FELLOWSHIP PROGRAM

IN

CARDIOLOGY

KING SAUD UNIVERSITY

Division of Cardiology
Department of Medicine
College of Medicine
King Saud University

Introduction

During the past three decades, the magnitude of research and development in the field of cardiac in investigational techniques (invasive and noninvasive) and management plans have developed with a fast pace. Since the establishment of the College of Medicine at king Saud University (KSU) in the year 1389 A. H. (1969 A.D., the number of medical graduates has increased significantly. These graduates have been absorbed by various departments and subspecialities, some of whom have become pioneers in their fields and have achieved international reputations especially in the fields of cardiology and cardiac surgery. The facilities provided in these two fields and the standard of care of cardiac patients at King Khalid University Hospital, King Faisal Specialits Hospital and Riyadh Armed Forces Hospital in Riyadh are equivalent to other teaching hospitals of international reputation.

Till recently, Saudi doctors used to go abroad for subspecialty training in cardiology. However, the increasing need for Saudi cardiologists and the established international recognition of the above-mentioned hospitals created the demand for a fellowship program to provide subspeciality training in cardiology to a level that will enable the holder of its diploma to discharge the duties as a consultant cardiologist.

The Fellowship Program in Cardiology will commence at King Khalid University Hospital, Riyadh, in liaison with other accredited and/or affiliated hospitals. This program is approved by King Saud University Council.

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Objectives

The main objective of the KSU Fellowship Program in Cardiology is to produce a competent, safe and skilled cardiologist so that he can assess, diagnose, and manage the cardiac patients in an optimal manner. The specific objectives of the program are to train the fellow to:

1. Understand the ethics of the profession based on Islamic principles.
2. Acquire theoretical knowledge in the field of cardiology.
3. Develop the desire for self-education.
4. Develop clinical skills based on a systematic approach to diagnose cardiac diseases and to manage them efficiently and effectively.
5. Develop progressive skills to independently perform noninvasive and invasive techniques safely in the field of cardiology necessary for diagnosis and management of cardiac patients.
6. Acquire sufficient experience with critically ill patients and to manage them with utmost urgency.
7. Perform research with special emphasis on cardiac care within the community and advice on preventive measures.
8. Express himself clearly on any topics related to cardiology.
9. Advise doctors in other specialties on cardiac care.
10. Teach and train other members of his cardiology team (including residents, house staff and nurses).
11. Develop skills to become the leader of his cardiology team which needs patience and tolerance.
12. Pursue further study and interest in one area of subspecialty (e.g., noninvasive cardiology, invasive cardiology, pacemaker implantation, coronary care unit and clinical cardiology, etc.).

Prerequisites for Training

After successful completion of at least four years of residency program in internal medicine and possessing a postgraduate degree in medicine (e.g., King Saud University Fellowship or equivalent) the candidate is eligible for the cardiology training program for three years.

Evaluation of Trainees

The evaluation of trainees (fellows) for both the clinical and specialized technical skills must be carefully documented. Cardiology program directors must establish procedures and protocols for the regular evaluation of the clinical competence of the cardiology trainees. This evaluation must include cognitive abilities, clinical skills, attitudes, interpersonal relations, as well as specific tasks on patient management. The trainees must have appropriate feedback of this information at regular intervals.

Records must be maintained on all evaluations, as well as a log book of all invasive and noninvasive procedures. Examinations should be held at the end of each year of training, according to the rules and regulations of KSU Fellowships.

Examinations

Examinations should be conducted according to the rules and regulations of the KSU Fellowship programs.

Certifications

1. A certificate of training in cardiology will be issued at the end of the successful completion of cardiology training.
2. A certificate of fellowship in cardiology will be issued after the successful completion of training and passing the final examination in the cardiology fellowship program.

General Guidelines

1. The trainee should stay in the assigned rotation and must not change rotation without prior notification the Head, Division of Cardiology.
2. Maximum of four weeks of annual leave will be allowed for the fellows in training which include emergency leave and one Eid holiday.
3. The trainee under no circumstances, can take a leave of absence for more than two weeks during any rotation otherwise, he will have to repeat that particular rotation.
4. Each rotation will be for three months and after one year the evaluation and assessment of the trainees performance will be made available to the trainee.
5. Trainee may be assigned to work in other areas than his rotation, if deemed necessary; permission for these assignments should be given by the cardiology staff supervising the trainee.
6. Undergraduate teaching and outpatient clinical attendance will be included in each rotation.
7. Trainees in cardiology will be encouraged to organize ECG sessions, lectures on "Modern Trends in Cardiology", updates etc.
8. Teaching and training of the fellows will be research-oriented and each fellow has to participate in at least two research projects during his course of training.

Synopsis of Cardiology Fellowship Program

First Year of Training

1. Clinical cardiology
2. Coronary care unit.
3. Noninvasive cardiology.
4. Cardiac catheterization.

Second Year of Training

1. Clinical cardiology
2. Research or other rotation (elective)
3. Noninvasive cardiology.
4. Cardiac catheterization.

Note: This 24-month training period does not qualify the trainee to become a consultant in cardiovascular diseases or an expert in these technical skills.

Third Year of Training

1. Invasive cardiology: cardiac cathererization (right and left) and coronary angiography.
2. Noninvasive cardiology: 2D echocardiography, Doppler, pulsed and continuous wave, color Doppler, esophageal echocardiography, resting, ECS, stress ECS, Holter monitoring, and nuclear cardiology.

Cardiology Training Program
(Rotation Program)

The trainee will rotate to different units of the Cardiology Division during the training period. The duration of this rotation program is two years will include the following:

1. Rotation A (3 months): coronary care unit, ECG reporting, and consultation and referral from medical wards.
2. Rotation B (6 months): cardiac catheterization.
3. Rotation C (6 months) echocardiography, Doppler studies, stress ECG, Holter monitoring and nuclear cardiology.
4. Rotation D (6 months): cardiology ward, consultations and referrals from wards, other than medical wards.
5. Elective/Research (3 months): the fellow will be encouraged to select the rotation where he needs to have more training, however, cardiac catheterization rotation will not be included in this period. Elective period will be allowed only if enough trainees are available in the program.
6. In addition to the two-year rotation program, the trainee is also required to do one year in one of the specialized areas of cardiology:
    a) Invasive cardiology: right and left heart catheterization, coronary angiography
    b) Noninvasive cardiology: echocardiograpy, color Doppler, esophageal echocardiogram. Note: the log book of every invasive and noninvasive procedure will be maintained and duly signed by the program director.

At the end of the tree years of successful training in cardiology and passing of the examination, the candidate will be awarded the certificate of KSU Fellowship in Cardiology.

Rotation A

This rotation (CCU rotation) will involve:

- Coronary care unit
- ECG reporting
- Consultation and referral from medical wards

Coronary Care Unit

1. Under the supervision of Director of CCU, trainee will be responsible for the running of CCU with regards to diagnosis and management of patients admitted to the CCU. The trainee will learn that "time factor" or sense of urgency while dealing with patients does play a significant role in ensuring the treatment at the right time and without delay.
2. Trainee will be involved in all the invasive procedures and with time should be able to supervise the resident in the CCU while performing these procedures.
3. All patients admitted to the CCU will have a portable echo performed by the trainee.
4. CCU consultant will be responsible for teaching during CCU round. The trainee may attend lectures on certain topics and will be encouraged to discuss the problems in detail, with special emphasis on modern concepts in critical care.
5. Trainee in CCU will be second on call; the CCU resident of nurse will contact the trainee first who will then get in touch with CCU consultant. Each trainee will cover for one week during the night shift and the trainee assigned to CCU will cover during the day shift.
6. Trainee will give in-service lectures to nurses and residents.
7. Morning round in CCU should be attended by the trainee and all the new orders should be executed by the earliest possible time.

ECG Reporting

The trainee should become familiar with nearly all clinically encountered patterns, wave forms, and arrhythmias. He should understand their clinical implications, mechanisms of the arrhythmias, and their management. He should also be able to recognize the various forms of paced complexes and trouble shooting of pacemakers in order to manage the patients on pacemakers effectively.

The trainee is expected to report 4000 ECGs during his training period of three years, under the supervision of a consultant cardiologist.

All the ECGs performed in the hospital will be reported by the trainee in the CCU, under the supervision of CCU consultant and should be handed over the ECG Department the same day for filing.

Consultations and Referrals from Medical Wards

Any patient in the medical wards requiring cardiac consultation should be seen by the trainee in the CCU and the case should be discussed with the "consultant on call for cardiology" for further management. If the patient needs to be transferred to the CCU, the consultant in charge of the CCU should be informed prior to transfer of the patient to the CCU.

Rotation B

This rotation will involve:

- Cardiac catheterization lab

Cardiac Catheterization Lab

1. The trainee will be familiarized with the cardiac catheterization set up, radiographic machines, hemodynamic computer, different types of catheters and other equipments in his first four weeks of rotation.
2. All patients for cardiac catheterization should be reviewed by the trainee before the catheterization.
3. Trainee will attend the procedure under the supervision of catheterizing physician and will only assist the catheterizing physician if it is premed to be safe for him to become the primary operator.
4. Post catheterization follow-up in the ward or CCU will performed by the trainee and if any complication or new problem arises he will inform the catheterizing physician during the normal duty hours or cardiologist on call in the night.
5. Trainee will study the hemodynamic data and calculate the valve area and shunt fractions as well as review the film after the cardiac catheterization.
6. Trainee will be encouraged to present the cardiac catheterization films in cardiac catheterization conference and will be helped by the catheterizing physician. Interaction with the cardiac surgeon in important part of training while discussing cardiac catheterization films and hemodynamic data.
7. Trainee will learn the indications, different techniques, multiple radiograph projections (including their benefits and diadvantages) and to deal with anticipated problems arising during cardiac catheterization.
8. Trainee will learn the indications, different techniques, multiple radiograph projections (including their benefits and disadvantages) and to deal with anticipated problems arising during cardiac catheterization.
9. Topics concerned with fluid hemodynamics and basic measurements of cardiac output and calculations of valve area will be stressed in the first year (during the first 3-month rotation in the cardiac catheterization laboratory).

10. To perform independent diagnostic cardiac catheterization and angiography, the trainee must have a minimum of 12-month training in the cardiac catheterization laboratory (third year of training0, during which time a minimum of 300 procedures must be performed (including 200 as the primary operator).
11. Trainee will be encouraged to understand his limitations and although cardiac catheterization is an invasive procedure, it should be taken seriously should any complication arises which may endanger the life of the patient.

Rotation C

This rotation (noninvasive cardiology) will involve:

-Echocardiography

-Doppler studies

-Stress ECG (treadmill test)

-Holter monitoring

-Nuclear cardiology

Echocardiograpy and Doppler Studies

Echocardiography has now become the principal investigational tool for assessing cardiovascular anatomy and function. The trainee will do the following:

1. The trainee will be advised to read a standard textbook on echocardiography, the basic principles of echocardiography, Doppler echocardiography and color-doppler echocardiography.
2. The trainee will perform echocardiography in conjunction with the echocardiographic technician and consultant cardiologist of the noninvasive lab to understand the anatomical and morphological structures of the heart in various projections. In his first rotation the trainee should have enough knowledge to perform full studies (mmode, 2-D, Doppler studies) while learning echocardiography. He is expected to become familiar with the machine and to perform echocardiography effectively and efficiently.
3. The trainee should perform and interpret at least 200 echocardiographic procedures and 75 doppler examinations under the supervision of the director of the laboratory during his two years (six months in noninvasive laboratory) of cardiology training.
4. The trainee will attend the echocardiography reading session with the consultant cardiologist from the noninvasive lab.

5. The trainee will be encouraged to present interesting or problem-oriented echocardiographs to other cardiology faculty staff during the echocardiography session in cardiology unit rounds.
6. The trainee will be encouraged to develop a good rapport with technicians and other junior and senior colleagues to improve the efficiency of the noninvasive lab.
7. The trainee (if he selects noninvasive cardiology) in his third year of cardiology training must perform and/or report at least 600 echocardiograms, 250 doppler studies and 100 transesophageal echocardiograms.
8. The trainee should receive instructions in anatomy, physiology and pathophysiology with regards to the cardiovascular system, in general and in relation to the echocardiogram in particular. The trainee should have good working relationships with the cardiac surgeons so that he can consult with them regarding echocardiographic anatomic structures seen prior to surgery and anatomic structures seen during surgery in the operation theater.
9. The trainee should perform and/or report additional cases of stress ECG, stress thallium, persantin thallium and Holter monitoring.

Stress ECG

1. The trainee will supervise the stress ECG and make reports under the supervision of consultant cardiologist of the noninvasive lab. Interesting or difficult stress ECG tracings should be presented in the cardiology round by the trainee.
2. The trainee will be encouraged to read books and other publications on stress ECG including indications, contraindications, safety measures, precautions, when to stop exercise and how to report and what factors to consider when reporting stress ECG.
3. The trainee should become proficient in data interpretation, written reports and sensitivity and specificity of the procedure in different clinical settings.
4. The trainee should perform at least 100 stress ECGs and report them under the supervision of the consultant cardiologist.

Holter Monitoring

1. Trainee will review and report all Holter tracings under the supervision of consultant cardiologist of the noninvasive lab. Interesting and difficult Holter tracings should presented in the cardiology unit round for discussion.
2. The Fellow is expected to rule out or detect rhythm disturbances as a cause of symptoms and detect and assess arrhythmias believed to be associated with an increased risk for cardiovascular events. The trainee should also be able to assess the efficacy of antiarrhythmic therapy and investigate the effects of new therapeutic modalities.
3. The Fellow should scan at least 100 Holters (24-hour ambulatory ECG) during his three-year period of training in cardiology.

Nuclear Cardiology

1. In this rotation, the trainee will learn the following procedures:

    - Stress thallium/cardiolyte scan
    - Persantin thallium
    - Tecnitium pyrophosphate scan
    - MUGA scan

2. The trainee posted in the noninvasive lab will also be responsible for the above-Mentioned tests. He will attend the exercise test and reading sessions of nuclear cardiology.

3. During the rotation trainee is expected to have a reasonable understanding of the above-mentioned tests, their general principles, indications and limitations of these nuclear cardiovascular procedures including nuclear magnetic resonance imaging (MRI) studies. The trainee will also report on ECGs during stress thallium scans under the supervision of catheterizing physician.

4. The trainee should actively participate in radionuclide study interpretations under the supervision of qualified staff in nuclear cardiology and he should be able to correlate the angiographic, hemodynamic, echocardiographic and clinical data with that of nuclear cardiology tests.

5. The trainee must report at least 50 stress/persantin thallium scans under the supervision of qualified staff in nuclear cardiology.

Rotation D

This rotation will involve the:

- Cardiology ward
- Consultations and referrals from other departments

The trainee must learn the pathogenesis, pathology, risk factors, natural history, diagnosis by history, physical examination and laboratory methods, medical and surgical management, complications and prevention of various cardiovascular conditions.

1. The trainee will be encouraged to develop a clinical skill that will enable him to be less dependent on different investigative modalities and more confident on his clinical judgment.
2. While deciding about the management of any patient, the age, social, family and circumstantial factors are of paramount importance and these factors will be given due respect while a sense of clinical acumen and judgment will be highlighted during the training period.

3. Although it is important to know how to manage the patient, it is equally important to learn when to give limited treatment and when to stop treatment while managing a sick patient. These decisions are extremely delicate and involve medical ethics. The trainee will be encouraged to understand and grasp these factors while deciding about the management and future course of treatment of any given patient.
4. The trainee will be included in the team with the house officer and residents who make the daily round to in-patients. The trainee will help make decisions on patient management. However, if an important decision has to be made, the consultant in charge of the patient should be consulted.
5. The trainee will organize a teaching round with the house staff and residents and when appropriate, articles or review papers on the subject concerned will be provided by the trainee to the house staff and residents.
6. The trainee will also attend the consultant round. He will supervise the residents or house staff at the time of presentation of cases to improve the efficiency of ward rounds and to discuss the problematic and interesting cases in depth, both for problem solving and for academic discussion as well as to save time on uncomplicated and straight forward cases.

Cardiology Referrals and Consultations

1. The trainee posted in the medical wards will be responsible for all the cardiology consultations in the hospital except in the medical wards which will be the responsibility of the trainee posted in the CCU.
2. The trainee will be encouraged to discuss any problematic referral wit the consultant cardiologist on call for that week.
3. If the patient who is referred needs transfer to the CCU, the trainee will contact the consultant in charge of CCU for his agreement before the patient is trans ferred to the CCU.
4. The trainee will be advised to write clearly the case notes of referred patient after the examination. The future plan of the referred patient should also be written clearly and should be followed up as needed. The referring doctor should be informed in clear terms the future course of action with regards to the referred patient.

Cardiology Clinics

1. Each cardiology trainee will help the out-patient cardiology clinic at least twice a week on a regular basis, however, in unusual circumstances the trainee may be asked to attend more clinics in a week than assigned.
2. Cardiology trainee will be encouraged to discuss any problematic patient with the consultant in charge of the clinic or in his absence with the consultant cardiology on call for the week.
3. Discharging patients in the shortest time possible in the clinic and making important clinical decisions have serious implications. The trainee must become

well trained to seeing patients with complex cardiac problems while under the pressure of attending to many cardiac patients in the clinic.

Training in Cardiovascular Research

It is vital for the future intellectual health of cardiovascular medicine and the welfare of patients with cardiac disease that all future cardiologists be familiars with the principles and tools of research.

Every trainee should be encouraged to have direct involvement in the practical aspects of research with emphasis on literature review, data analysis and logical deduction. They should take research training as seriously as any invasive procedure or clinical training.

Components of Research

1. Literature review: assessing exact knowledge before undertaking new investigation.
2. Formulation of hypothesis and specific goals: ensuring that the hypothesis can be tested and that the goals can be achieved.
3. Development of the research plan and protocol: this includes a) informed consent b) data collection modes c) full description of procedures and d) medical ethics and approval of human investigation from the institution.
4. Development of analytical methods or procedural skill.
5. Data collections.
6. Data analysis.
7. Statistical significance
8. Presentation of results.
9. Risk benefit analysis.
10. Report (publish) in peer-reviewed journals.

Trainees will be encouraged to publish the results of their research and present in symposium and seminar for criticism or acceptance by fellow scientists.