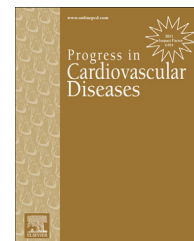


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## Current Trends in Reducing Cardiovascular Disease Risk Factors From Around the World: Focus on Cardiac Rehabilitation in Brazil

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### ABSTRACT

Cardiovascular diseases (CVD) are among the leading causes of morbidity and mortality in Brazil. Cardiac rehabilitation (CR) is a program composed of structured exercise training, comprehensive education and counseling to positively impact functional, psychological, social, and quality of life aspects in these patients. However, the delivery of formal CR programs is limited to major metropolitan centers in Brazil and does not exist in much of the national territory, specifically in the North and Northeast regions. Barriers to the inclusion of qualified patients are lack of referral by the health professionals, as well as transportation difficulties, low income, lack of insurance coverage, and low educational level. Government efforts to implement CR programs on a broader scale, to reach a larger portion of the CVD population, are imperative. Additional research must be focused on the assessment of CR referral and adherence patterns as well as the effectiveness of different CR delivery models.

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### CVD incidence and prevalence in Brazil

In Brazil, cardiovascular disease (CVD), cancer, diabetes and chronic respiratory diseases represent the major causes of premature death and disability and have a major economic impact.<sup>1</sup> Common risk factors which include tobacco use, physical inactivity, harmful use of alcohol and unhealthy diets are involved in the genesis of these chronic diseases.<sup>2</sup>

According to an analysis by the World Economic Forum, Brazil, Russia, India and China, nicknamed the BRIC countries, lose more than 20 million productive life years annually to non-communicable diseases (NCDs).<sup>3</sup> The World Health Organization (WHO) projects that losses in the labor force and decreased savings resulting from just these three NCDs, CVD,

diabetes and stroke, will lead to a loss of \$4.18 billion dollars (U.S.) in economic output between 2006 and 2015 in Brazil.<sup>4</sup>

These NCDs constitute a significant health problem and account for ≈72% of deaths in Brazil; 31.3% specifically attributed to CVD, disproportionately effecting the portion of the population that has low education and income.<sup>1</sup> According to Azambuja et al in 2008, the costs attributable to CVD in Brazil was ≈30.8 billion Reals (\$1 U.S. = 2.93 Reals; 2004): 36.4% for health care, 8.4% for social security and employers' reimbursements, and 55.2% due to lost productivity.<sup>5</sup>

Despite being the leading cause of death in Brazil, CVD mortality has been falling in recent decades.<sup>6,7</sup> However, Brazilian CVD mortality remains high and according to the

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### Abbreviations and Acronyms

BSC = Brazilian Society of Cardiology

CPX = cardiopulmonary exercise testing

CR = cardiac rehabilitation

CVD = cardiovascular disease

DM = diabetes mellitus

HR = heart rate

HTN = hypertension

NCDs = non-communicable diseases

PA = physical activity

WHO, the forecast is that in 2040, Brazil will lead the world in CVD-attributable mortality.<sup>8</sup>

### Brazilian public policy initiatives directed toward CVD risk reduction

Trends in CVD in Brazil signal the need to strengthen health promotion activities aimed at the prevention and control of CVD, primarily achieved through

better management of modifiable risk factors. In this context, public policies that address CVD in Brazil have been developed (Strategic action plan 2011–2022). The strategic plan addresses CVD surveillance, evaluation, monitoring, health promotion and comprehensive care.<sup>1</sup>

Among the main actions, the plan identifies the need to build healthy spaces that promote increased intentional and leisure time physical activity (PA) and healthy lifestyles.<sup>1</sup> A national registry for hypertension and diabetes mellitus (DM; HiperDia) was also started in 2002.<sup>9</sup> Obesity and hypertension (HTN) prevention and treatment will begin in the school system, with goals of promoting nutritional and anthropometric evaluation, encouraging the practice of PA and providing healthy food choices.<sup>10,11</sup> In early 2011, the Ministry of Health also expanded its People's Pharmacy Program, which will now offer basic medicines for DM and HTN free of charge, as well as drugs for other chronic disorders.<sup>6</sup>

The anti-tobacco policy is a point of great relevance, including regulatory actions such as, national legislation prohibiting smoking in certain public places, risk warnings on packs, and tax increases of tobacco products. In addition, the Brazilian government instituted the Brazil without Poverty program in 2011, which aims to reduce poverty, highlighting actions to cope with chronic diseases such as HTN and DM. While these policies and population-level initiatives are laudable, high incidence and prevalence of CVD, as well as associated risk factors, persist. Given these persistent CVD trends, effective secondary prevention treatment strategies, such as CR, are still required.

### The current CR delivery model in Brazil

Cardiac rehabilitation (CR) programs are recognized as integral to the comprehensive care of patients with CVD. The evidence is clear that CR leads to improved clinical outcomes, including fewer hospital readmissions, better adherence to pharmacotherapy, enhanced functional status, improved risk profile, less depression, and better quality of life.<sup>12,13</sup>

Thus, CR programs that are cost effective and multidisciplinary have been widely endorsed in worldwide guidelines to improve outcomes in the CVD population.<sup>14,15</sup> CR is also a strategy advocated by the Brazilian Society of Cardiology (BSC), given the multitude of consistently documented benefits derived from participation in these patients.<sup>16</sup>

Brazilian Guidelines defines CR delivery in four distinct but ideally seamless phases. Phase I is delivered in the inpatient setting, to facilitate recovery acutely following an acute cardiovascular event and/or surgical procedure. The exercise program in Phase I entails a combination of low intensity physical exercise,<sup>17,18</sup> techniques to reduce stress and education programs related to risk factors. The duration of this stage has decreased in recent years due to shorter hospitalizations (7 days or less) and, because of this decreased length of stay; the progression of the exercise program has accelerated.<sup>17</sup> Ideally, the core team of professionals is composed of a physiotherapist, nurse, nutritionist, psychologist, and physician, all trained in cardiopulmonary resuscitation. The aim of the program at discharge is improve physical function and possibly psychological well being as well as promote referral to and participation in Phase 2 outpatient CR.<sup>16,19</sup>

After discharge, patients are advised enroll in and begin outpatient CR as soon as possible. The expected duration of this phase in Brazil is between 3 and 6 months, and in some cases extends longer. The target intensity of the physical training programs is moderate to vigorous and should include resistance exercise.<sup>20</sup>

Clinical centers, either directly within a large hospital or in close proximity, usually operate outpatient CR in this phase since they employ appropriately trained personnel and house both exercise and emergency equipment needed to deliver a safe and effective intervention in the CVD population. The CR team during Phase II in Brazil is interdisciplinary and includes a physician, physical educator or physiotherapist, psychologist and nutritionist. Ordinarily the intervention during Phase II is individualized to the patient's risk factor profile and disease severity and the degree of monitoring during exercise (i.e. signals, symptoms, ECG, blood pressure, oxygen saturation and blood glucose monitoring) is titrated accordingly. The aim of this phase is to improve functional capacity, promote a greater frequency of healthy lifestyle choices (e.g. nutritional, smoking and alcohol cessation, and increased physical activity), if appropriate, return the patient to their professional activities, facilitate social reintegration, and improve their perceived quality of life.<sup>16,19,20</sup>

Phase III is considered an extension of Phase II, performed from approximately month 6 to month 24 following hospital discharge and includes activities that support ongoing maintenance or improvement of functional capacity and healthy lifestyle choices. Phase III CR sessions may be performed individually or in small groups. The focus of this Phase is to provide a further understanding of relevant symptoms and prepare for independent management of CR by the patient. Finally, Phase IV CR is primarily managed independently by the patient, with periodic evaluation and potentially

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