are various methods to randomize study participants to their groups.
- Cohort study (prospective observational study: A clinical research study in which people who presently have a certain condition or receive a particular treatment are followed over time and compared with another group of people who are not affected by the condition.
- Case-control study: Case-control studies begin with the outcomes and do not follow people over time. Researchers choose people with a particular result (the cases) and interview the groups or check their records to ascertain the different experiences they had. They compared the odds of having an experience with the outcome and the odds of having an experience without the outcome.



- **Cross-sectional study:** Observation of a defined population at a single point in time or time interval. Exposure and outcome were determined simultaneously.
- **Case Reports and Series:** A report on a series of patients with an outcome of interest. No control group was included.
- **N.B.** For the PHO fellowship program, this study design is not accepted as the main graduation research project.
- **Ideas, Editorials, Opinions:** Put forth by experts in the field

Bioethical training and certification

Each fellow should take an online ethical course, which usually requires the testing of acquired knowledge and certification. Most universities are providing these courses either for free or subscription. The most popular courses and certifications are the NIH or CITI.

Research Funding

Research funding in many countries is provided by research bodies or private organizations that distribute money for equipment and salaries. In the KSA, the funding bodies include the research center within individual institutes, King Abdul-Aziz City for science and technology, or pharmaceutical companies.

Research Requirements

- 1) Selection of research
- 2) Research team
- 3) Approval of project by local training committee
- 4) Preparation of proposal with references
- 5) Fulfilling the IRB requirements
- 6) IRB approval
- 7) Data collection
- 8) Data Analysis
- 9) Writing the paper
- 10) Publication

Appendix (example)

Written Exam Blueprint

	Content Categories	Percentage	remarks
1	Cardiovascular Structure, Development, and Function	7%	
2	Pharmacology	6%	
3	Cardiovascular Examination, Principles, and Application of Cardiac Diagnostics	9%	
4	Office-Based Cardiac Problems	7%	
5	Left-to-Right Shunts	6%	
6	Right-to-Left Shunts	6%	
7	Single Ventricular Lesions	6%	
8	Structural, Valvar, and Obstructive Lesions	6%	
9	Congenital Abnormalities of the Great Arteries and Aorta	5%	
10	Systemic and Pulmonary Venous Abnormalities and Situs Abnormalities	4%	
11	Disorders of the Myocardium, Pericardium, Endocardium, and Vasculature	4%	
12	Heart Function and Disease in the Fetus and Newborn	5%	
13	Intensive Care Management of Patients with Congenital Heart Disease	5%	
14	Arrhythmias	6%	
15	Acquired Forms of Cardiac Disease	4%	



	Content Categories	Percentage	remarks
16	Genetic Disorders and Syndromes of the Cardiovascular System	4%	
17	Congenital Heart Disease in the Adolescent and Adult	5%	
18	Core Knowledge in Scholarly Activities	5%	

*Main blueprint framework adapted from the American Board of Pediatrics.

Appendix (example)

Final Clinical Exam Blueprint

DOMAINS FOR INTEGRATED CLINICAL ENCOUNTER	DIMENSIONS OF CARE					
		Health Promotion & Illness Prevention 1 ± 1 Station(s)	Acute 5 ± 1 Station(s)	Chronic 3 ± 1 Station(s)	Psychological Aspects 1 ± 1 Station(s)	# Station(s)
	Patient Care 7 ± 1 Station(s)	1	4	2		7
	Patient Safety & Procedural Skills 1 ± 1 Station(s)		1			1
	Communication & Interpersonal Skills 2 ± 1 Station(s)			1	1	2
	Professional Behaviors 0 ± 1 Station(s)					0
	Total	1	5	3	1	10

*Main blueprint framework adapted from the Medical Council of Canada
Blueprint Project

Definitions

Dimensions of Care	Focus of care for the patient, family, community, and/or population
Health Promotion & Illness Prevention	The process of enabling people to increase control over their health and its determinants, and thereby improve their health. Illness prevention covers measures not only to prevent the occurrence of illness such as risk factor reduction but also arrest its progress and reduce its consequences once established. This includes but is not limited to screening, periodic health exam, health maintenance, patient education and advocacy, and community and population health.
Acute	Brief episode of illness, within the time span defined by initial presentation through to transition of care. This dimension includes but is not limited to urgent, emergent, and life-threatening conditions, new conditions, exacerbation of underlying conditions
Chronic	Illness of long duration that includes but is not limited to illnesses with slow progression.
Psychosocial Aspects	Presentations rooted in the social and psychosocial determinants of health that include but are not limited to life challenges, income, culture and the impact of the patient's social and physical environment.



Domains	Reflects the scope of practice & behaviors of a practicing clinician
Patient Care	Exploration of illness and disease through gathering, interpreting and synthesizing relevant information that includes but is not limited to history taking, physical examination and investigation. Management is a process that includes but is not limited to generating, planning, organizing care in collaboration with patients, families, communities, populations, and healthcare professionals (e.g. finding common ground, agreeing on problems & goals of care, time and resource management, roles to arrive at mutual decisions for treatment)
Patient Safety & Procedural Skills	Patient safety emphasizes the reporting, analysis, and prevention of medical error that often leads to adverse healthcare events. Procedural skills encompass the areas of clinical care that require physical and practical skills of the clinician integrated with other clinical competencies in order to accomplish a specific and well characterized technical task or procedure.
Communication & Interpersonal Skills	Interaction with patients, families, caregivers, other professionals, communities & populations. Elements include but are not limited to active listening, relationship development, education, verbal, non-verbal and written communication (e.g. patient-centered interview, disclosure of error, informed consent)
Professional Behaviors	Attitudes, knowledge, and skills based on clinical and/or medical administrative competence, ethics, societal, and legal duties resulting in the wise application of behaviors that demonstrate a commitment to excellence, respect, integrity, accountability and altruism (e.g. self-awareness, reflection, lifelong learning, scholarly habits, and physician health for sustainable practice).

Appendix (example)

Case-Based Discussion (CBD)

Purpose:

To evaluate the level of professional judgment exercised in clinical cases by the trainee.

CBD is designed to:

- Guide the trainee's learning through structured feedback

- Help improve clinical decision making, clinical knowledge and patient management
- Provide the trainee with an opportunity to discuss their approach to the case and identify strategies to improve their practice.
- Be a teaching opportunity enabling the evaluator to share professional knowledge and experience

Overview

The CBD encounter involves a comprehensive review of clinical cases between a trainee and an evaluator. The trainee is given feedback from an evaluator across a range of areas related to clinical knowledge, clinical decision-making, and patient management. The CBD encounter takes approximately 20-30 minutes.

Trainee responsibilities

- Arrange a CBD encounter with an evaluator.
- Provide the evaluator with a copy of the CBD rating form.

Evaluator responsibilities

- Choose the case(s) for discussion.
- Use the CBD form to rate the trainee.
- Provide constructive feedback and discuss improvement strategies.
- Provide an overall judgment on the trainee's clinical decision-making skills.



Case-Based Discussion (CBD) Rating Form

Case-Based Discussion (CBD) Rating Form

Trainee name:

Registration no:

Fellowship level: _____

Date: _____

Brief summary of case:

☐ New example ☐ Follow-up case

☐ Inpatient ☐ Ambulatory ☐ Emergency ☐ Department ☐ Other

Complexity

☐ Low ☐ Moderate ☐ High

Focus

☐ Data ☐ Gathering ☐ Diagnosis ☐ Therapy ☐ Counseling ☐ Other

Assessment									
SCORE FOR STAGE OF TRAINING									
Questions	Unsatisfactory			Satisfactory			Superior		
	1	2	3	4	5	6	7	8	9
Clinical Assessment									
Investigation and Referrals									
Treatment									
Follow-up and Future Planning									
Professionalism									
Clinical Judgment									
Leadership/Managerial skills									
Overall Performance									

Suggestions of development:

1-

2-

3-

Evaluator name:

Evaluator signature:

Appendix (example)

Direct Observation of Procedural Skills (DOPS)
Name of Fellow:
Date of Procedure:

Direct Observation of Procedural Skills (DOPS)

Criteria	Below Expectation	Displays Competency
Ability to Perform Bone Marrow Aspiration		
Ability to Perform Bone Marrow Biopsy		
Ability to Perform Lumbar Punctures with Intrathecal Chemotherapy		
Comments:		
Supervising Staff:		
Signature:		
Date:		
Date of Procedure:		
Criteria	Below Expectation	Displays Competency
Ability to Perform Bone Marrow Aspiration		
Ability to Perform Bone Marrow Biopsy		
Ability to Perform Lumbar Punctures with Intrathecal Chemotherapy		
Comments:		
Supervising Staff:		
Signature:		
Date:		

Direct Observation of Procedural Skills (DOPS)		
Date of Procedure:		
Criteria	Below Expectation	Displays Competency
Ability to Perform Bone Marrow Aspiration		
Ability to Perform Bone Marrow Biopsy		
Ability to Perform Lumbar Punctures with Intrathecal Chemotherapy		
Comments:		
Supervising Staff:		
Signature:		Date:
*Fellows should complete this form within two months of joining the fellowship program. *Fellows should bring this form to the program director whenever it is signed off on.		

Appendix DOPS for ECHO and Cardiac Catheterization

DIRECT OBSERVATION OF PROCEDURAL SKILLS (DOPS)

Congenital Echocardiography

Date:

Fellow's Name:

Level of training: F1 F2 F3 rotation period: from to

Assessor's name:

Training Center:

Please enter your grade scale of 1 to 10 or N/A.

Guide to scoring

Unsatisfactory	Satisfactory	Above Expected	Not Applicable
1-4	5-7	8-10	N/A

1-3 is considered unsatisfactory, 4-7 satisfactory and 8-10 is considered above that expected, for the stage of training and level of experience.

If you score 1, 2, or 3, please give a brief example in the comments box.

Please feel free to add any other relevant opinions about Fellow's strengths and weaknesses.

OBSERVATION	SCORE
1. Puts patient and parents at ease, explains the procedure and behaves in a considerate manner throughout the scan.	
2. Obtains all relevant demographic data, details of referring doctor, relevant previous treatment and reasons for the scan.	
3. Uses appropriate transducers, machine settings and ultrasound modalities throughout the scan.	
4. Identifies visceroatrial situs and position of the heart	
5. Identifies venous, atrioventricular and ventriculoarterial connections	
6. Identifies abnormalities, distinguishing between normal variants and pathological findings	
7. Knows the differential diagnosis when there are indirect signs of anomalies (e.g., dilated right heart)	
8. Interprets echo measurements appropriately, demonstrating knowledge of limitations of calculations	

OBSERVATION	SCORE
9. Uses color flow, pulsed wave and continuous wave Doppler when relevant.	
10. Interprets Doppler findings correctly (e.g., appropriate use of Bernoulli equation and formulae for calculations)	
11. Records clear, relevant images with appropriate brevity.	
12. Attends to infection control appropriately.	
13. Documents the echo fully, writing a concise and appropriate report.	
Average score; excluding non-applicable observations (out of 10 Scale)	/10

Comments and Feedback

Fellow's signature:

Assessor's Signature:

DIRECT OBSERVATION OF PROCEDURAL SKILLS (DOPS)

Cardiac Catheterization Laboratory

Date:

Fellow's Name:

Level of training: F1 F2 F3 rotation period: from to

Assessor's name:

Training Center:.....

Please enter your grade scale of 1 to 10 or N/A.

Guide to scoring

Unsatisfactory	Satisfactory	Above Expected	Not Applicable
1-4	5-7	8-10	N/A

1-3 is considered unsatisfactory, 4-7 satisfactory and 8-10 is considered above that expected, for the stage of training and level of experience.

If you score 1, 2, or 3, please give a brief example in the comments box.

Please feel free to add any other relevant opinions about the fellow's strengths and weaknesses.

Skills	SCORE
1. Puts patient and parents at ease, explains the procedure.	
2. Obtains all relevant demographic data, details of referring doctor, relevant previous treatment and reasons for the scan.	
3. Accompanied the patient to the catheter lab. and observed the preparation by technologist and Nurses	
4. Venous and arterial line insertion	
5. Demonstrates the confidence to perform right heart catheterization	
6. Performance of left ventricular and aortic angiography by power injection	
7. Knows potential complications and management of cardiac catheterization	
8. Knows how to calculate intracardiac shunts, valve areas, vascular resistance and transpulmonary gradients.	
9. Attends to infection control appropriately	
10. Documents the cath. fully, writing a concise and appropriate report	
Average score; excluding non-applicable observations (out of 10 Scale)	/10

Comments and Feedback

Fellow's signature:

Assessor's Signature:

Mini-Clinical Evaluation Exercise (Mini-CEX)

Definition

The Mini-CEX is a 10-20 minutes direct observation assessment or “snapshot” of a trainee-patient interaction. To be most useful, the evaluator should provide timely and specific feedback to the trainee after each assessment of a trainee-patient encounter.

Purpose

A mini-CEX is designed to:

- Guide the trainee's learning through structured feedback
- Help improve communication, history taking, physical examination and professional practice
- Provide the trainee with an opportunity to be observed during interactions with patients and identify strategies to improve their practice.
- Be a teaching opportunity enabling the evaluator to share their professional knowledge and experience

Trainee responsibilities

- Arrange a mini-CEX encounter with an evaluator
- Provide the evaluator with a copy of the mini-CEX rating form

Evaluator responsibilities

- Choose an appropriate consultation for the encounter



- Use the mini-CEX rating form to rate the trainee
- Provide constructive feedback and discuss improvement strategies. If a trainee received a rating that is unsatisfactory, the assessor must complete the “suggestion for Development” section.

Mini-Clinical Evaluation Exercise (Mini-CEX) Rating Form

Mini-Clinical Evaluation Exercise (Mini-CEX) Rating Form	
Trainee name: _____	
SCFHS Registration no: _____	Fellowship level: _____
Date: _____	
Mini-CEX time: _____ min	
Observing: _____ min	
Providing feedback: _____ min	
Brief summary of case: _____	
☐ New example ☐ Follow-up case ☐ Inpatient ☐ Ambulatory ☐ Emergency ☐ Department ☐ Other Complexity: ☐ Low ☐ Moderate ☐ High Focus: ☐ Data ☐ Gathering ☐ Diagnosis ☐ Therapy ☐ Counseling ☐ Other	

Assessment									
SCORE FOR STAGE OF TRAINING									
Questions	Unsatisfactory			Satisfactory			Superior		
	1	2	3	4	5	6	7	8	9
History taking									
Physical examination Skills									
Communications skills									
Critical judgment									
Humanistic quality/professionalism									
Organization and efficiency									
Overall clinical care									
Suggestion of development: 1- 2- 3- Evaluator name: Evaluator signature:									

Question	Description
History taking	Facilitates patient's narrative; uses appropriate questions to obtain accurate, adequate information effectively; responds to verbal and nonverbal cues appropriately.
Physical examination skills	Follows an efficient, logical sequence; examinations are appropriate for clinical problems; provides patients with explanations; is sensitive to patients' comfort and modesty
Communication skills	Explores patients' perspectives; jargon free speech; open and honest; empathetic; agrees management plans and therapies with patients
Critical judgment	Forms appropriate diagnoses and suitable management plans; orders selectively and performs appropriate diagnostic studies; considers risks and benefits
Humanistic quality/professionalism	Shows respect, compassion, and empathy; establishes trust; attends to patient's comfort needs; respects confidentiality; behaves in an ethical manner; is aware of legal frameworks and his or her own limitations
Organization and efficiency	Prioritizes; is timely and succinct; summarizes
Overall clinical care	Demonstrates global judgment based on the above topics

Appendix (example)

Procedures Logbook					
Date	MRN	Age/Gender	Procedure Name	Supervising Consultant	Comments

References

- Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.).

