

Establishment of cardiac rehabilitation program in Yazd-Iran: An experience of a developing country☆☆☆

Mahdieh Ghanbari-Firoozabadi, Mohammadreza Vafaii Nasab, Fatemeh Boostani, Masoud Mirzaei *,
Fatemeh Amrollahi, Jamal Entezari, Maryam Askari

Yazd Cardiovascular Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

ARTICLE INFO

Article history:

Received 30 April 2019

Received in revised form 10 July 2019

Accepted 14 July 2019

Available online 23 July 2019

Keywords:

Cardiac rehabilitation

Low-middle income countries

Referral rate

Attendance rate

Enrollment rate

Completion rate

ABSTRACT

Background: Cardiovascular diseases are the most common causes of mortality in the world including Iran and are one of the main causes of disability. Cardiac Rehabilitation (CR) is a multidisciplinary program that helps CVD patients recover faster after a heart attack and avoid any subsequent incident. This report determined the current state of CR in Yazd, Iran.

Characteristics of the program: Hospital-based Afshar CR program in Yazd, Iran, is the only CR facility in Yazd province, which is located in the centre of Iran. Currently, the Afshar CR program has four phases including inpatient, sub-acute, outpatient and maintenance. The CR team includes cardiologists and heart surgeons as physicians, and physical medicine rehabilitation specialist, outpatient and inpatient resident medical officers, psychiatrists, nutritionists, psychologists, physiotherapists and social workers.

Discussion: Given the facilities and training programs mentioned above, the rate of patient referral to the center by the inpatient CR team during the short life of CR in this center was 60%, the patient participation rate was 6.9% and the enrollment rate was 55%. In addition, over the past three years, 57% of registered patients completed the program.

Conclusion: The Afshar CR is trying to get closer to the world standard setting. But it seems that it is necessary to develop the standard of CR in Iran based on the culture and socio-economic status of Iranian community.

© 2019 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Cardiovascular disease is the most common cause of mortality in the world including Iran and is one of the main causes of disability [1]. If risk factors of heart disease are not controlled properly, cardiac events, re-hospitalization, repeated therapeutic interventions and even premature death will occur. Effective and right policies after heart disease can reduce disability in patients. Cardiac Rehabilitation (CR) is a multidisciplinary program that helps patients with CVD recover faster after a heart attack and do not have a subsequent incident [1]. Evidence-based CR program, class I is recommended for patients with myocardial infarction (MI), acute coronary syndrome, chronic angina, heart failure (HF), post-operative coronary artery bypass graft (CABG), and post-angioplasty (PCI). It is also recommended to the patients undergoing cardiac valve and heart transplantation on the basis of AACVPR [2].

Exercise-based CR significantly decreases cardiovascular mortality, the risk of re-hospitalizations and as a result, the costs [1]. This paper determined the current state of CR in Yazd- Iran including characteristics of the program, number and types of duties of each team member and CR indications.

2. Characteristics of program

Hospital-based Afshar CR program in Yazd- Iran, has been commenced in Afshar Hospital-a teaching and referral hospital for cardiovascular diseases- from February 2004 with outpatient CR program, after reviewing the latest available guidelines during a research project [1–4]. This public CR center is the only CR facility in Yazd province which is located in central Iran. The program demanded by the cardiologists in response to AHA recommendation of CR as a method to stabilize, slow down, and even reverse the course of arteriosclerosis in cardiac ischemia patients commenced its activities [5].

CR underwent many fluctuations in this interval. The treatment team showed some deficiencies at different intervals. Despite many limitations like lack of health insurance coverage, lack of cooperation of some cardiologists and hospital authorities, shortage of human and financial resources, the CR center has continued working so far.

☆ The authors have not received any grant for this paper.

☆☆ All authors are aware of the whole article and can be responsible and do not have any conflict about the information.

* Corresponding author at: Yazd Cardiovascular Research Center, Afshar Hospital, Jomhuri Blvd., Yazd, Iran

E-mail address: mmirzaei@ssu.ac.ir (M. Mirzaei).

Table 1
Duties of Cardiac Rehabilitation team members in Yazd-Iran.

No.	Team member	No in team	Duties
1	Physical Medicine and Rehabilitation	1	Technical and primary assessment of patient
2	Resident medical officer	2	Managing the program and determining the activity level and safety of program
3	Psychiatrist	2	Drug therapy if needed on the basis of diagnosis of team psychologist or for complementing consultations
4	Nurse	6	To increase awareness of the cardiac disease, health literacy, drugs, and patient self-care, especially during activity like heart rate, table of the patient's perceived activity, preventing the incidence of cardiac symptoms during activity, talk test, method of dealing with cardiac symptoms, and the use of nitroglycerine
5	Physiotherapist	2	Rapid initiation of safe activities in cardiac patients, prevention of problems of sedentary living after cardiovascular accidents, and training required for warming up and cooling down to improve musculoskeletal problems
6	Nutritionist	4	Dietary assessment, assessing the lipid profile, blood pressure, blood sugar tests, anthropometry like weight and BMI, and patient training for controlling nutritional cardiac risk factors
7	Psychologist	3	Investigation of mental and psychological status, completing the DASS-21 ^a and SF-36 ^b Life Quality questionnaires, teaching of mental factors, smoking and drug abuse cessation and more consultation for reference to psychiatrist
8	Social worker	3	Survey of social support status of the patients, occupational consultation, appropriate interventions in the case of social problems, creation of a supportive environment, counseling on smoking cessation in coordination with psychologist
9	Secretary	3	Recording of the implemented interventions and patient information

^a DASS: Depression, anxiety, stress scale-21 items.
^b SF: Short form-36.

An attempt was made to secure insurance coverage for all indications such as post-MI patients, acute coronary artery syndrome, chronic angina, heart failure, open heart surgery and angioplasty, valvular surgery, heart transplantation, peripheral vessels diseases, and even multi-risk factor patients without cardiovascular diseases [5]. These indications were not previously covered by the insurance companies. However, since health insurance companies cover up to six months CR after hospitalization only for MI, open cardiovascular surgery, valvular surgery, heart failure, angioplasty, and heart transplantation, most inpatient CR activities have no insurance coverage.

The CR facility has provided some privileges for patients without insurance. In December 2013, the hospital management team changed, which was a turning point in the CR program since more suitable milieu was provided in the hospital for rehabilitative activities by supplying appropriate resources, equipment and instruments. Experienced personnel were recruited and trained. Processes and guidelines were developed after reviewing the latest protocols [6] and inpatient CR was started in December 2014 to train the personnel and to prevent subsequent accidents and also to promote patients' health. The processes, procedures and guidelines are revised annually.

The CR team includes cardiologists and heart surgeons as physicians, and physical medicine rehabilitation specialist, outpatient and inpatient resident medical officer, psychiatrists, nutritionists, psychologists, physiotherapists and social workers.

The number and duties of each of the team members are presented in Table 1.

3. Phases of CR

Currently, the Afshar program has four phases: a) Inpatient, b) Subacute, c) Outpatient and d) Maintenance. The process of Afshar CR is presented in Fig. 1.

3.1. Inpatient phase

The inpatient CR is commenced by the physician's order. The patient is assessed by physical medicine and rehabilitation specialist. The process includes full medical history, past medical history, cardiovascular risk factors of the patient, patient's literacy, mental status, tobacco smoking, drug and alcohol abuse, social support, and musculoskeletal problems. After patient assessment, the inpatient rehabilitation resident plans the required consultation on the basis of patient's mood and patience and by considering hospital stay, which, given the innovative interventions, is very short. Then, the patient's activity level during hospitalization is determined with respect to activity contraindications. These programs are managed under supervision till the time of discharge and are performed by team members as displayed in Table 1 and then, recorded on the patient's health record. All patients with

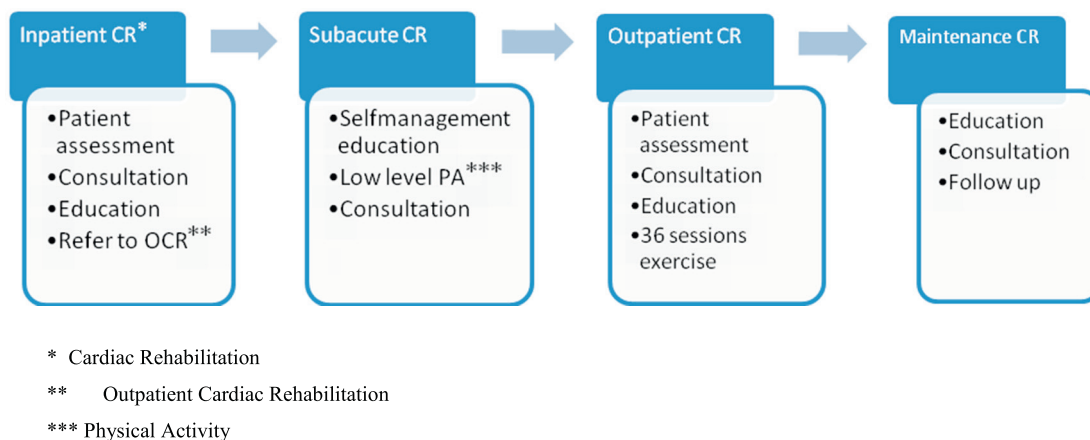


Fig. 1. The process of Afshar Cardiac Rehabilitation in Yazd-Iran.

indications undergo comprehensive CR on the basis of AACVPR (American Association of Cardiovascular and Pulmonary Rehabilitation) [6]. Hospitalized patients with cardiac risk factors such as diabetes and hypertension, patients post ablation procedures, patients with arrhythmia or dysrhythmia, and patients post device placement receive the required training by the team nurse. They receive an educational package including type of nutrition, physical activity level, method of drug administration, and method of approaching acute mental and psychological problems after discharge and before commencing outpatient rehabilitation activities by the rehabilitation team. The time of presenting for the outpatient phase is determined on the basis of disease type and given interventions (1–3 weeks) [6]. The importance of presenting for CR and the effects of outpatient CR are explained to the local patients and the first date is reminded by mail.

Since Yazd province is the south-east hub for various medical services in Iran and Afshar Hospital is the heart center of the province, around 40% of hospitalized heart patients are not local. However, these patients undergo inpatient CR. If there is a CR center in their own hometowns, which is not available in most cases, they are referred to that center. Otherwise, the method of physical activity at home and self-care during activity is explained to them in greater details.

3.2. Sub-acute phase

This phase includes the stage after discharge and before the outpatient phase. At this stage, the level of physical activity and self-monitoring during the activity are taught to the patient. This education includes the measurement of pulse, symptom control and the patient's rating of perceived exertion (RPE) by the team nurse. If patients cannot go to an outpatient phase, they will be based on risk factors for counseling by the multidisciplinary team (Table 1).

3.3. Outpatient phase

If the patients attend the outpatient CR center at the appointed time, they are assessed again to complete the trainings. Past medical history, status of cardiac risk factors, tobacco smoking, drug and alcohol abuse, patient's activity level before cardiovascular accident, post-discharge phase, patient's symptoms during daily activity and rest time are assessed. Also, echocardiography and exercise test (in the case of indications and under physician's advice) are done. On the basis of this assessment, the patient undergoes risk stratification using AACVPR guidelines [6]. Again, the patient receives various consultations according to Table 1 to complete the trainings. The number of counseling sessions during the program is planned on the basis of the assessed problems. Each patient undergoes a 36-session program of physical activity three days per week for three months [6]. During this time, an attempt is made to extract the educational needs of the patient and plan to increase the health literacy level and self-care of the patient in the form of various collective training classes and face-to-face training by the multidisciplinary team (Table 1). The patient's physical activity program is recorded in a special chart. During this time, pulse, blood pressure, and other vital signs of the patient are frequently monitored and recorded. In the case of diabetes, the patient's glucose level is measured initially and recorded in the chart. In the case of any contraindications on the basis of AACVPR, the patient is referred to the physician for more evaluation [6]. The patient's physical activity is commenced by warm-up in the presence of the physiotherapist. The main phase of physical activity is performed in the presence of nurses, physiotherapist, and resident in the major space of cardiac rehabilitation center. The patient's daily activity in the CR center is planned on the basis of activities of the previous session considering maximum heart rate (MHR) determined for each individual patient and the patient's perception of physical activity of the previous session (using Borg's table). In the case of MHR exceeding the preset level, the patient's perceived physical activity reaching 13, ECG changes, incidence of symptoms, positive talk

test, or the incidence of contraindications on the basis of AACVPR, the patient's activity is reduced or stopped [6]. The sports equipment in this center includes treadmill, recumbent bicycle, and arm ergometer. Considering the patient's activity capacity, two activities are performed in each session that usually includes treadmill followed by recumbent bicycle or arm ergometer. At the end of the use of sports equipment, the patient performs some stretching exercises to cool down. At the end of physical activity, the patient leaves the center after making sure of their stable status. The rate of physical activity of each patient and weekly increasing of MHR are determined on the basis of performance capacity, symptoms, and risk factors [7]. At the completion of cardiac rehabilitation program, the patient undergoes assessments like echocardiography and exercise test similar to the beginning phase. The patient's activity level for the maintenance phase is determined on the basis of echocardiography, METs, HR of exercise test, and patient's symptoms. Again, the method of self-care during exercise and the patient's activity level are explained to the patient using activity table in which the METs of each activity are clearly stated. All consultants carry out the end-of-phase assessments according to Table 1 and evaluate the course of patient improvement during these three months. They plan the long-term training or, if necessary, continue to the next consultation sessions. Finally, all the trainings are given to the patient as an educational package. The patient is advised to present to the center three months later for repeated investigations, assurance of stabilized trainings, continuation of monitoring of cardiac risk factors, and in the case of lack of control of some risk factors like smoking, drug abuse, and alcoholism. If the patient does not present to the center at the appointed time for the outpatient CR phase, they are given a call after one month of their discharge for follow-up and performing the required care. The barriers of presenting to the center are investigated during the one-month interval. All consultations, according to Table 1, are performed for this group of patients at the time of presentation. If the patients claim that they cannot do the physical activities in the center for 36 sessions, the reason is investigated. If the patients have financial problems in paying the costs, lack of social or familial support, or cannot attend the center due to duties and responsibilities, they undergo social support consultation, and if the problem is resolved, the patient is admitted. If the patient cannot really attend the center or have no personal inclination to do so, they receive self-care training, HR, Borg, and at home-activity chart to be completed by them. The patient's activity level is determined on the basis of METs of activities, echocardiography, and exercise test (on the advice of the physician) and elucidated to the patient. The patient's feedback of trainings is controlled. The educational package including nutritional orders, method of approaching and controlling mental factors, returning to job, cessation of smoking, drug abuse, and alcoholism, and the patient's activities is delivered to the patient.

3.4. Maintenance phase

Patients can exercise at the center once a week. After completing the outpatient phase, the patients are advised to attend the CR center three months later. They are investigated for the interventional effects and continuation of the interventions to exercise independently with monitoring, take care of the risk factors of heart disease, and take their medications regularly by the multidisciplinary team (Table 1).

4. Discussion

Given the facilities and training programs mentioned above, the rate of referral to the center by the inpatient CR team during the short life of inpatient CR in this center was 60%, the patient participation rate was 6.9% and the enrollment rate was 55%. In addition, over the past three years, 57% of registered patients completed the program. As shown in previous studies, according to the conditions, the referral rate was different (84.5% for non-ST elevation MI to 10.4% for HF patients) [8]. The

attendance rate is less than 50% in high-income countries [9] and the referral rate is less than 40% in low middle income countries and unclear in Iran [10]. In Afshar CR center, patients' referral by cardiologists and by other hospitals is not clear due to the absence of patients' referral system. Indeed, the percentage of reference is determined on the basis of patients hospitalized by CR rehabilitation team. Unlike in developed countries, the patient referral system involving patient referral from physicians and CCU wards to cardiac rehabilitation centers has not been defined and the referral rate is not clear in Iran. Of course, the referral rate of cardiac patients in this center is considered on the basis of referral by intra-ward rehabilitation nurses.

There are substitute ambulatory cardiac rehabilitation programs such as home-based CR and community-based CR available in the developed countries. This center is also trying to provide such substitute programs to increase the rate of use of secondary cardiovascular prevention programs by this patient population in the center. Much attempt has been made in the CR center to enhance presentation of cardiovascular patients for CR.

5. Conclusion

The Afshar CR is trying to get closer to world class standard. But it seems that it is necessary to develop the standard of CR in Iran based on the culture and socio-economic status of Iranian society. In this regard, numerous studies are presently being carried out to identify the barriers to patient's participation to CR centers and patient referral by clinicians the results of which will be subsequently published. Some parts of CR standards have been developed by Iranian Ministry of Health, Treatment, and Medical Education on the basis of international guidelines. Yet, there is no comprehensive Iranian CR guideline available. A strategic guideline ought to be developed on the basis of the

results of studies on Iranian CR barriers and facilitators, the efficacy of Iranian CR programs, the abilities and needs of patients, clinicians' experiences, and opinions of policy-makers and insurance companies.

References

- [1] J.B. Derstine, H.S. Drayton, in: J.B. Derstine, H.S. Drayton (Eds.), *Comprehensive Rehabilitation Nursing*, 1st edition W.B. Saunders, Philadelphia 2001, pp. 486–506.
- [2] W.D. McArdle, F.I. Katch, V.L. Katch, in: J. Eric (Ed.), *Essential of Exercise Physiology*, 2th edition Lippincott Williams and Wilkins, Baltimore 2000, pp. 262–295.
- [3] Medicine American College of Sports, in: P. Darcy (Ed.), *ACSM'S Resource Manual for Guidelines for Exercise Testing and Prescription*, fourth edition Lippincott Williams and Wilkins, Philadelphia 2001, pp. 263–298.
- [4] American Association of Cardiovascular and Pulmonary Rehabilitation. *Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs*. 4th edition, Human Kinetic, Champaign, 2004.
- [5] A.S. Leon, B.A. Franklin, F. Costa, G.J. Balady, K.A. Berra, K.J. Stewart, et al., Cardiac rehabilitation and secondary prevention of coronary heart disease: an American heart Assoc. scientific statement from the council on Clin. Cardiol. (subcommittee on exercise, cardiac Rehabil., and prevention) and the council on Nutr., Phys. Activi, *Circulation* 111 (3) (2005) 369–376.
- [6] American Association of Cardiovascular and Pulmonary Rehabilitation Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs 5th Edition. Champaign: Human Kinetic 2013.
- [7] D.L. Mann, D.P. Zipes, P. Libby, R.O. Bonow, Braunwald E, Editors. *Braunwald's Heart Disease: A Text Book of Cardiovascular Medicine*, 10th edition Elsevier Saunders, Philadelphia, 2015.
- [8] R.J. Thomas, G. Balady, G. Banka, T.M. Beckie, J. Chiu, S. Gokak, et al., 2018 ACC/AHA clinical performance and quality measures for cardiac rehabilitation: a report of the American College of Cardiology/American Heart Association task force on performance measures, *J. Am. Coll. Cardiol.* 71 (16) (2018) 1814–1837.
- [9] M. Bäck, B. Öberg, B. Kreviers, Important aspects in relation to patients' attendance at exercise-based cardiac rehabilitation - facilitators, barriers and physiotherapist's role: a qualitative study, *BMC Cardiovasc Disord. BMC Cardiovascular Disorders* 17 (1) (2017) 1–10.
- [10] L. Ragupathi, J. Stribling, Y. Yakunina, V. Fuster, M.A. McLaughlin, Vedanthan R. Availability, Use, and barriers to cardiac rehabilitation in LMIC. *Glob heart, [Internet]. World Heart Federation (Geneva)* 12 (4) (2018) 323–334 (e10).