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STATE-OF-THE-ART PAPER

The Reality of Heart Failure in Latin America

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Heart failure (HF) data in Latin America (LA) were reviewed to guide health service planning in the prevention and treatment of HF. The HF epidemiology and the adequacy of relevant health service provision related to HF in LA are not well delineated. A systematic search of the electronic databases and the World Health Organization website was undertaken for HF in LA. LA countries have reduced gross income and lower total expenditure on health per capita. LA is a heterogeneous region with HF risk factors of developed and nondeveloped countries, including lower risk of raised blood glucose levels, obesity, tobacco, and aging, whereas systemic hypertension (SH), rheumatic fever, and Chagas' disease (C'D) are higher in LA. Main etiologies of HF in LA are idiopathic dilated cardiomyopathy (from 1.3% to 37%), C'D (from 1.3% to 21%), ischemic (from 68% to 17%), SH (from 14% to 76%), valvular (from 3% to 22%), and alcohol related (from 1.1% to 8%). The prognosis of C'D HF is worse than for other etiologies. Chronic HF is the cause of death in 6.3% of cases. Decompensated HF is the main cause of cardiovascular hospitalization. The prevalence of systolic HF varies from 64% to 69%. LA is under the awful paradox of having the HF risk factors and HF epidemiology of developed countries with the added factors of SH, C'D, and rheumatic fever. Overall, in the scenario of lower total expenditure on health per capita and lower gross national income per capita, new strategies are essential for prevention and treatment of HF in LA. (J Am Coll Cardiol 2013;62:949–58) © 2013 by the American College of Cardiology Foundation

The knowledge of risk factors of heart failure (HF) in Latin America (LA) is essential because apart from the prevalence of risk factors comparable to developed countries in certain areas, the epidemiology of HF can also be influenced by risk factors that are more frequent in LA. In fact, a review about HF in LA is of immediate interest. Also, the review of new LA HF data, including HF risk factors obtained from the World Health Organization (WHO), recent registry data from LA countries and institutions, epidemiological studies, analyses of LA HF populations selected for recent HF trials, LA expenditure in health and gross income, and new advances in the cumulative knowledge of neglected diseases in LA, could have a strong impact on planning future health policies for HF in LA. Therefore, the objective of this review is to offer an HF LA update as a valuable resource for researchers, clinicians, healthcare policymakers, media professionals, and many others who seek the best available data on HF.

Systematic Review Methodology

The online MEDLINE PubMed database (National Center for Biotechnology Information, U.S. National Library of Medicine, Bethesda, Maryland) and other electronic bibliographic databases (e.g., ClinicalTrials.gov, Cochrane Library, Elsevier/ScienceDirect, SciELO, LILACS) were searched for data literature from LA in September and October 2012. The search strategy used the MeSH terms "heart failure," "chronic heart failure," "decompensated heart failure," "acute heart failure," "Chagas' disease," "chagasic heart failure," "diastolic heart failure," and "systolic heart failure." All titles and abstracts of the articles were evaluated. After exclusion based on the title and abstract, full articles were evaluated, and articles meeting the inclusion criteria were identified. Relevant articles with information about epidemiology were examined and thus reviewed. Data from the WHO were also obtained.

Risk Factors for HF in LA

Socioeconomic deprivation is a powerful independent predictor of HF development and adverse outcomes (1). The reduced gross income per capita of LA countries (US$8,555) in comparison with Canada (US$38,370) and the United

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Abbreviations and Acronyms

C'D = Chagas' disease

DHF = decompensated heart failure

HF = heart failure

HFPEF = heart failure with preserved left ventricular ejection fraction

LA = Latin America

SH = systemic arterial hypertension

WHO = World Health Organization

States (US$47,310) is evidence for a lower economic status in LA and increased HF risk (2). The lower total expenditure on health per capita, and lower total expenditure on health as a percentage of gross national income per capita, indicate limited access to primary or secondary care of diseases leading to HF, or to therapies that have been shown to be effective in treating HF. In reference to access to health care, 2009 U.S. data from the WHO show the expenditure on health care as a percentage of the gross domestic product and as per capita costs is 17.9% and US$8,364, respectively, whereas in LA, Brazil, Argentina, Chile, and Mexico, the values were 7.2% and US$632, 9% and $943, 9.5% and $1,387, 8.2% and $1.172, and 6.5% and $846, respectively (2).

Variability in the high prevalence of HF risk factors can be observed among LA countries in WHO data (Figs. 1 to 5). The WHO and CARMELA (Cardiovascular Risk Factor Multiple Evaluation in Latin America) study data suggest that some countries in LA may have HF risk factors comparable to developed countries (3). In the CARMELA study, the prevalence of systemic arterial hypertension (SH) was 18% (9% to 29%), hypercholesterolemia 14% (6% to 20%), diabetes 7% (4% to 9%), metabolic syndrome 20% (14% to 27%), obesity 23% (18% to 27%), and smoking 30% (22% to 45%). Also, data showing that 40% to 49% of populations in some LA countries are Afro-Americans or mulatto is evidence for higher-risk HF in LA because black ethnicity was associated with a high risk of incidental HF (4). An increment in the elderly population is expected in Brazil and LA in the next decades, with implications for a higher HF burden (5). The influence of age and sex on HF differs among different countries (Table 1). In Argentina, a review of 5 registries involving 2,974 patients between 1992 and 2004 showed that the mean age of HF subjects was 65 to 70 years old, with 40% female (6), although outpatients studies in Argentina showed a large predominance of men (82% to 79%) (Table 1) (7). In Brazil, HF patients seem to be younger (53 to 73 years old), and at least 1 study showed female predominance (58%) (8–10). In Chile, the mean age in an in-hospital cohort was 69 years old, with a slight predominance of men (59%) (11).

In summary, data from the WHO and the CARMELA study, corroborated by data from the recent LASO study, indicate that LA is currently experiencing a large-scale epidemic of HF risk factors (12). This could be attributable to an epidemiological transition with changes in

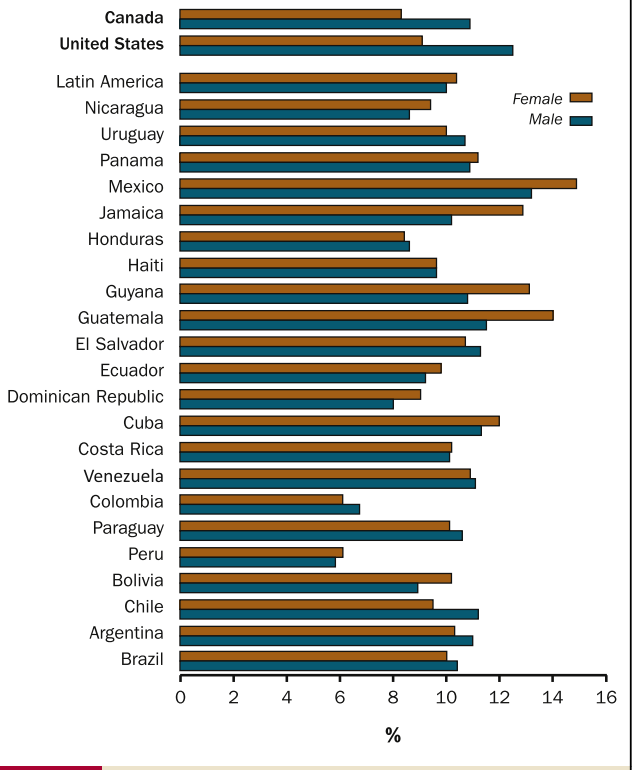

Figure 1 Prevalence of Raised Blood Glucose Levels in a Population of Both Sexes, Age >25 Years

Prevalence is according to the World Health Organization data (2008) (2).

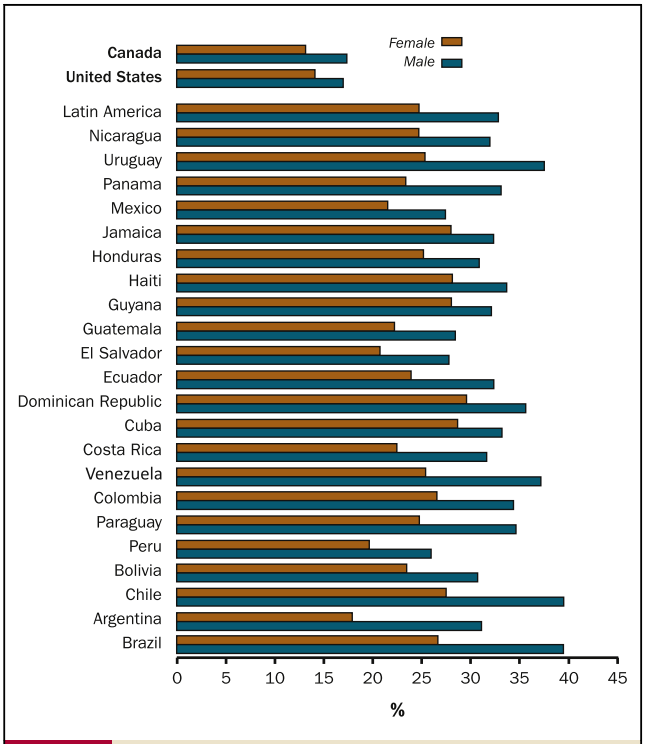

Figure 2 Prevalence of Raised Systemic Blood Pressure Levels in a Population of Both Sexes, Age >25 Years

Prevalence is according to the World Health Organization data (2008) (2).

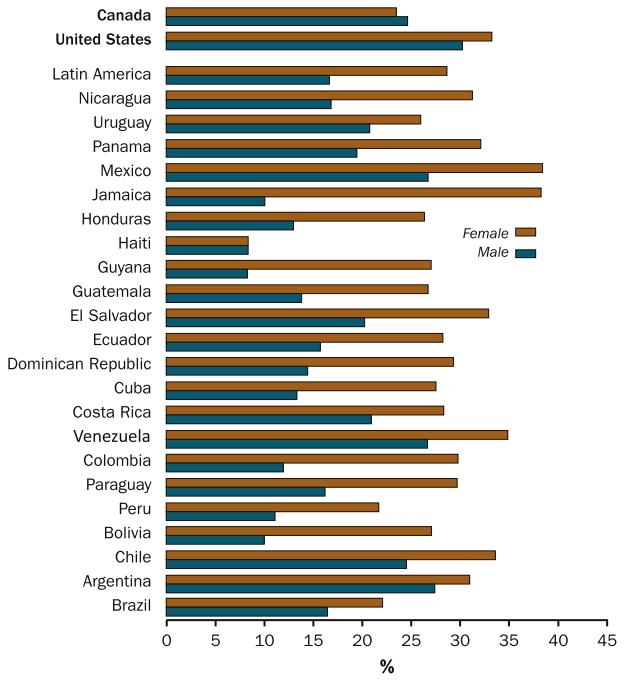

Figure 3 Obesity Prevalence in a Population of Both Sexes, Age >20 Years

Prevalence according to the World Health Organization data (2008) (2).

lifestyle, increased life expectancy, urbanization, physical inactivity, and high-caloric and high-fat diets (13). An increment in HF risk factors in LA countries could cause deep concern. The increase might not be closely followed by more access to preventive and treatment strategies for HF, given LA's limited expenditure on health. The threat to LA countries comes from the paradox of having HF risk factors similar to developed countries, but without the HF preventive and treatment policies of developed countries.

Decompensated HF

In 2007, data from the Brazilian Ministry of Health showed that 39.4% of hospital admissions were related to decompensated HF (DHF). This proportion was 70% in the over-60-year age group (14). DHF was the single most frequent cause of hospitalization in the elderly population in Brazil (15). Hospital discharges with a final diagnosis of HF increased 164% from 1979 (total 377,000) to 2000 (999,000). Tables 1 and 2 show the etiology, age, type of HF (systolic HF or HF with preserved left ventricular ejection fraction [HFPEF]), prognosis, and days of hospitalization for DHF in LA (8,16–23).

In comparison with other countries in the ADHERE-I (Acute Decompensated Heart Failure National Registry–International) study, LA countries had a longer average length of stay when compared with Asian-Pacific countries

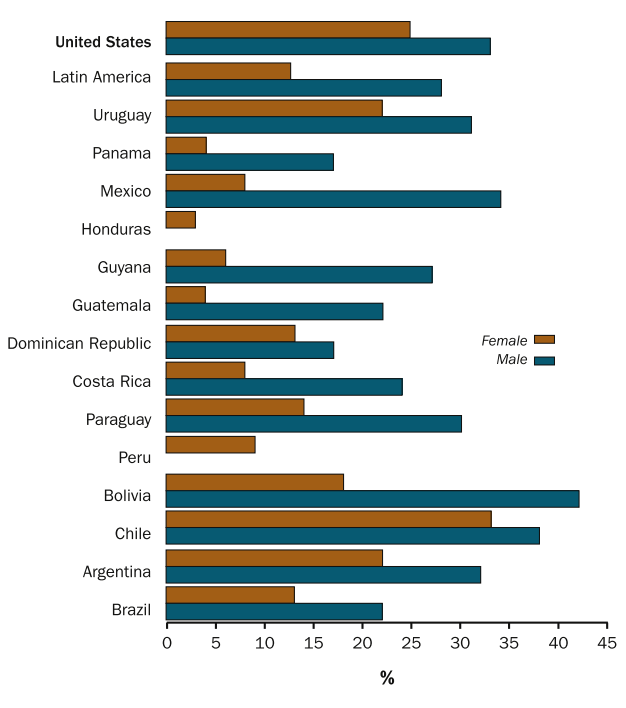

Figure 4 Tobacco Use Prevalence in a Population of Both Sexes, Age >15 Years

Prevalence is according to the World Health Organization data (2009) (2).

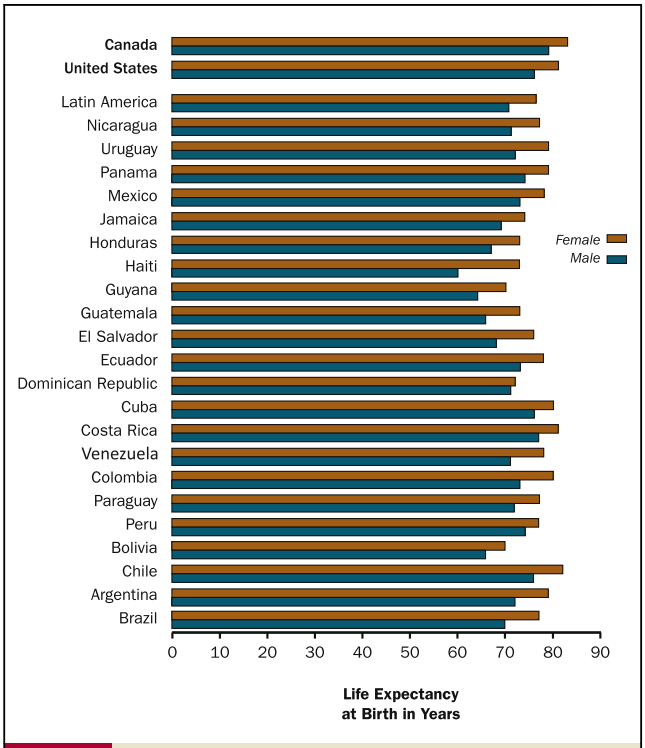

Figure 5 Life Expectancy of Both Sexes at Birth

Expectancy is according to the World Health Organization data (2).

Table 1 Etiology of HF in LA According to Studies in Selected Populations

First Author (Ref. #)	Country	Year	N	Mean Age (yrs)	Etiology									
					IDC	C'D	Isch	SH	Valv	Alco	Perip	Myo	EMF	Toxi
Outpatient														
Freitas et al. (16)	Brazil	2005	1,220	45	37	20	17	14	5	4	2	1	<1%	<1%
Bocchi et al. (4)	Brazil	2008	350	50 and 52	10–17	21–16	22–28	22–18	3	8–4	NA	—	—	NA
Mendez et al. (31)	Mexico	2007	72	61	44	—	47	—	—	—	—	—	—	—
Silva et al. (38)	Brazil	2007	96	52	28.2	8.6	28.2	20.6	6.5	2.1	3.2	—	—	—
Ferrante et al. (37)	Argentina	2005	1,518	65	NA	NA	44.4	NA	—	NA	NA	—	—	—
Doval et al. (7)	Argentina	1994	516	50 and 52	19.5–23.0	10.5–8.1	38.3–39.6	NA	—	NA	NA	—	—	—
DHF														
Mangini et al. (17)	Brazil	2008	212	60	8	15	30	21	15	NA	NA	NA	NA	NA
Latado et al. (18)	Brazil	2006	299	69	3	9.7	49.2	25.8	11.7	—	—	0.7	—	—
Tavares et al. (25)	Brazil	2004	203	50 and 52	NA	NA	62–68	NA	NA	NA	NA	NA	NA	NA
Fairman et al. (19)	Argentina	2009	736	74	NA	4	21	76	20	NA	NA	NA	NA	NA
Perna et al. (6)	Argentina	1992–2004	2,974	65–70	1.3–13.8	1.3–8.4	27–38	18.2–32.3	16–22	1.0–5.4	—	—	—	—
Castro et al. (11)	Chile	2004	372	69	7.4	—	31.6	35	14.8	2.2	NA	NA	NA	NA
Bocchi et al. (20)	Brazil	2008	182	55	NA	21	34	NA	NA	NA	NA	NA	NA	NA
Barretto et al. (8)	Brazil	1998	903	53	25.8	6.2	32.6	7	22	NA	NA	NA	NA	NA
Rohde et al. (9)	Brazil	2005	143	73	NA	0.6	39	25	10	NA	NA	NA	NA	NA
McSwain et al. (28)	Antigua-Barbuda	1999	293	69	5	—	33	41	12	2	NA	NA	NA	NA
Thierer et al. (21)	Argentina	2002	400	68	5	4.3	28	21.8	17	NA	NA	NA	NA	NA
Rizzo et al. (22)	Argentina	2004	615	70	3.7	8.4	27.4	18.2	16.4	NA	NA	NA	NA	NA
Thierer et al. (23)	Argentina	2006	2,201	68	9.3	6	40.5	23.7	12	—	—	—	—	—

Values are %.

Alco = alcohol etiology; C'D = Chagas' disease; DHF = decompensated heart failure in hospitalized patients; EMF = endomyocardial fibrosis; HF = heart failure; IDC = idiopathic dilated cardiomyopathy; Myo = myocarditis; Perip = peripartum cardiomyopathy; SH = systemic arterial hypertension; Toxi = toxicity by drugs (for example, chemotherapy for cancer); Valv = valvular etiology.

Table 2 Prevalence of Systolic HF and HFPEF and Mortality in LA

First Author (Ref. #)	Year	N	HF Type		In-Hospital Mortality	Late Mortality	Days of Hospitalization	Hospitalization
			Systolic	HFPEF				
Outpatient								
Freitas at al. (16)	2005	1,220	100	—	—	34 (26 m)	—	—
Bocchi et al. (4)	2008	350	80.0 and 81.6	20.0 and 19.4	—	17.5 (12 m) and 48–60 (60 m)	—	—
Mendez et al. (31)	2007	72	63	37	—	12 for SHF (6 m)	—	—
Silva et al. (38)	2007	96	100	—	—	—	—	—
Ferrante et al. (37)	2005	1,518	79.4	20.6	—	15.3–16.1 (16 m)	—	34.3 and 39.1 (16 m)
Doval et al. (7)	1994	516	100	—	—	24.5–32.5 (12 m)	—	—
DHF								
West et al. (24)	2011	151† and 33‡	—	45.7*	8.5† and 2.9‡	—	10† and 7‡	—
Bocchi et al. (15)	2005	—	—	—	6.58–6.95	—	5.8	—
Mangini et al. (17)	2008	212	55	45	10	—	8.5	—
Latado et al. (18)	2006	299	65.8	34.2	17.4	—	—	—
Tavares et al. (25)	2004	203	NA	NA	9 and 13	—	12.6	—
Fairman et al. (19)	2009	736	60	40	8	—	7	24.5 (3 m)
Perna et al. (6)	ENUC-1993	521	—	31.8–36.0	12.1–4.6	—	—	—
	CONREC-1999	751	—	25.3–20.0	10.5–8.9	—	—	—
	IC-SAC-2002	400	—	27	4.7	—	9.3 – 7	—
	IC-SAC-2004	615	—	—	—	—	—	—
	CONREC-2004	687	—	—	—	—	—	—
Castro et al. (11)	2004	372	69 (LVEF <40%)	NA	4.5	—	11	—
Bocchi et al. (20)	2008	182	100	—	14.8	—	8	36 (5 m)
Barretto et al. (8)	1998	903	>58.5	—	15.7 and 14.6	—	—	—
Rohde et al. (9)	2005	143	64	36	13	—	11	36 (3 m)
McSwain et al. (28)	1999	293	NA	NA	17.4	—	—	—
Thierer et al. (21)	2002	400	74	25	10.5	—	7	—
Rizzo et al. (22)	2004	615	71.7	28.3	8.94	—	7	—
Thierer et al. (23)	2006	2,201	72.6	27.4	—	—	—	—

Values are %. *Prevalence of HFPEF in the ADHERE-I (Acute Decompensated Heart Failure National Registry–International) trial; †patients from Brazil; ‡patients from Mexico.
LVEF = left ventricular ejection fraction; HFPEF = heart failure with preserved ejection fraction; m = months; SHF = systolic heart failure; other abbreviations as in Table 1.

and the United States: 6 days (range: 4 to 10 days) versus 4 days (range: 3 to 7 days) (24). However, in-hospital mortality rates (unadjusted) for patients hospitalized with HF and HFPEF showed wide variation by the country of enrollment. The United States had the third lowest observed inpatient mortality rate (2.7%); Brazil had the highest (8.5%), whereas México had 2.9%, and Hong Kong had the lowest (0.5%). Patients in the U.S. cohort presented with more comorbidities (such as prior myocardial infarction, renal insufficiency) and peripheral edema compared with patients outside the United States. The I Latin America Guidelines for the Assessment and Management of Decompensated Heart Failure reported that in Brazil, the average hospital stay was 5.8 days and in-hospital mortality was 6.58% to 6.95% (15). Also, in a study from Brazil, patients admitted into public hospitals were on average 1 decade younger in comparison with patients in private hospitals (25). In this study, HF patients hospitalized in public hospitals consisted of a higher percentage of Afro-Brazilians (65% vs. 20% in private hospitals), illiterate individuals (56% vs. 11% in private hospitals), and patients who had frequently suspended medication before the hospital admission (51% vs. 17% in private hospitals). The length of hospitalization and the mortality rate adjusted for age were higher in patients in the public health system. These findings reinforce the concept of lack of access to preventive management of HF risk factors and treatment in socioeconomically deprived populations.

In summary, DHF is an important cause of mortality and hospitalization in LA, mainly in the elderly population. Length of hospitalization seems to be longer in LA, and the mortality is heterogeneous among the countries. Hospitalized patients in public hospitals may be younger and with fewer comorbidities.

Systolic HF in LA

Table 2 shows the prevalence and prognosis of systolic HF in hospitalized DHF patients and outpatients. In the Chilean National Registry of Heart Failure, patients with

impaired systolic function were more often men (73.7% vs. 36.3%) and more commonly had a history of coronary artery disease (29.5% vs. 17.1%) in comparison with subjects with HFPEF (26). With respect to HF in children, few publications have reported treatment effects in idiopathic dilated cardiomyopathy, and there are no epidemiological studies (27).

HF due to long-standing SH is somewhat rare in Brazil (7%) (8), which contrasts with the high prevalence of hypertensive HF reported in Antigua (41%) and in Chile (35.2%), which showed a high prevalence of systolic HF (11,28). In the Chilean HF registry ICARO (Insuficiencia Cardíaca: Registro y Organización), the etiology showed an interesting pattern associated with socioeconomic status. For subjects in the low-income tertile, a SH etiology was predominant (58.2%); conversely, in the high-income tertile, an ischemic etiology was far more common (34.5%) (29). In Argentina, the ischemic etiology seems to be more common than the SH etiology, ranging from 27.4% to 38.4% for ischemic HF versus 18.2% to 23.7% for systolic HF (30). This also seems to be the case in Mexico and Colombia (27.5%) (31,32). Also, association of comorbidities with HF has been reported in LA, with relevant published data concerning diabetes mellitus, dyslipidemia, hypothyroidism, chronic obstructive pulmonary disease, renal dysfunction, and anemia (33,34).

Despite the advances in HF treatment, compliance with international and national guidelines remains low in LA (35). Furthermore, there is no substantial financial support for development of trials specific for the LA population, as observed for the planned IRON-HF (Iron Supplementation in Heart Failure Patients With Anemia) trial (36). In the Chilean HF registry ICARO, beta-blocker use at admission was very low (15%) and did not improve substantially at discharge (21%). Conversely, levels of angiotensin-converting enzyme inhibitor/angiotensin receptor antagonist use, although below recommendations, were acceptable both at admission (44.5%) and at discharge (67.9%) (11). Medical treatment at the time of admission to the emergency room due to DHF showed a wide variation according to socioeconomic status. High-income subjects were more often adequately treated, and 44% received a beta-blocker. By contrast, low-income subjects were usually undertreated, and merely 23.6% were prescribed a beta-blocker (32). These results contrast with the high rates of compliance with the established guidelines seen in clinical trials from Argentina and Brazil (4,37,38). Success of HF education programs, which is dependent upon socioeconomic status, was reported in randomized prospective trials in Brazil and Argentina (39). The REMADHE (A Long-Term Prospective Randomized Controlled Study Using Repetitive Education at Six-Month Intervals and Monitoring for Adherence in Heart Failure Outpatients) trial, developed in Brazil, was designed to include outpatients for long-term follow-up, with repetitive education at 6-month intervals (39). The intervention included the education of patients and caregivers; patients had their medical treatment optimized based on current guidelines, and received remote monitoring. The multidisciplinary team of care providers included nurses, cardiologists, pharmacists, social workers, dieticians, dentists, and psychologists. Communication with patients and caregivers was made during individual or group face-to-face interviews, as well as by telephone. The interval between interviews was reduced in the presence of any change in clinical status that required evaluation and/or treatment modifications. A daytime telephone number was provided to patients for emergencies or questions about HF management (39).

For severely ill patients, heart transplantation availability differs widely among countries. Brazil has one of the largest transplantation programs in the world, second only to the United States. Patients submitted for heart transplantation in a Brazilian center were young (mean, 36 years of age), and a large portion had dilated cardiomyopathy (53.4%) (40). In a tertiary center in Argentina, the mean age was 46 years, and the most common etiology for HF was ischemic (37%) (41). Those findings are closely similar to those published by a Chilean tertiary center, in which the mean age of the recipient was 43 years old, and the main etiology for HF was ischemic (40%), closely followed by dilated cardiomyopathy (36%). Survival was 87.2% at 1 year, and 74.7% at 7 years (42,43). Many surgical procedures have been tested in LA for systolic HF treatment, but none of them are used in current clinical practice (44,45). Stem cell–based treatment was also investigated in HF (46).

In summary, systolic HF is a common syndrome in LA, and the major etiology is heterogeneous according to each country and is under the influence of socioeconomic status. SH and coronary artery disease are the main etiologies. In general, compliance with guidelines is low in clinical practice, except in some countries and selected centers. Heart transplantation is developed in select areas.

HF Due to Neglected Diseases in LA

Chagas' heart disease and rheumatic heart disease continue to be a burden in LA, affecting large sectors of the population (Table 1). Multiple factors explain the persistence of these neglected etiologies, such as the lower total expenditure on health, the lower income of the population, and limited funding assigned to prevention and treatment of these diseases in LA.

C'D was responsible for 7.8% of HF deaths in a report from Brazil (14). C'D etiology was reported in a range from 8.1% to 21% of HF outpatients, and in 0.6% to 21% of hospitalized patients with DHF (Table 1). It is estimated that 21,000 deaths related to C'D occur every year in Brazil, Chile, Argentina, Paraguay, Peru, and Uruguay in LA (47). The patients with chagasic HF are younger in comparison with other etiologies. C'D is endemic in 21 countries in LA. About 7 million to 8 million people worldwide are estimated to be infected with *Trypanosoma cruzi* worldwide, mostly in LA (48). Despite more countries endemically involved due mainly to population mobility, the number of infected

people has remarkably dropped since the 1990s (48,49). *Trypanosoma cruzi*, the agent responsible for the infection, is most frequently acquired through vector-borne transmission from triatomine bugs; however, the *T. cruzi* infection can also arise through blood transfusions, congenital infection, needle-stick injuries, oral transmission, and organ transplantation (50).

Longitudinal studies show that from 25% to 30% of infected individuals develop chronic C'D including symptoms related to heart damage (51). Three phases are described in the course of the disease. In the acute phase, which lasts between 15 and 30 days, the feature can be intense parasitemia, which in turn triggers both B and T lymphocyte–mediated immune responses. In this phase, the patient can manifest a clinical status from asymptomatic to severe systemic infection with myocarditis. The subacute or indeterminate phase, lasting between 5 and 20 years, is characterized by low blood parasite concentrations and myocardial or nerve lesions generating minimal or no symptoms, and can only be detected using ancillary diagnostic tests (52). Seventy percent to 80% of positive serology patients remain in the indeterminate phase; the remaining 20% to 30% enter the chronic phase, exhibiting mainly cardiac involvement (53), which may cause death due to ventricular arrhythmias, conduction disorders, embolic events, and severe HF. The detection of *T. cruzi* antigens in chronic chagasic cardiomyopathy and the reported reactivation of the *T. cruzi* infection associated with myocarditis after heart transplantation suggest a direct effect of the agent apart from immunological mechanisms (54). However, the value of specific treatment for *T. cruzi* infection in chronic chagasic cardiomyopathy needs to be proven in randomized prospective trials in LA, taking into consideration the ineffective preventive treatment of *T. cruzi* infection reactivation in heart transplantation (55). Furthermore, coinfection with mycoplasma, chlamydia, virus, and archaeal organisms has been reported, emphasizing the complexity of chagasic cardiomyopathy (56,57). Chagasic HF is associated with systemic inflammatory and neurohormonal activation (58). However, a recent LA guidelines proposed a new classification of the chronic C'D in 4 stages (A, B1/B2, C, and D), such as in HF, according to the extent of cardiac damage, with the objective of better management of the epidemiology, prevention, and treatment of C'D (59).

Despite the worse outcome of patients with C'D in comparison with other etiologies having been first published in 1994 (60), there are no established specific trials for pharmacological chagasic HF treatment. When only patients using beta-blockers were considered, the survival of patients with C'D was similar to that of other etiologies, suggesting that beta-blockers may have a beneficial effect on survival in patients with HF and Chagas' heart disease (61). Consequently, research on surgical procedures and stem cell treatment has been promoted for chagasic HF in LA (62,63). However, sudden death, persistent myocarditis, right ventricular dysfunction, and myocardial fibrosis are justifications for the lack of successful surgical procedures for chagasic HF, with the exception of heart transplantation (64–66). The common right ventricular dysfunction observed in C'D could be a limitation for left ventricular assist devices. On other hand, C'D HF may have low pulmonary hypertension (67). Successful ventricular assist device procedures as a bridge for heart transplantation were reported (68). Heart transplantation is now accepted as the surgical treatment of choice for chagasic refractory HF despite the risk of *T. cruzi* infection reactivation (61,69). Successful long-term survival after heart transplantation for Chagas' heart disease was reported (70,71). *T. cruzi* infection has been reported to occur in 26.5% to 42.9% of cases (72,73). A multivariate analysis showed rejection episodes, neoplasms, and mycophenolate mofetil use as independent determinants for factors (74–76). Prophylactic treatment early after transplantation was of no benefit in a small cohort of patients (77).

Rheumatic cardiopathy is still a significant cause of morbidity and mortality in LA (Table 1). Rheumatic valvulopathy is an important indication for cardiac surgery both in children and adults in LA (78). Reports from the Ministry of Health in Brazil show that in that country, about 22,000 patients develop rheumatic cardiopathy every year, and the prevalence of rheumatic fever is 3% to 5% in children and adolescents (79). Rheumatic fever prevalence was also reported to range from 7.9 of 1,000 inhabitants in La Paz (Bolivia) to 2.9 of 1,000 inhabitants in Cuba (80). In 2003, 101,822 cases of rheumatic fever were reported in children in LA. These data show that rheumatic fever and its associated complications, characterized by valve disease and HF, still pose a challenge to public health in LA.

In summary, C'D and rheumatic cardiopathy are important neglected causes of HF in LA. There are no specific trials for treatment of C'D; it is treated similarly to other etiologies despite the different physiopathology.

HF With Preserved Ejection Fraction

In reports from LA, the prevalence of HFPEF was 0% to 37% in HF outpatients, whereas in hospitalized patients, it was 20% to 45.7% (Table 2). SH prevalence observed in LA subjects in the I-PREFER (Identification of Patients With Heart Failure and PREserved Systolic Function: an epidemiological regional study) study (81) was greater than that observed in patients with HFPEF in developed countries. Also, the blood pressure control in patients with SH and HFPEF differed according to the region. Blood pressure was controlled in only 39% of patients in LA. The high rate of SH, together with inadequate blood pressure control in LA patients, could be one factor leading to HFPEF in LA. Figure 6 shows medical treatment of HFPEF in LA.

HFPEF is common in LA; however, the prevalence may be lower in comparison with systolic HF. The younger age observed in HF trials in LA could be a factor influencing the epidemiology of HFPEF in LA.

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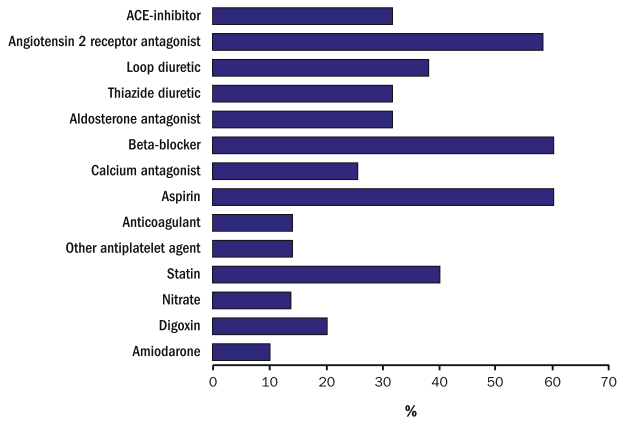

Figure 6 **Medication Use Among Patients With HFPEF in Certain LA Countries**

Data are modified from the I-PREFER study (82). HFPEF = heart failure with preserved left ventricular ejection fraction; I-PREFER = Identification of Patients With Heart Failure and PREserved Systolic Function: an epidemiological regional study; LA = Latin America.

Limitations

The most important limitation of this systematic review is that data in general were obtained from registries, government-based databases, selected populations or institutions, and trials with inherent bias. However, the data were the best available and can be the basis for planning well-designed future studies.

Clinical Implication and Conclusions

Despite the shortcomings of the available published data, it is clear that there is an excess burden of systolic, HFPEF, and DHF HF in LA leading to high rates of hospitalization and high mortality. LA is under the awful paradox of the HF risk factors and HF epidemiology of developed countries with an added high prevalence of SH, C'D, and rheumatic fever, together with a lower total expenditure on health per capita. Lower total expenditure on health per capita in LA indicates limited access to primary or secondary care of diseases leading to HF. As a consequence of multiple factors in LA, the HF population seems to be younger than in developed countries. New strategies for prevention and treatment of HF are essential in LA. Specific trials for LA populations are necessary. There is a need for large-scale epidemiological studies of the incidence, prevalence, determinants, and outcome of HF in LA to guide strategies for the treatment and prevention of HF in LA. Implementation of public policies proposed in 2012 jointly by the Brazilian Society of Cardiology, American Heart Association, European Society of Cardiology, World Heart Federation, and Interamerican Society of Cardiology (Letter of the Rio de Janeiro, III—Brazil Prevent & I Latin America Prevent, 2012) could reduce the HF burden in Latin America (82).

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