Is There a Role for Cardiac Rehabilitation After Coronary Artery Bypass Grafting?

Treatment After Coronary Artery Bypass Surgery Remains Incomplete Without Rehabilitation

Josef Niebauer, MD, PhD, MBA

In Europe, between 1985 to 1989 and 2000 to 2004, a decline of >30% in cardiovascular disease (CVD) and coronary heart disease mortality was observed. However, according to the latest figures of the European Heart Network, the annual mortality of CVD still exceeds 4 million (ie, 47% of all deaths) in Europe and 1.9 million (ie, 40% of all deaths) in the European Union. Furthermore, despite a falling trend in most European countries, CVD remains the most common cause of death in women and men. The financial burden for the European Union economy is estimated to be almost €196 billion a year, of which 54% is attributable to healthcare costs, 24% to productivity losses, and 22% to the informal care of people with CVD.

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In the United States, an even greater decrease in cardiovascular mortality of 67% was achieved between 1969 and 2013. In addition, during this time period, age-standardized years of potential life lost per 1000 decreased by 68%.

Despite this meaningful improvement, >50 years after the first coronary artery bypass grafting (CABG) in 1964 and almost 40 years after the first percutaneous coronary intervention in 1977, the incidence and prevalence of CVD remain high. So does the annual rate of CABG, even though it continues to drop, for example, to 1081 CABGs per 1 million adults in 2007 to 2008 in the United States.

Obviously, coronary revascularization is widely appreciated for alleviating symptoms and improving prognosis. However, as a structural intervention, it does not address disease progression, which is why revascularization must be paired with measures of secondary prevention to maximize benefit. Given the social and economic burden of coronary artery disease, optimization of evidence-based treatment is paramount. According to current guidelines, treatment of coronary artery disease is incomplete without lifestyle changes and cardiac rehabilitation, regardless of revascularization. Cardiac rehabilitation has to be prescribed as routinely as statins or aspirin. In light of all the evidence in support of cardiac rehabilitation, it is surprising that withholding such an effective and evidence-based treatment has not resulted in litigation. It seems as if such litigation is not a matter of “if” but “when.”

Lifestyle changes need to be made to attenuate disease progression and thus to improve patients’ health and prognosis. Despite the fact that the European Society of Cardiology guidelines on prevention and myocardial revascularization recommend lifestyle changes and cardiac prevention and rehabilitation programs, referral to and attendance of such programs remain low. This is unacceptable. Stronger efforts have to be made to correct this unfortunate situation.

Secondary Prevention: A Brief Case for Physical Activity

Cardiovascular risk factors can be divided into nonmodifiable (age, sex, heredity, including race) and modifiable (smoking, arterial hypertension, dyslipidemia, hyperglycemia, obesity, and physical inactivity) risk factors. Indeed, it is well known...
that modifiable cardiovascular risk factors are associated not only with the development of CVD but also with morbidity and mortality. Numerous studies have shown that acting against modifiable risk factors results in decreased risk of myocardial infarction and stroke. Although positive changes in current mortality trends are largely a result of the tremendous progress achieved in improved emergency response, optimized medication, early revascularization, and subsequent surgical therapy, risk factor reductions have also contributed. Of all possible interventions, physical activity is the treatment that both counteracts the major modifiable risk factor of physical inactivity and either directly influences all the other modifiable risk factors or helps in the adaptation of a lifestyle that supports healthy behavior and thereby beneficially affects these risk factors (Figure 1). As a consequence, exercise training has become the mainstay of both inpatient and outpatient cardiac rehabilitation because it ameliorates symptoms, reduces ischemia, improves endothelial function, induces regression or attenuation of progression of the disease, and reduces morbidity and mortality. This is manifested in current guidelines and position papers from all the major cardiac societies.

Despite the fact that all modifiable risk factors should be considered to normalize the risk factor profile, battling endemic physical inactivity seems especially worthwhile. Indeed, physical inactivity has a high prevalence in the adult population worldwide (>30%), with proportions ranging from 17% in Southeast Asia to ≈43% in the Americas and the eastern Mediterranean. Especially frightening is the fact that an alarming 80% of 13- to 15-year-olds are doing <60 min/d of moderate- to vigorous-intensity physical activity. As those authors showed, the prevalence of physical inactivity is quite comparable to that of smoking, and both of these very potent cardiovascular risk factors induce a similar number of deaths per year worldwide (5.3 and 5.1 million deaths). For many other reasons, this should lead us not only to consider labeling cigarette packages with frightening images of diseases but also to encourage professional associations, including but not limited to the American Heart Association, to engage in a campaign that would encourage less use of elevators and escalators, for example, by posting warnings in immediate proximity such as “The Surgeon General: elevators and escalators put your health at risk.” We have to raise public awareness to the fact that voluntary physical activity has been almost completely eliminated from daily living and that it will take a concerted effort to reintroduce it into our daily routine, which is likely to be effective only if it is promoted by the medical community. To this end, technology that enhances the prospects for increased physical activity is critical. Devices that measure and monitor physical activity would help to guide the development of policies and programs to increase activity levels and to reduce the burden of noncommunicable diseases. Currently, however, this potent cardiac risk factor is not even a vital sign. As a consequence, it is not being asked or documented and certainly not quantified. Unfortunately, if physical activity is not measured, it is difficult to improve.

Cardiac Rehabilitation

Several definitions for cardiac rehabilitation exist, but they all have in common that cardiac rehabilitation and prevention are mainly the coordinated sum of efforts needed to establish the best possible physical, psychological, and social conditions that help limit or reverse the progression of the underlying medical condition and as a result enable patients to keep or reclaim their familiar place in society. Indeed, cardiac rehabilitation is conducted by an interdisciplinary team that aims at achieving a sustainable reduction in cardiovascular risk factors to stabilize or even slow the progression of CVDs. Furthermore, anxiety and depression associated with CVD have to be addressed and appropriate measures have to be taken. Consequently, ways to optimize health-related quality of life have to be pursued.

![Figure 1. Impact of physical activity on modifiable risk factors. Regular physical activity is generally accompanied by significant improvement in major cardiovascular risk factors.](image-url)
Over a time span of >3 decades, a panoply of studies and at least 5 meta-analyses have unanimously demonstrated in ≈20,000 patients that outpatient cardiac rehabilitation in particular exerts multifold beneficial effects in patients with various CVDs. These effects were not limited to one particular group of patients and held true for patients with stable coronary artery disease and patients after myocardial infarction, coronary bypass surgery, or percutaneous coronary intervention alike.

Not surprisingly, treatment effects were greatest when the time between an event and enrollment in a rehabilitation program was shortest and the duration of the program was longest. Even though cardiac rehabilitation is a Class I A recommendations in the American Heart Association/American College of Cardiology management guidelines and performance measures, up to 80% of eligible patients are not referred. Because in the United States cardiac rehabilitation programs run for only 12 weeks, the effects of longer programs remain unknown.

With the understanding that longer programs are needed to achieve long-term lifestyle changes, the Austrian Working Group of Outpatient Cardiac Prevention and Rehabilitation has previously published guidelines on outpatient cardiac rehabilitation, and in a subsequent analysis, some 1500 consecutive patients in a nationwide registry were assessed. The Austrian model constitutes a phase II (60 hours over 6 weeks) and subsequent phase III (up to 100 hours over 6–12 months) that give patients ample time not only to improve their physical work capacity but also to translate what they have learned in classes on lifestyle changes to their daily routine. The core components of this rehabilitation model have been built around current literature and guidelines. Currently, we are in the midst of analyzing data of some 5500 consecutive patients, which will provide an even deeper and more complete insight.

Inpatient cardiac rehabilitation is a long-standing tradition in Austria and several other central and eastern European countries. Even though it has been shown several times that 3 to 4 weeks of inpatient rehabilitation, most often far away from patients’ homes, induces positive changes in cardiovascular risk factors, initial benefit could not be sustained during 1 year of follow-up, and results were often as bad if not even worse than on admission. In a recent meta-analysis, outpatient rehabilitation yielded superior results with regard to the control of cardiovascular risk factors compared with inpatient rehabilitation. In addition, long-term comprehensive outpatient cardiac rehabilitation led to stabilization of and often improvement in short-term results. These data strongly support the need for phase III rehabilitation of sufficient length, which is in line with the finding that an attendance at more rather than fewer sessions leads to a reduced risk of further myocardial infarction or death and the observation that successful completion of long-term cardiac rehabilitation is associated with improved survival and decreased hospitalization.

Outpatient cardiac rehabilitation phases II and III according to the Austrian Working Group of Outpatient Cardiac Prevention and Rehabilitation guidelines are feasible and effective in improving cardiovascular risk factors at large. Additionally, improvement achieved during phase II rehabilitation was sustained and often enhanced during phase III rehabilitation. This held true after both inpatient and outpatient cardiac rehabilitation phase II, proving phase III rehabilitation to be an effective intervention after phase II inpatient rehabilitation. A study is underway to assess the long-term effects of this program years after discharge from outpatient cardiac rehabilitation.

Cardiac Rehabilitation: A Must-Have and not Just Nice to Have After CABG
Cardiac rehabilitation is a Class I A recommendation in all current guidelines. Because the effectiveness has been proven beyond reasonable doubt, one might argue that cardiac rehabilitation does not reach enough patients and that patients in general are not willing to perform lifelong lifestyle changes, so the money for rehabilitation should be spent on repair rather than prevention. Apart from the fact that it is unethical to withhold Cardiac rehabilitation because it is vastly underused as a result of significant barriers, and it could be even more cost-effective and should be more patient-centered to reach a wider range of patients.

Cardiac rehabilitation needs widespread adoption while in parallel new strategies that will lead to further improvement are being tested and implemented. Indeed, there are several shortcomings that can be overcome. The main obstacles are the following: referrals that are too few, too late, and too selected; lack of training and thus of understanding in the medical community; and a reluctance to assess and fund new models such as P-Rehabilitation and others.

Referrals: Too Few, Too Late, Too Selected
Too Few
The EUROASPIRE series has identified once again an underuse of current knowledge with regard to but not limited to adequate secondary prevention. As reported in its latest analysis of coronary patients, the majority does not comply with current recommendations and continues to fall short of achieving standards set in guidelines for secondary prevention. There continues to be an intolerably high prevalence of physical inactivity, smoking, arterial hypertension, hyperlipidemia, unhealthy diets, overweight or obesity, and subsequently type 2 diabetes mellitus.

Because CVD remains the leading cause of morbidity and mortality in the European Union and in most Western and
developing countries, initiatives have to be launched that go beyond mere coronary revascularization.

Disappointingly, still fewer than half of all coronary patients enroll in programs of prevention and rehabilitation, which should be embarrassing especially for the developed countries that have both the knowledge and the resources to provide access to this potent therapeutic option to all patients in need. As stated in the current European guidelines on prevention, all coronary and vascular patients should participate in programs of modern preventive cardiology to achieve healthier lifestyles, better risk factor control, and adherence to cardio-protective medication. In addition, according to the current European Society of Cardiology/European Association for Cardio-Thoracic Surgery guidelines on myocardial revascularization, all patients should be advised on lifestyle changes, including smoking cessation, regular physical activity, and a healthy diet; this is rated as a Class I, Level A recommendation. Furthermore, participation in a cardiac rehabilitation program to attain lifestyle changes and to increase adherence to treatment should be considered for all patients requiring hospitalization or invasive intervention after an acute ischemic event or coronary bypass surgery (Class II, Level A). The authors clearly state that myocardial revascularization must be accompanied by medical therapy and other secondary prevention strategies for risk factor modification and permanent lifestyle changes, and they see secondary prevention and cardiac rehabilitation as an integral part of the management strategy after revascularization that reduces future morbidity and mortality in a cost-effective way.

Furthermore, a large proportion of patients with coronary artery disease who do not engage in regular exercise achieve neither lifestyle changes nor a reduction in cardiovascular risk factors despite a reasonably well-implemented medical therapy.

Several studies revealed a mortality benefit for those who participated in cardiac rehabilitation programs soon after the end of the program but also as long as 10, 14, and 14 years after CABG. A further study demonstrated reduced all-cause mortality in patients with the greatest number of controlled risk factors. In addition, the greater the number of ideally controlled lifestyle factors, the less likely was a recurrence of coronary events.

Most clinical trials in patients with stable coronary artery disease do not show a mortality benefit in those who receive revascularization. This fact holds true for the majority of patients after percutaneous coronary intervention and CABG. This is not surprising because myocardial infarction typically does not develop at the site of mild to moderate stenoses. Therefore, these interventions do not alter the course of CAD and most often are not associated with a mortality benefit. What would improve the course of the disease is cardiac risk factor modification, which should include all modifiable risk factors. Even if patients have been told to alter their lifestyle, it is clear that casual recommendations are insufficient. To support them in successfully making behavioral changes, programs of comprehensive cardiovascular risk reduction as typical for cardiac rehabilitation programs have to be offered.

Kotseva et al reflected on their experience gained from EUROASPIRE and concluded that passive dissemination of guidelines in isolation results in only minute lifestyle changes. They agree that physicians need more support to promote and practice cardiovascular prevention. As a result, the standard of cardiovascular prevention could be raised by the more effective achievement of lifestyle changes and medication compliance. They suggest a comprehensive multidisciplinary approach accessible to both patients with established disease and those who are at a high risk of developing it. Prevention centers in the community that also involve patients’ families could lead to a reduced risk of recurrent cardiovascular events and improved quality of life and survival.

Although clinical trials on patients after CABG that demand the control group to continue to live or to adapt a sedentary lifestyle are considered unethical and would not be approved by an ethics committee, in everyday practice, the majority of our patients effectively do just this. Raising the awareness that every coronary revascularization ought to be followed by secondary prevention, that is, cardiac rehabilitation, is long overdue. This will become even more important because in an aging population in whom life expectancy increases, mortality rates after cardiac events decrease, and morbidity remains rather stable, the pool of patients eligible to benefit from cardiac rehabilitation will become even larger. In addition, the rising morbidity for chronic heart failure in an aging population presents new challenges for health care, an opportunity for cardiac rehabilitation, and thus hope for patients in need.

Too Late and Too Selected

Exercise training is a key element of current guidelines on the prevention and treatment of coronary artery disease, and subjects with cardiac risk factors should have access to appropriate information and treatment, which includes exercise training. Once the subject at risk has become a patient, an exercise-based cardiac rehabilitation program is warranted. Whereas cardiac rehabilitation has been demonstrated to be an effective postevent intervention, efforts to reduce the burden of cardiovascular risk should start much earlier, that is, as programs of primary prevention. Unfortunately, cardiac rehabilitation lags in the race to influence disease progression because subjects with a moderate to high risk of coronary artery disease would already benefit greatly from access to such programs. Additionally, patients awaiting revascularization and particularly coronary artery bypass surgery would benefit from an exercise-based program during the waiting period, while in hospital, and certainly right after discharge.

When programs exist, referrals should be made once the diagnosis has been established, definitely before discharge. Numerous studies have shown that patients are more prone to listen to advice and to begin making lifestyle changes if this has been addressed early after the incident event. The more
time elapses, the less likely it is for patients to change habits. This has been illustrated nicely in a recent trial by Marzolini et al.,48 who assessed the effects of delayed referral to a cardiac rehabilitation program in 6497 patients after coronary artery bypass surgery.

Mean and median total wait time amounted to an incredible and unacceptable 101.1±47.9 and 80 days, respectively. For emphasis, consider a referral system that would withhold antiplatelet or statin therapy from patients during the first 3 months after hospital discharge. Changes would be implemented almost immediately. Cardiac rehabilitation, which according to North American and European guidelines has a Class IA indication in the vast majority of CABG patients, either is not started at all or is started after an unacceptably long delay, and no one says a word.49 Both short- and long-term results after revascularization would be better if patients were sent to cardiac rehabilitation, so it is hard to understand that neither interventionists nor cardiac surgeons urge immediate rehabilitation. As we all know, if a patient were denied medical treatment that is recommended in current guidelines for no good reason, a legal case would be filed. Interestingly, this has not happened with patients who have been denied referral to or who have to wait an unacceptably long time for cardiac rehabilitation. In the face of the overwhelming evidence in current literature, what could be an argument for withholding such strong treatment? According to Marzolini et al.,48 factors interfering with early enrollment in cardiac rehabilitation were female sex, older age, being used, less social support, longer drive time to cardiac rehabilitation, lower neighborhood socioeconomic status, higher systolic blood pressure, abdominal obesity, and a complex medical history. These “risk factors” for insufficient therapy should be taken into account when measures for improved referral and for improved infrastructure are being considered. Marzolini et al also found that a longer wait time was associated with poorer attendance at cardiac rehabilitation classes, lower completion rate, and thus less improvement in body fat percentage, resting heart rate, and cardiopulmonary fitness. The last finding is most worrisome because an increase in V_o2peak and a high attendance rate during cardiac rehabilitation have been shown to confer a mortality advantage.

A major reason why referral rates are not sufficiently high to sustain already existing programs or to motivate others to start programs is the lack of training of medical professionals in the field of physical activity and exercise training as a treatment strategy for disease prevention and rehabilitation. Unfortunately, too few physicians received appropriate training during medical school, residency, or fellowship. Indeed, a survey of British medical schools observed widespread omission of basic teaching elements and concluded that there is an urgent need for physical activity teaching to equip tomorrow’s doctors with the basic knowledge, confidence, and skills to promote physical activity and to follow numerous clinical guidelines that support physical activity promotion.50 In the United States, medical students are being offered physical activity education at only 13% of medical schools.51 Unless education on physical activity and exercise training is included in curricula nationwide, we should not expect to see widespread adoption of physical activity and healthy lifestyle changes. The latest publication of the EUROASPIRE study series has once again documented that only half of the patients were advised to participate in a cardiac rehabilitation program, of whom 81% completed at least one half of the sessions.46 Only well-trained doctors can give informed recommendations, as was shown at Harvard Medical School. Once a course in preventive medicine was introduced, medical students felt more confident in promoting exercise.52

The time to raise awareness and to improve knowledge is now. As mentioned before and in keeping with Weiler et al.,50 there is considerable disparity between public health policies, clinical guidelines, and the promotion and delivery of physical activity. During an epidemic of physical inactivity and a steady rise of noncommunicable diseases worldwide, it is vital that tomorrow’s doctors understand the basic science and health benefits of physical activity.

Currently, the preponderance of those who know what to recommend and how to prescribe exercise training and other components of healthy living either work or have worked in cardiac rehabilitation centers or hospitals at some stage of their training. It seems clear that although we have a potent intervention that could keep people from developing vascular diseases or attenuate its progression in those who already have it, it is not sufficiently embedded in medical school curricula or during residency programs. It is not dissimilar to having Class IA evidence for the treatment of a disease through pharmacotherapy but not training doctors in pharmacology. In addition, imagine not having drugstores or an infrastructure that allows swift access to the drugs that doctors prescribed. One could speculate that if there were an income incentive in the provision of cardiac rehabilitation, things might be different. Perhaps costs for CABG should be fully covered only if the patient successfully completes a cardiac rehabilitation program, and possibly all involved would get some kind of a bonus if patients meet long-term goals.

New Models

P-REhabilitation

Elective CABG is often scheduled months in advance. Until then, patients are usually advised to avoid stress or strenuous activities. Once admitted, patients have to wait for surgery without exercise therapy. As a consequence, physical work capacity diminishes, which is one of the strongest predictors of uncomplicated recovery from surgery, shorter hospital stay, and more expedient return to work. More often than not, doctors practice what they have learned by experience. We are not considered responsible if a patient deconditions and as a result has prolonged recovery, but we might be presumed responsible if a patient encounters an untoward event during exercise. Despite the fact that the former frequently is the case whereas chances for the latter are rather slim, doctors opt for the
former strategy, seemingly to ameliorate their exposure. This could be overcome, however, if patients had a place where they could exercise under medical supervision not only once they have had surgery but also as an antecedent strategy. Costs for supervised exercise training are negligible compared with the costs that accrue as a result of prolonged hospital stays and recovery. One less day in the intensive care unit would be enough to cover these costs, in addition to the benefit for the patient of faster recovery and lower risk of death.

After an acute coronary event, patients may remain in hospital for some time before surgery can safely be performed. This invariably starts the process of physical deconditioning and may negatively affect surgical outcome.49,53,54 This waiting time could be better used by enrolling patients in rehabilitation programs on site. This would allow patients to continue to exercise at a low but effective intensity without exposing them to an unwarranted risk and could provide them with information on secondary prevention, details of their upcoming surgery, and coping strategies for anxiety, which otherwise might negatively affect their recovery and is associated with increased rates of major adverse cardiovascular and cerebrovascular events.55 Patients would already be acquainted with staff and rehabilitation schedules, which should lead to improved enrollment and compliance once they enroll in the program postoperatively.

Despite substantial progress in recent years, postoperative complications continue to be relatively frequent after CABG and are linked to several factors that are mostly of respiratory or cardiac nature. Few studies have evaluated the effect of preoperative and postoperative rehabilitation in patients awaiting CABG. Arthur et al56 assessed the effect of an ambulatory cardiovascular rehabilitation program on patients awaiting CABG. Through multidisciplinary intervention, a group of patients underwent an exercise program for 2 h/wk during a minimum of 8 weeks. Comparing the intervention group with the control group that received conventional treatment showed that the former had a decrease in hospital stay and an improvement in quality of life after surgery. In keeping with this finding, Ku et al57 reported in inpatients who were awaiting CABG that a phase I type of progressive exercise program leads to reduced levels of anxiety.

Encouraged by these findings, Herdy et al58 assessed the effects of an in-hospital preoperative and postoperative rehabilitation program (phase I) in patients awaiting CABG to evaluate its impact on the length of stay in the intensive care unit and surgical wards and the most frequent postoperative complications such as pneumonia, atelectasis, pleural effusion, and atrial fibrillation. They reported that this program was well accepted among patients and staff and that it was safe for patients who were stable for >48 hours. Furthermore, the preoperative intervention led to a reduction in the incidence of pneumonia and the duration of orotracheal intubation. Respiratory training attenuated the otherwise pronounced decline in peak flow and improved respiratory efficiency, which coincided with a reduced incidence of pleural effusions, atelectasis, and pneumonia. These findings were in keeping with other studies on preoperative respiratory training that showed a reduction in respiratory complications.59 These findings are of utmost importance because respiratory complications are common during the postoperative phase and lead to prolonged hospital stay and deaths.60 Atrial fibrillation occurred in 37% of patients in the control group; atrial fibrillation has been shown in literature to vary between 10% and 65%.51,62 In the intervention group, only 10% of the patients had atrial fibrillation, representing an 80% reduction, probably because of fewer respiratory complications. Even though mortality was not an end point, previous studies have shown that 30-day and 6-month survival rates are superior among patients without postoperative atrial fibrillation.63 Overall, as a result of the preoperative exercise training, a faster recovery was observed, which is in sharp contrast to the control group, in which the walking distance decreased significantly (Figure 2).

This and other studies break the ground for programs of P-REhabilitation to be implemented. It is shortsighted to argue against the obvious and to insist that such programs cannot be funded because of lack of financial resources. As long as we are not willing to allocate resources on needed prevention, we will have to spend a multifold on repair.

Conclusions

Even in wealthy North America and Europe, there are not enough outpatient cardiac rehabilitation facilities. In addition, existing programs are underfunded. As a result, too few patients receive cardiac rehabilitation. Cardiac rehabilitation facilities need to be in the patient’s vicinity, to serve as a haven of knowledge and encouragement well beyond cardiac

![Figure 2. Preoperative and postoperative cardiac rehabilitation: 6-minute walk test. During in-hospital preoperative and postoperative rehabilitation in patients awaiting coronary artery bypass graft surgery (phase I rehabilitation), the 6-minute walk test was performed after randomization and on the day before discharge. Whereas patients in the intervention group maintained their walking distance, patients in the control group showed a significant decline in the distance covered. Modified from Herdy et al.]

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rehabilitation, and to promote lifelong compliance with current guidelines. Indeed, if travel time exceeds 30 minutes, patients are unlikely to enroll or attend. Cardiac rehabilitation facilities would be especially of interest for those who want to return to work as soon as possible. Moreover, hospitals should not only concentrate on repair but also become involved in the process of recovery, return to work, and secondary prevention.

The time has come to admit that our healthcare systems have failed to alter behaviors in a way that has been demonstrated to reduce cost, morbidity, and mortality. It is not enough to just advise patients without providing adequate infrastructure. It is time for exercise training, an effective and evidence-based therapeutic option, to finally receive the attention it deserves. Data on reduction of morbidity and mortality, and improvement in quality of life are so striking that neither we nor our patients can afford not to use this polypill. For managing both long- and short-term risk, lifestyle changes are first-line interventions, and their potential cannot be overestimated. But as always, the most potent remedy can exert beneficial effects only if it is being taken. If we compare the availability and accessibility of cardiac rehabilitation programs with that of drugstores, another place where life-prolonging therapy can be obtained, it becomes obvious why the former fails and the latter prospers. Drugstores and thus lifesaving medication need to be at easy reach; the same should hold true for cardiac rehabilitation programs. Believing that patients will become physically active just because we say so is ignoring reality. Many patients, in fact two thirds of the population in North America and Europe, have been sedentary for decades, more often than not have never enjoyed playing sports, and are absolutely clueless when it comes to translating our recommendations into action. Despite the fact that patients’ knowledge was never greater than it is now, societies continue to fail to increase physical activity and to decrease the body weight of their citizens. If a more realistic approach is not chosen and the infrastructure required is not provided, then we will continue to spend unnecessary amounts of money on repair instead of spending a fraction of it on prevention.

It is obvious that cardiac rehabilitation not only has come to stay but also will become increasingly important, simply because societies can no longer afford to ignore this potent and cost-effective treatment option. The number and quality of cardiac rehabilitation programs have to increase, which in turn will require an increasing number of skilled staff. More doctors have to be trained adequately to develop the skills required to effectively recommend appropriate measures to patients, let alone actually guiding or accompanying them on this lifelong journey. Last but not least, policy makers together with doctors have to find ways to permit cardiac rehabilitation programs to generate revenue because this would ignite efforts for nationwide programs.

Disclosures

None.

References


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Response to Niebauer

Miguel Mendes, MD

Dr Niebauer wrote an enthusiastic, global, and classic defense of cardiac rehabilitation (CR) after coronary artery bypass grafting (CABG). He considers CABG a structural intervention that does not stop the progression of coronary artery disease unless complemented by CR as a secondary prevention program. I agree with him in theory because I found that CR has all the ingredients to make it very useful after CABG. It can provide not only a faster normalization of daily life activities unless complemented by CR as a secondary prevention program. I agree with him in theory because I found that CR has all the ingredients to make it very useful after CABG. It can provide not only a faster normalization of daily life activities but also a better health related quality of life and (maybe) a longer survival. In the specific evidence for CR in CABG alone mentioned by Dr Niebauer, only a 2013 nonrandomized, controlled trial by Packer published in Circulation, with a population of >800 CABG patients, is cited. This community study lacks strength to support CR unequivocally in terms of morbidity and mortality after CABG. I believe that Dr Niebauer did not analyze the citations of the US 2011 American College of Cardiology Foundation/American Heart Association guideline for CABG, used to support CR as a Class I indication. The evidence is not specific for CABG or strong enough: 2 mechanistic studies, 1 on inflammation and the other about body composition changes; an article studying return to work and quality of life after CABG patients; 2 meta-analyses assessing CABG patients together with other coronary artery disease subsets, the most recent printed in 2006; and the 2007 American Association of Cardiovascular and Pulmonary Rehabilitation/American College of Cardiology/American Heart Association 2007 performance measures on CR. CABG is a coronary artery disease subset with physiological specificities. The effect of exercise training on mammary arteries and saphenous veins conduits deserves to be better known and specifically studied.
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