



COMPARING CARDIAC REHABILITATION GUIDELINES

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Abstract:

Objectives: Comparing Cardiac Rehabilitation Guidelines. **Method:** guidelines were searched alone and with combination with different nations in English language. To review information about the exercises modes, exercise intensity, testing, and monitoring of patients. **Results:** the United States, Canadian, United Kingdom, and European guidelines all have common components and have differences in the exercises modes and intensity. The United States, Canada, and European guideline suggest aerobic training should progressing from moderate to vigorous intensity through the program, these guidelines also suggest resistance training combined with the aerobic training to improve quality of life. The United Kingdom recommends lower intensity program and less ECG monitoring. Although the other guidelines recommend ECG exercises stress test for functional capacity assessment. **Conclusion:** guideline for the Mediterranean region should be assembled and after reviewing these guidelines, it is recommended to use ECG monitoring for functional assessment. Managing the risk factors is recommended in all the guidelines. Aerobic endurance training is recommended to advance from moderate to high intensity exercises combined with resistance training. These characteristics are safe for the patients and also showed improvements in patient's health and quality of life.

Keywords: cardiac rehabilitation, comparing guidelines

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1. Introduction

Cardiovascular diseases (CVD) are considered to be the leading cause of deaths in Mediterranean Region by estimated percent of 54% of the total deaths. The prevalence of the CVDs is due to the way of the individual living, from being inactive and the tobacco use to the rest of the risk factors. Adults aged above 15 years in Kuwait, Bahrain, UAE, and Saudi Arabia shows high level of obesity rate in the Mediterranean Region and that shows clearly why the leading cause of deaths in that region is CVDs (WHO). According to the Guardian Saudi Arabia 61% of male adults are inactive and 76.2% of female adults are inactive. Therefore, the ideas of preventing the leading cause of death interest me. Either way it is after or before the CVD occurs. The increasing inactivity rate in that region 50% also considered high risk in women more the men. The tobacco use is also in increase (in adult men between 7%-57%). (The Guardian)

The scope of view in the Cardiac Rehabilitation (CR) has changed from only physical activity and exercises to even bigger life changing habits. That will provide even wider prevention and enhancement of the patient lifestyle and motivating in bigger concept, such as smoking cessation, education and modifying risk factors. Worldwide CR is considered class I recommendation. Two centuries ago, restrictions were imposed in-patient with coronary events. Heberden reported a patient who improved after working half an hour a day in wood work and by then the studies continued until CR is class I recommendation. (Mampuya, 2012) Despite being Class I recommendation, CR is underutilized with less than 30% of CVD patients' participation. Reasons of this gap are present in different levels (patient, Physicians, Healthcare settings and society). (Massimo, 2014)

1.1 Phases of CR

CR is generally divided into three phases:

1. Inpatient CR: services and rehabilitation who is hospitalized.
2. Early outpatient CR: services and rehabilitation in early after a CVD event, usually it's the first Six months and extends to One year.
3. Long-term outpatient CR: Long term program that deliver prevention and rehabilitative services in outpatient setting. (Randal, 2007)

1.2 In-Patient (Phase I)

Research was conducted on 10 hospitals in Korea regarding cardiac rehabilitation phase I. using questionnaires modified by previous studies and 9 hospitals responded. On 1st post-op day the patient did (sitting on bed, sit to stand, up to chair, and walking in the ward). On 2nd day (stairs up and down) was done on different days in some hospitals. Patient also received educational and preventing complications and increase muscle strength by home exercises. Based on the results of these questionnaires showing improvements in the understanding of the patient condition and prepare the patient for phase II CR. (Yong, 2017)

1.3 Early Outpatient Phase II

Exercises program after discharge from the hospital to prevent future cardiac events. A study was done on maintaining the program. It was conducted on one hundred and thirty participants, sixty four patient on the counseling group and sixty six patients on the control group. The counseling group was giving 6 months exercise counseling delivered by telephone and printed materials. Measurements such as (maximal stress test, motivational readiness to exercises) were done at the baseline, six months, and twelve months. The study shows significant increase in participation in the exercises in the counseling group more than the control group. (Bernardine, 2011)

1.4 Long-Term Phase III

Cardiac rehabilitation is a complex intervention, which offered to patients who suffer from heart diseases, which contain health education reduction of risk factors and physical activity and stress management. (Dalal, 2015) Identifying the long-term goals and the correct way to achieve them. Also in this phase clearing the patient's responsibilities and self-managements. The cardiac rehabilitation team should give an appointment after one year to follow-up the patient life-style and physical activity and for national audit by using questionnaires. (BACPR).

1.5 CR Eligibility

The program eligibility is mostly common in all countries which include patient who suffer from:

- Acute coronary syndrome:
- Following revascularization:
- Stable heart failure:
- Stable angina:
- Heart valve replacement/repair:
- Heart transplantation
- Congenital heart disease
- Other atherosclerosis such as peripheral arterial disease (PAD), transient ischaemic attack.

1.6 CR Program staff

CR Multidisciplinary team should consist of highly qualified practitioners led by a clinical coordinator. The team should include:

Cardiologist	Nurse specialist	Physiotherapist	Dietitian
Psychologist	Exercise specialist	Occupational therapist	Clerical administrator

All the staff members are aware of their role in the CR program and should work in the same harmony and communication is key factor between them to achieve the goals of the program.

1.7 CR Components

Programs such as the British guideline suggest that there are seven-core component in CR. These seven components are considered the key aim of cardiac rehabilitation. The seven-core components are:

1. Health behavior change and education: Providing information and education in the patient health status and addressing if there is any cardiac false impression, identifying the patient's place of support such as a relative or his/her best friend. Patient must be encouraged to play a strong role in the CR. The education should aim to Increase the knowledge and the understanding of decreasing the risk factor and utilize evidence-based behavior theory in its delivery. The education must be delivered in high quality methods of teaching.
2. Lifestyle risk factor management:
 - Physical activity and exercise: exercise prescription by the leading staff and ADLs, including the choice of exercises place (house/community/hospital)
 - Diet: the focus should be making healthy changes with the supervision of the leading staff.
 - Smoking cessation: every effort should be done to help the patient quit smoking and prevent coming back to it again, and may also include other tobacco use such as chewing gum.
3. Psychosocial health: all patients must be assessed by psychologist to assess (anxiety, depression, quality of life) at baseline and after CR program is complete and the patient is ready to be discharged and continue as outgoing patient.
4. Medical risk factor management: Such as regularly managing blood pressure and glucose.
5. Cardioprotective therapies: includes medication (Anti-platelet therapy- lipid lowering therapies. etc.) and implantable devices (defibrillators – cardiac resynchronization. etc.) as the staff leading decide appropriate to the patient.
6. Long-term management: identifying long-term goals and reassessment, also addressing the patient responsibilities.
7. Audit and evaluation: every CR should evaluate their services based on the outcomes and provide measurements. (Dalal, 2015)

1.8 Availability of CR Programs

The availability of CR programs in Arabic countries is limited although Arab countries are considered to be high-income countries. The CR programs are usually provided as Women-only classes. After comparing the risk factors with other high-income countries as the Arab countries and comparing, the CR viability in those countries such as Canada the results shows limitation as mentioned above that can be treated with providing more CR programs and the education of the benefits of it. The governments and health societies should show serious actions against these raising problems. (Karam, 2015)

1.9 Psychological factors

The CR participants usually show some psychological factors that may face off the goals of the CR program or even effect on the participant attendance. For that, a study was made to assess the psychological factors such as depression and anxiety and social support, and cardiac prone personality and improving it by psychologists, Shen (2005) and by that, we increase the motivation of the participants to achieve the program goals. The program should focus also on the patients believes to keep the motivation all the way. (Shahsavari, 2012)

1.10 Weight Control

The European CR guideline suggests that the patient should be weighted each visit to encourage weight control via physical activity and formal behavior program which suggest maintaining healthy BMI (18.5 – 24.9 kg/m²). Also it is suggested by the European guideline to give a vocational advice and to be assessed before discharge and returning to previous activity must be discussed unless its medically contraindicated and discussing returning to work adjustments and disability awareness.

Community support in European guideline conduct groups within local community to support patients in everyday life. These groups also useful for recognizing the patient who does not wish to attend these programs and for those there is other possibilities such as monitoring their risk factors led by primary care practitioners and also seek help from the local sources. (Massimo, 2014)

1.11 MICE or AIT

The Canadian guideline prescribe moderate intensity continues exercise (MICE) but a study was done on 1544 samples in Toronto Rehabilitation Institute to utilize the differences if we applied Aerobic interval training (AIT) rather than MICE. Patients were separated equally into two groups, group received the usual care of CR which is MICE for twenty six weeks (60-80% of VO₂ peak, 5 times a week) and the other group received twenty six weeks of progressive training interval (15 min/mile walking pace, 12 min/mile jogging pace, 5 times a week). The results showed improvements in VO₂ peak in the AIT group more than MICE group and also larger improvements in CV risk profile characteristics, BMI, Triglycerides, depression score and hip to abdominal girth compared to MICE. (Lees, 2017)

1.12 Cost of CR

A randomized study was done on 90 low-to-moderate cardiac risk patients participating in CR program for three months either home-based or center-based. The home-based patients were given tele-monitoring guidance. Although training was similar between the two groups (12 weeks at least 2 sessions weekly for 45-60 minutes continuous training with intensity of 70-85% of Maximum Heart Rate) but the home-based showed higher satisfaction but no different in physical fitness at discharge. Non-significantly center-based program cost more than home-based per patient (£3160).

Healthcare costs were non-significantly lower in the home-based group. They found that the home-based training is more cost-effective than the center-based. (Kraal, 2017)

1.13 The Aim of This Paper

The aim is to recognize the differences between the guidelines in different fields and in different countries to explore the outcomes and measurements in the patient health and physical activity and the latest evidence-based practices in CR and the health practitioner's point of view in the guideline. Promoting CR in the community and explaining the risk factors and how to reduce them. Also clearing the misunderstanding about heart disease patients in avoiding the physical activity.

2. Method

This study aim to search for National guidelines, outcomes and measurements for exercises-based outpatient CR were searched using search engines (Google, PubMed, Pedro) up until December 2018. Using the key words "Cardiac Rehabilitation" "Guideline" "outcomes and measurements" "Cost of Cardiac rehabilitation" "Exercise-based". There were more than eight hundred results and after choosing (Last 10 years – Humans) filters, it remained more than two hundreds. Adding terms for choosing nations such as "Canada" "American" "European" "United Kingdom".

Governments and known cardiology websites were also inspected for additional information and possible guidelines and/or measurements to extract the relevant information for this review.

3. Results

There are some components all the chosen guidelines agree on and there is, in the other hand, differences between them. Here are some of the CR components, which are agreed on:

3.1 Assessment

CR should have initial assessment in each core component and ongoing assessment during the program and reassessment by the end of the program. The assessment should discuss each core component and also discussion of goals to be achieved during the program in written and the patient should have a copy. The initial assessment should investigate:

- Medical history: previous surgeries or diseases.
- Physical examination: examine the cardiopulmonary system including pulse, blood pressure, palpation and inspection of the lower limb for arterial pulses or edema.
- Testing: obtain resting 12-lead ECG, Assess patient's health related quality of life.

Patient treatment plan should be documented with short-term goals that will guide the interventions. Also, documentation helps in areas that should be investigated

more and monitored. Discharge Plan documentation should include long-term plan and strategies for success.

3.2 Managing the Risk Factors

Risk factors are the road in which it will take for having CVD's. These risk factors must be acknowledged and educated to the patient. Each patient must be assessed based on his life habits in details. After assessing the patient's life activity, the patient must know which are the risk factors, which led him to have CVD. The guidelines agree that (smoking, inactivity, bad diet, obesity and hypertension) are modifiable risk factors. And there are non-modifiable risk factors such (Family history, age and Diabetes). Each guideline has a component of modifying these risk factors as important component in the guideline and has a special CR member to assist the patient on managing them, such as:

3.2.1 Blood Pressure Management

Blood pressure should be monitored minimum in 2 visits as what the USA guideline suggest also assessing current treatment and compliance. The expected outcome: Short-term goal is to assess and adjust interventions until normalization. Long-term goal is maintaining the BP at goal levels.

3.2.2 Tobacco Cessation

Smoking or tobacco use is considered one of the main risk factors and its mentioned on all the collected guideline. In the initial assessment patient should be asked and documented about the smoking status (former smoker - never smoked – current smoker) including patient who quit the last year because of the high possibility of relapsing. Also be specific about the amount (cigarettes by day) and for how long (years) also ask about the exposure to second-hand smoking in home or at work. Determine the readiness to change is confirmed proceed with the “5 As”: Ask, Advice, Assess, Assist, and Arrange. When the readiness of change is not express, provide brief motivational with the “5 Rs”: Relevance, Risk, Reward, Roadblocks, and Repetition. The interventions needed for tobacco cessation are counseling with the staff and group involvement and pharmacological support. It is important to emphasize to stay away from second-hand smoking in work or home to avoid relapsing.

The expected outcome from the interventions is complete cessation for at least one year as a long-term goal. The short-term goal is to express readiness to change and quitting with the pharmalogical support and the relapse prevention skills. Patient who still smoke during the cardiac rehabilitation program are more likely to drop out.

3.2.3 Obesity

The usual risk factors are known and should be managed through the patient life. Leaving the bad habits and living a healthy life is a must for patients with CVDs. Obesity is well known risk factor, but underweight (18.5 kg/m² in body mass index (BMI)) is not monitored. A study was done with cross-section data of 2013 in the

database of Behavioral risk factor surveillance systems (BRFSS) with 491,773 US individuals. They found that underweight had a 19.7% greater risk than normal weight. The overweight and obese population had a 50% and 96% increased risk. (Donghwi. 2017)

3.2.4 Diet

Patients within admission must undergo baseline assessment of their dietary habits. Including measurements of weight, BMI and waist circumference. Patients must understand the relation between what they eat and how it will affect him in the future. These changes must be focused on making healthy dietary and also the practitioner in response must take in consideration the patient's culture, needs and capabilities.

Diet play an important role in cardiac rehabilitation and it includes weigh loss for patients who has increased fat and that should perform increased physical activity and decreased caloric intake. And also weight gain for example (debilitated patients) and weight maintenance.

Weight loss could also be combined with pharmacotherapy for support. In USA guideline in the baseline assessments, they measure cholesterol, high-density lipoprotein, low-density lipoprotein and triglycerides. And they repeat it after 4-6 weeks. The expected outcome after the dietary changes is reduction of all measurements.

3.3 Psychological Management

Patient should be assessed to identify any psychological distress such as depression, anxiety, anger or social isolation. Also sexual dysfunction and substance abuse (alcohol or any other drugs) by using standardized measurement tools or/and interview. Also take in consideration in the evaluation the use of psychotropic medication. Using an appropriate tool should assess the quality of life.

The psychosocial intervention should include group education on adjustment of heart diseases and also stress managements. When it's possible, the family member should be also included in the interventions. Enhancing the patient and the family social support by developing supportive rehabilitation environments and community support. Lack of social support or even social isolation has association with increased heart mortality. In the other hand over protection may also effect on quality of life. Another intervention is to teach the patient self-help strategies.

Services should also focus on illness perception and stress management skills. It is important to consider the vocational advices and financial implications and assess the patients to overcome them.

The expected outcomes of these managements are an absence of clinically significant psychosocial distress, drug dependency and social isolation. Also compliance with psychotropic medication and stopping the using of tobacco, alcohol, caffeine. Patient should also demonstrate responsibility for changes in health-related behaviors. Arranging ongoing managements if issues are still present.

3.4 Exercise Intervention

3.4.1 United States Guideline

- Prior to participate in CR a symptom-limited exercise testing is strongly recommended. If any changes occurred on patient's clinical condition the test may be repeated. The parameters of the assessment should be included like; heart rate and rhythm, signs, symptoms, ST-segment changes, hemodynamics, perceived exertion, and exercise capacity.
- The risk stratify should be determine the level of supervision and monitoring required during the exercises based on the assessment and the exercise testing.
- Individualized exercise prescription based on the evaluation for aerobic and resistance.
- Aerobic Exercise: Frequency (F)= 3-5 days per week; Intensity (I)= 50-80%; Duration (D)= 20-60 minutes; Modality (M)= cycling, walking, treadmill, stairs climbing, rowing and others either continuous or interval training.
- Resistance Exercise: (F)= 2-3 days per week, (I)= 10-15 repetitions per set to moderate fatigue, (D)= 1-3 sets of 8-10 different upper and lower limbs exercises, (M)= elastic bands, cuffs/hand weight, dumbbells, free weights, or weight machine.
- Flexibility training: stretches 3-5 reps for 2-3 sessions per week.
- Warm-up and cool-down should be included in the exercise session and flexibility exercises as well.
- Progressive update to the exercise program should be provided.
- Observation is needed for symptoms, HR monitoring, BP monitoring, PRE, and ECG (starting as continuous monitoring to intermittent as suitable to the patient risk level)

The expected outcome to achieve: Moderate intensity of 30-60 minutes per day for at least 5 days a week as home-based physical activity. Also, achieving muscular endurance and strength, As well as muscle strength, improved psychosocial well-being and reduction of symptoms. (Balady G.J., 2007)

3.4.2 Canadian Guideline

- Exercises testing using Graded Exercises testing (Bruce Protocol) with ECG monitoring.
- Aerobic Exercise: (F)= 3-5 days per week; (I)= 40-85% of Heart Rate Preserved (HRR); (D)= 20-40 minutes per session.
- Resistance Training: (F)= 2-3 days per week; (I)= for upper limbs 30-40% IRM and 50-60% IRM for lower limbs; (D)= 12-15 repetitions per set and 1-3 sets for 6-10 different exercises for both upper and lower limbs
- Flexibility Training: Static stretch more than 4 reps per exercises and 15-60 sec per stretch, PNF stretching: 6 sec contraction followed by 10-30 sec assisted stretch.
- The guideline suggest monitoring HR, BP, RPE, ECG, Respiratory rate (RR) if needed, and Arterial Oxygen Saturation.

- The Program Length > 12 weeks.

The expected outcome to encourage engaging in light forms of physical activity on days when the patient does not have a formal session. To achieve moderate to vigorous intensity exercises in most of the weekdays. (Stone J. A., 2009)

3.4.3 European Guideline

- Exercise testing with symptoms-limited exercises test.
- Aerobic training such as walking, jogging, cycling, swimming): (F)= more than 3 session per week; (I)= 50-80% $VO_{2\max}$ or 50-80% HR_{Peak} or 40-60 HRR or PRE 10-14; (D)= 20-30 minutes per session.
- Resistance Training: (F)= 2 sessions per week, (I)= to moderate fatigue; (D)= 10-15 reps per set.
- Progressive increase should be applied in follow-ups control.
- The guideline suggests monitoring the HR, BP, ECG during initial stages or patients with new symptoms, and also it suggest observation of symptoms.
- The Program Length 2-16 weeks.

The expected outcome: equal of 30 minutes of moderate walking intensity per day. Increase cardiorespiratory fitness and muscular endurance and strength. (Piepoli M. F., 2010)

3.4.4 United Kingdome Guideline

- Exercise testing using Functional capacity test (6 min walk test/shuttle walk test/ Chester step test or symptom-limited ergometer test – no ECG monitoring)
- Aerobic training: (F)= 2-3 sessions per week; (I)= 40-7-% HRR PRE 11-14; (D)= 20-60 minutes per week.
- Resistance Training: (F)= 2-4 sessions per week; (I)= 30-40% 1 RM for upper body and 50-60% 1 RM for lower body; (D)= 2-4 sets of 8-12 reps for 8-10 muscle groups.
- Flexibility Training (static, PNF stretches): 2-4 reps 60 sec per stretch for 2-3 sessions per week.
- The guideline suggests monitoring HR, BP, PRE, and Oxygen Saturation.
- The program length 4-24 weeks depending on patient's status.

The expected outcomes are not specified in the guideline. (BACPR)

3.5 Long-term Management

After finishing the CR program the patient should have participated in all the core components and passed its requirements through a individualized program, also the patient should be reassessed, and identified with the practitioner the long-term management goals. The UK, Canadian, USA guidelines suggest involving the patient in community-based physical activity programs with reduced monitoring and supervision, also getting involved with the cardiac support groups to get access to education and discussion.

4. Discussion

4.1 Initial Assessment

All the guidelines agreed on that the initial assessment is a core component and it should contain (Medical history, physical examination, and tests) and it should be documented and the short-term goals should be addressed and what interventions will achieve these goals. The documentations should also address the long-term goals as suggested in all guidelines chosen. In the initial assessment, the components of the cardiac rehabilitations should be discussed in details and with an explanation, which intervention would help in which goals.

4.2 Aerobic Endurance Training

The foundation of cardiac rehabilitation programs is the aerobic endurance training. It positively affects the cardiorespiratory fitness and functional capacity, reduces disease related symptoms and positively influences coronary risk factors. It also helps with the reduction mortality rate among MI survivors. Aerobic endurance training recommendation is universal but the mood, intensity, duration vary from country to another. The recommendation of the leading societies in cardiac rehabilitation is to progress from moderate to vigorous through the course of CR program. But the United Kingdom guideline suggests starting from light to moderate intensity aerobic training program. (Stone, 2009) Which is the same program WHO suggested for developing countries which has restricted monitoring during trainings (WHO, 1993). However, the United Kingdom also recommend less vigorous physical activity assessment compared with other nations which is standard to use ECG-monitored exercises stress test.

Moderate to vigorous intensity as seen in the Canadian and the United states guidelines showed a significant improvement in exercise capacity, measured by maximal exercise testing such as 6 minute walk test and incremental shuttle walk test, in comparison with non-exercises control group. (Gordon, 2002)

Risk factors improvements, lipid profile, blood pressure, and body mass were reported benefited in moderate to vigorous intensity programs (Gordon, 2002). Light to moderate intensity interventions has no or little improvements in exercise capacity and morbidity compared with non-exercises control groups. (Maddison, 2015)

The Canadian, United states, European guidelines recommend the frequency as more than 3 sessions of the exercises per week. United States and European guidelines emphasized the mood of exercises such as walking, cycling, treadmill, or swimming.

The duration of the aerobic endurance exercises is the same minimal time between all the chosen guidelines which is 20 minutes but the max time of the session is different, the US and UK guidelines suggest it stay as long as one hour (as tolerated) however the Canadian guideline suggests it last up to 40 minutes, the European guideline also suggest 30 minutes as the max time of the session. Although a late study was conducted on the effect of the characteristics of the training sessions and it concluded that the duration does not affect the benefits of the aerobic training and the

adjustments should be done to aim optimizing the expenditure of the total energy in the four training characteristics. (Kraal, 2017)

The intensity of the aerobic training has different measurement units such as VO_2 (maximal oxygen uptake) or HR_{max} (maximum heart rate) or HRR (Heart rate reserve) the US and the Canadian guidelines suggest the intensity should be between 40-85% HRR. The European and the UK guidelines suggest the intensity should be 40-60 HRR.

Resistance Training has benefits in cardiac rehabilitation patients in increase of physical strength and independent of activities of daily living and improvements of quality of life. (Williams, 2007) Studies have been conducted to compare the aerobic training alone and the aerobic training combined with the resistance training. The results showed superiority in increased skeletal muscle mass and reduction of body fat via improved resting metabolic rate. (Marzolini, 2012) The aerobic endurance training is still the primary component in exercises training in many cardiac rehabilitation guidelines internationally, all the chosen guidelines prescribed resistance training and other nations do not include it in CR program, maybe it is because of the complications resulted from blood pressure increase during the resistance training.

The United States and Canadian guidelines have similar resistance training program, They both suggest frequency of 2-3 days per week and the intensity 30-40% on 10-15 repetitions per set, 1-3 sets per sessions, both guidelines suggest low to moderate intensity exercises on 8-10 exercises on both upper and lower extremities.

However, the European guidelines suggest 2 sessions per week and in intensity of moderate fatigue. The exercises of upper and lower limbs should be done on 10-15 repetitions per set. The United Kingdom guideline suggest the sessions should be programed on intensity 30-40% of 1 RM for upper body, 50-60% for lower body, and progression to 50-80% 1 RM for both. The exercises should be held 2-4 sessions per week 2-4 sets of 8-12 repetitions.

Exercise testing is an important core of patient's assessment prior to participate on CR program. The United States and the Canadian guidelines strongly recommends ECG monitored exercises stress test which has benefits such as identifying any abnormal signs or symptoms which seen during the exercises and finding contraindications to high intensity exercises, and also determining the peak exercise capacity in order to enable individualized exercise programs.

Guidelines such as United Kingdom believe that ECG monitored exercises stress test should be performed on high-risk patients or patients who takes high intensity exercises only. Low to moderate intensity patients are assessed by the 6-minute walk test and incremental walk test. The European guideline agrees with the UK guideline and adds ECG monitored exercises stress test should be done in initial assessment only and if the patient present with new symptoms.

Flexibility trainings were suggested in the United States, United Kingdome, and Canada guidelines as stretching. The intensity of the stretching exercises were pointed as to mild discomfort. Stretches sessions should be 2-3 times per week and each session should consist of 2-3 repetitions with hold for 60 seconds or as tolerated.

Program length is of the United States guideline is less than or equal to 36 weeks which is more or less agreeable with the united kingdom program length of 4-24 weeks. The Canadian and the European guideline suggest fewer weeks with 2-16 weeks. All guideline have a common component about the maintenance stage which comes after the CR program finish. They all suggest the patients should keep the active physical lifestyle and attend gym or walk daily or community groups to meet the physical activity guidelines. A study on patients who exercised moderate intensity for 10 years showed improvement of quality of life in patients with heart failure. (Belardinelli, 2012). After the patient complete the program, patient should be reassessed as what the guidelines agrees on. The reassessment should include all the risk factor management status such as smoking, blood pressure managements, medications, physical activity, psychosocial managements, and body weight.

The guidelines all have in common that the patient who finished the program should be documented and audited and the services should be updated and evaluated based on the results of the cardiac rehabilitation outcomes.

5. Conclusion

The United States, Canadian, European, and united Kingdome guideline were reviewed and the updated version of each guideline was also review and the conclusion is similarity in some components and differences in other components. The Mediterranean region should compose its own guideline based on the reviews of each guideline. The guideline should be done with the latest evidence-based practice of each practitioner. The risk factors in the area in a rise and the cardiac rehabilitation will cost the countries even more. The first step should be the society education of the risk factors of CVDs and how to manage it before it is too late. Preventions should not start after the cardiac incidents occur. The aerobic training is a key component of the cardiac rehabilitation program and the latest studies shows the exercises should starts from moderate intensity to vigorous as supported in all the guidelines chosen, With a minimum of 3 sessions per week as supported in US, Canadian, European guidelines.

The combination of resistance training and Aerobic endurance training is seen to show improvements physical strength and quality of life. the guidelines agree on the important of resistance training but differ in the intensity. The latest study showed that the resistance training should begin from moderate and progress slowly until vigorous. Resistance training should be performed with a minimum of 2 sessions per week on 8-10 of big muscle groups as supported on the US, Canadian guidelines. The testing and monitoring of patients should be done in initial assessment and the reassessment and if the appearance of new symptoms using the ECG exercises stress test which is supported by the US, Canadian, and European. Flexibility exercises should be performed minimum twice a week in a moderate intensity as agreed on almost all guidelines chosen except the European. After the cardiac rehabilitation, all the guidelines suggest that the patient should be involved with a group community or a hobby to keep the physical activity in increase and the risk factors manageable. All the

guidelines agrees on the documentation to always keep the services up to date and ready to be evaluated which will increase the positive outcomes of the program. I suggest that the Mediterranean region should build its own guideline especially with the CVDs in a rise and the risk factors levels are not going down. The help of the researchers should add the latest evidence-based practices on the guideline, with the overlook of the outcomes with each nation outcomes to determine the most appropriate approach to the patients.

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