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7.5.2 Ethnicity

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On the basis of a Statistics Canada 2006 census,¹ the visible minority population surpassed 5 million, reaching 16.2% of the population. In Ontario, more than 1.5 million people are of Chinese, South Asian, Black, or Aboriginal descent. To understand and manage a person's illness it is necessary to appreciate the effects of the person's culture and social environment. This is perhaps most relevant in the health care management of minority groups. Morale is crucial to the patients' adaptation and their maintenance of involvement in their management; miscommunications as a result of ethnocultural differences might have a detrimental effect on their adaptation to their illness. Furthermore, health care providers might contribute to the ethnic care disparities through clinical uncertainty and stereotyping of health behaviours related to minority patients.² However, the use of ethnicity as a way to differentiate patients may be debatable and differential medical treatment based on the color of one's skin has been associated with detrimental outcomes for ethnic minorities.³ A significant contributor is the paucity of research to clearly identify the sources of these differences in outcomes in ethnic groups and to distinguish among biological, environmental, or social causes of disease differences.⁴ Evaluation of disease differences in subsegments of the population is needed to understand the mechanisms of pathophysiology and to optimally target therapeutic responses. Thus, effective research that would contribute to a reduction in health care disparities requires collection of data on health status in ethnic populations and assessment of differences in disease patterns. It also requires clinical trials to include adequate numbers of diverse populations to probe for differences in pathophysiology including environmental or social factors contributing to disease and responses to treatment. Where differences are observed among population segments, clinical trials focused in these population groups are warranted.^{4,5}

7.5.2.1 General considerations

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There have been very few published population-based epidemiological studies or large-scale randomized controlled studies of HF in countries outside North America, Europe and Australia,⁶ regions from which most of the minority groups that reside in the Western countries emigrated. For example, it is generally believed that rheumatic heart disease and congenital heart disease remain important causes of HF in sub-Saharan Africa and certain parts of Asia and South America.

Hypertension is thought to be an important cause of HF in Asia, and in the African and African American population, whereas Chagas' disease is an important aetiology in subjects from South America.⁷ Although it is useful to remember region-specific aetiologies of HF particularly when managing recent immigrants from the regions where the minority groups were resident, it should be remembered that as these regions also constantly undergo epidemiological and economic transitions and the epidemiology of HF is likely to be increasing similar to that of the Western world. The INTERHEART study has demonstrated that the impact of conventional and potentially preventable risk factors on the risk of myocardial infarctions are consistent across different geographical regions and different ethnic groups.⁸ This implies that simple measures that can prevent myocardial infarction and likely the subsequent development of HF are equally applicable to different ethnic populations in different geographic locations. The recently published Cardiovascular Health in Ambulatory Care Research Team (CANHEART) Immigrant study⁹ demonstrates that most immigrant groups to Canada have lower rates of major cardiovascular events than long-term residents of similar age; striking variations in the event rates exist between immigrants from different ethnic background. East Asian immigrants, predominantly of Chinese descent, had the lowest burden of risk factors and events overall, although the event rate increased with greater duration in Canada. There are also high-risk groups such as South Asian immigrants, who had a high burden of traditional risk factors and frequent cardiovascular events. In general, patients in the Asia Pacific region have historically less CAD as etiology, onset at younger age, fewer uses of devices, more diabetes, and more uses of parenteral agents during acute episodes.¹⁰

There is little evidence to indicate that criteria used to diagnose HF differ between ethnic populations. For example, a recent study from the United States has shown that the diagnostic performance of the biomarker N-terminal BNP is similar in African American and non-African American individuals.¹¹ Evidence that different ethnic groups have the same mortality benefit from current standard therapy is scant as very few large RCTs have included regions outside Europe and the United States. There have been smaller trials that confirmed the effectiveness of ACEis and beta-blockers in patients from Africa and Asia.^{7,12} Given the fundamental nature of the derangements in HF, it is likely that the current treatment approach such as blockade of neurohormonal activation and the judicious use of devices will be similarly effective, although

one cannot rule out the possibility that the degree of response to treatment might vary among ethnic groups.

7.5.2.2 HF in specific ethnic minority populations

The South Asian population

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The South Asian population is currently the largest and fastest growing minority group, representing 25% of all minority and 4% of the total population in Canada.¹³ South Asians have increased susceptibility to premature mortality from coronary heart disease.^{7,14,15} A higher disease burden of coronary heart disease in South Asian individuals might be expected to result in a higher prevalence of HF. In a study conducted in Leicestershire in United Kingdom involving 5789 consecutive patients,¹⁶ admission rates for HF were higher among South Asian than Caucasian patients. South Asians were younger and more frequently had concomitant diabetes than Caucasians. Despite differences in risk factors, clinical outcome was similar. In a matched historical cohort study of patients hospitalized for HF, conducted also in Leicestershire,¹⁴ when compared to Caucasians the South Asian patients had similar rates of CAD but more often had hypertension and diabetes. South Asian patients had a lower mortality than Caucasian patients. A retrospective chart review of South Asians and non-South Asian white patients hospitalized with HF at two Toronto-area community hospitals in Canada demonstrated that South Asians were younger, of lower body mass index and were more often diabetic.¹⁷ In-hospital mortality was also not different although South Asians were more likely to experience atrial and ventricular arrhythmias. In an analysis that compared two HF clinics, one that managed mostly Chinese, the other one South Asians, it was demonstrated that South Asian patients more frequently had a past history of myocardial infarction, multi-vessel CAD on angiogram, and treatment with coronary revascularizations compared to non-Chinese, non-South Asians.¹⁸

These data therefore suggest that South Asians have more risk factors thereby increasing the risk for premature coronary heart disease which may lead to development of HF at a younger age. As in other ethnic groups, in order to understand and manage a person's illness it is necessary to appreciate the effects of their culture, experiences and environment on the illness.

The Chinese population

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The Chinese represent the second largest visible minority

comprising of 24% of the minority population in Canada.¹³ When managing Chinese patients with HF, their ability to comprehend and speak English and their family values should be considered. Chinese languages are the third most commonly spoken language in Canada and many Chinese do not speak or understand English well, particularly in technical terms. The modern Chinese continue to emphasize the values of family and there is a strong bond between parents, children and family members. A recent survey conducted in Toronto and Vancouver where the majority of Chinese reside revealed that there is a general lack of awareness of the symptoms of stroke and myocardial infarction and risk factors for CVD among the Chinese Canadians.¹⁵ These social and ethnocultural factors may therefore confound the management of the Chinese patients.

There are few long-term prospective studies defining specifically etiologic factors for HF in the Chinese. Available data, by no means definitive, point to hypertension being the most important identifiable risk factor in Chinese with HF.^{7,19} In a prospective study of 730 consecutive Hong Kong Chinese patients admitted to hospital with HF, the main identifiable risk factors were hypertension (37%), coronary heart disease (31%), valvular heart disease (15%), cor pulmonale (27%), idiopathic dilated cardiomyopathy (4%), and miscellaneous (10%). In women, hypertension was the commonest cause of HF at all ages but in men aged <70 years, coronary heart disease was equal in frequency to hypertension. Twenty-one percent had diabetes compared to a community rate of 10% for this age group.²⁰ A subsequent study reported by the same group evaluated 200 consecutive patients with HF using Doppler echocardiography.²¹ An LVEF >45% was considered normal. The results showed that 12.5% had significant valvular heart disease. Of the remaining 175 patients, 132 had a LVEF >45%. Therefore, 66% of patients with a clinical diagnosis of HFpEF. Most had an abnormal relaxation pattern in diastole and 14% had a restrictive filling pattern. In the systolic HF group, a restrictive filling pattern was more common (46%). There were no significant differences in the sex distribution, aetiology, or prevalence of left ventricular hypertrophy between these two HF groups. These investigators conclude that HFpEF is more common than HFrEF in Chinese patients and that this may be related to an older age at presentation and the high prevalence of hypertension. In a case-mix study in Toronto, LVEF of Chinese (n=47) and Caucasian patients (n=243) with a diagnosis of HF were compared.²² Among these patients, there were more Chinese patients with LVEF > 40% than Caucasian patients. The median LVEF was also greater in Chinese and the Chinese patients were older. With the economic growth in the world and the associated socioeconomic changes, a large proportion of Chinese adults now have the metabolic syndrome and obesity has become an important public health problem in China.²³ A recent review¹⁹ from China indicated that in contrast to the Western countries, the prevalence of HF is greater in women than in men which might in turn be related to higher prevalence of rheumatic heart

disease which affected women more than men. It is therefore more than likely that antecedent factors for incident HF in the Chinese will approach those of the Western world. A recent study examined the clinical profile of ethnic minority groups among patients with HF managed in two specialized HF clinics that follow a large number of Chinese and South Asian patients respectively.¹⁸ Detailed medical records of 1266 non-Chinese, non-South Asians, 215 South Asians and 151 Chinese patients managed in two specialized HF clinics in Ontario that follow large numbers of South Asian and Chinese patients were reviewed. Compared to non-Chinese, non-South Asians, there were more women in the Chinese patients with HF. South Asian patients had the highest frequency of a history of previous myocardial infarctions and hypertension and the least frequency of concurrent AF. A smaller proportion of Chinese patients had systolic dysfunction that was categorized as Grade II or worse. Chinese patients had the least frequent use of ACE inhibitors but on the other hand had the most frequent use in ARBs. Our data therefore indicate that among patients managed in HF clinics in Ontario, Canada, Chinese and South Asian patients have different patterns of demographics, comorbid conditions, proportion of patients with preserved LVEF and medication use when compared to non-Chinese, non-South Asian patients with HF. Awareness of these differences may help to design future studies and develop differential strategies to prevent and manage HF among the largest and increasing ethnic minority groups in the Western countries.

There are currently no large scale RCTs of pharmacologic and device therapy conducted specifically in Chinese patients with HF. Indeed, the recommendations from the Chinese guidelines on the diagnosis and treatment of chronic HF closely resemble those contained in guidelines in the Western world.²⁴ The Hong Kong Diastolic Heart Failure Study studied 150 Chinese patients with HF and preserved systolic function and reported no significant additional benefit by adding irbesartan or ramipril to diuretic treatment.²⁵ It has been stated that Chinese subjects experience a high incidence of cough when treated with ACEis.^{26,27} However, most of these studies that reported high incidence of ACEi-induced cough in Chinese patients had involved very small number of patients and did not compare simultaneously Chinese and Caucasian patients. Given the compelling data in support of the benefit of ACE inhibition in HFrEF, a Chinese patient with HF should not be denied the initiation of an ACEi based on anticipated intolerance. The doses of antihypertensive agents prescribed in Asian patients are frequently lower than in Caucasian patients, due in part to a perception of greater sensitivity and therefore higher risk of hypotension in the Asian patients. Unless strong evidence that can change the management of Chinese patients with HF is available, it is prudent to follow the recommendations from guidelines in the Western countries when managing Chinese patients with HF.

The Black population

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In the United States, the black population has a higher prevalence of HF than persons of other races; they present with symptoms of HF at younger ages, and are less likely to be due to coronary heart disease than in Caucasians.²⁸ Two studies have reported on the contemporary epidemiology of HF among African Americans. Observations from the Coronary Artery Risk Development in Young Adult (CARDIA) study have indicated that 1 in 100 African-Americans develop HF at an average age of 39, 20 times the rate in Caucasians. Incident HF in the African Americans before 50 years of age was associated with hypertension, obesity, CKD and systolic dysfunction that were already present before age of 35.²⁹ The incidence, risk factors, and outcomes of HF among African Americans were also examined in the 2934 older individuals without HF in the Health, Aging, and Body Composition (Health ABC) Study.³⁰ African Americans were more likely than Whites to develop HF. Smoking, left ventricular hypertrophy, fasting glucose levels, systolic blood pressure, decreased albumin, and increased heart rate were more prevalent in African Americans.

These data imply that young black individuals with risk factors should be a target of more aggressive intervention for HF prevention. Analysis of outcome data from the Studies of Left Ventricular Dysfunction (SOLVD) trials has shown higher mortality and morbidity rates in blacks compared to Caucasians with HF.³¹ Whether this reflects differences in baseline characteristics or access of care or socioeconomic factors is not entirely clear. There have been reports which point to access to care and unfavourable clinical characteristics that are independent of HF as factors for poor outcomes.³²

Long-standing clinical observations have suggested that blacks with hypertension respond less well than Caucasians to ACEis.³³ Concerns remain that differences in the effectiveness of blockade of the renin-angiotensin system might also be present. Several retrospective subgroup analyses of data from randomized trials have added some support to the concept that the response of blacks and Caucasians with HFrEF to ACE inhibition may differ.³⁴ However, these post hoc analyses do not provide sufficient evidence to support a strategy other than routine use of ACE inhibitors in black subjects with HFrEF. Although the Beta-Blocker Evaluation of Survival Trial (BEST) with bucindolol did not find a beneficial effect of β -blockade in blacks,³⁵ subgroup analysis of data from the US Carvedilol Trials suggests that the beneficial effect of beta-blockers on outcomes in blacks is similar to the effects in the larger population³⁶ and these findings are supported by other analyses.³⁷ The totality of data to date therefore still supports the use of beta-blockers in black patients with HFrEF.

Data from the Vasodilator-Heart Failure Trial (VHeFT) I and II first suggested a racial difference in treatment response between white and black patients with symptomatic LVSD treated with hydralazine-isosorbide dinitrate.³⁸ Representation

of blacks, women, and other minorities in other HF trials has been so poor that even meaningful retrospective subgroup analyses have been precluded. On the basis of the ethnic differences observed in these retrospective analyses, the African-American Heart Failure Trial (A-HeFT) was designed as the first HF trial in an all-black cohort. A-HeFT enrolled 1050 black patients with New York Heart Association class III or IV symptoms and with dilated ventricles and systolic dysfunction.³⁹ Subjects were assigned to receive a fixed combination of isosorbide dinitrate plus hydralazine or placebo in addition to standard therapy. The primary end point was a composite score made up of weighted values for death from any cause, a first hospitalization for HF and change in the quality of life. The study was terminated early due to a higher mortality rate in the placebo group. The mean primary composite score was significantly better in the group given nitrate and hydralazine than in the placebo group, as well as its components. These data therefore form the basis for the support for the addition of the combination of isosorbide dinitrate and hydralazine to the standard medical regimen for black patients with HF.

The First Nations population

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Data from the 2006 census on Canada's First Nations population counted 1,172,790 First Nations, Métis, and Inuit people, representing 3.8% of Canada's total population. More than half the country's 1.2 million aboriginal people live off reserve. Aboriginal people were four times as likely as non-aboriginal people to live in a crowded dwelling and three times as likely to live in a dwelling in need of major repairs. Life expectancy for First Nations males is 7.4 years less and 5.2 years less for First Nations women compared to other Canadian men and women respectively. There is also evidence to indicate that geographic location, as compared with Aboriginal identity, appears to have a large impact on health status and the use of physician services, with on-reserve Aboriginals reporting lower likelihood of having seen a physician.⁴⁰ The Study of Health Assessment and Risk Evaluation in Aboriginal Peoples (SHARE-AP) reported a higher frequency of CVD among Aboriginals in Canada and a greater burden of atherosclerosis when compared with Canadians of European ancestry.⁴¹ As with other colonized people, there have been significant social, economic and cultural changes in the past decades which might accounted for an observed increase in hospitalization for CAD.⁴² Given the increasing incidence of diabetes that accompanies the transition from traditional to urban lifestyles,⁴³ the incidence of CVD and therefore that of HF will likely also increase. There are currently few data available that can directly guide the management of HF in the aboriginal population. In patients who have commenced dialysis in Alberta, Saskatchewan, or Manitoba in Canada, the risk of death from HF was higher in Aboriginals than in Caucasians.⁴⁴

When managing Aboriginal patients with HF, health care professionals need to understand how Aboriginal people interpret their illness and respond to treatment, and respect the logic and rationale of another system of thought where health is perceived as a harmonious order. They need to adapt their treatment plans and education programs to the cultural, social and economic circumstances and to recognize that many communities are geographically remote. They will likely need to adopt a holistic approach in offering advice and care for their patients, respecting local traditions and not to impose their own values.⁴⁵ Workers need to recognize the multigenerational legacies of colonization and the importance of local history; to respect traditional beliefs; and to acknowledge the role of the social determinants of health and inadequate resources. Health care workers should work in multidisciplinary teams and include community health representatives. They must be sensitive to cross-cultural care. Aboriginal patients might be operating in a second language and might not be comfortable questioning someone who is perceived to have greater power and knowledge.

In summary, there are important differences across ethnic minority groups in the etiologies of HF and how patients respond to treatment. However, most of the published studies are based on small sample sizes. Given the increasing frequency of HF in these populations and an increasingly multiethnic world, additional studies on HF across different ethnic groups are needed. Furthermore, to be successful in reducing the burden of HF and indeed heart disease at large, and if one is committed to providing the best care for all patients, then one must be cognizant of the health care disparities and if feasible take steps to narrow and eliminate gaps in care as a function of ethnicity. Recommendations and practical tips on the management of patients with HF from the four largest ethnic minority groups in Canada are displayed in [Table 32](#).

Table 32: Four common ethnic minority groups in Canada

Ethnic population	Risk factors for HF Prevention	Language spoken and ethnocultural considerations	Treatment of HF
South Asians	Obesity, diabetes and metabolic syndrome	Predominantly English, family involvement important	Follow guidelines.
Chinese	Hypertension, however coronary heart disease and diabetes increasingly	Mostly Cantonese and Mandarin, family involvement very important	Follow guidelines. Beware of concurrent traditional Chinese

Ethnic population	Risk factors for HF Prevention	Language spoken and ethnocultural considerations	Treatment of HF
	prevalent		medicine
Black	Hypertension	English or French	Follow guidelines. Consider adding hydralazine-nitrate in those with HF and reduced ejection fraction; uncertainty remains if A-HeFT results apply to all self-identified black populations
Aboriginals	Obesity and diabetes	English, Cree and Ojibwe are among many spoken languages in Canada. May need to involve family members and community representatives	Follow guidelines.

A-HeFT, African-American Heart Failure Trial; HF, heart failure.

References

1. Canada S. Census of Population. 2006.
2. Balsa AI, McGuire TG. Prejudice, clinical uncertainty and stereotyping as sources of health disparities. *J Health Econ* 2003;22:89-116.
3. Gerend MA, Pai M. Social determinants of Black-White disparities in breast cancer mortality: a review. *Cancer Epidemiol Biomarkers Prev* 2008;17:2913-23.
4. Groman R, Ginsburg J, American College of P. Racial and ethnic disparities in health care: a position paper of the American College of Physicians. *Ann Intern Med* 2004;141:226-32.
5. Woolf SH, Johnson RE, Fryer GE, Jr., Rust G, Satcher D. The health impact of resolving racial disparities: an analysis of US

- mortality data. *Am J Public Health* 2008;98:S26-8.
6. Colvin M, Sweitzer NK, Albert NM, et al. Heart Failure in Non-Caucasians, Women, and Older Adults: A White Paper on Special Populations from the Heart Failure Society of America Guideline Committee. *Journal of Cardiac Failure* 2015;21:674-93.
 7. Sanderson JE, Chan SK, Yip G, et al. Beta-blockade in heart failure: a comparison of carvedilol with metoprolol. *J Am Coll Cardiol* 1999;34:1522-8.
 8. Yusuf S, Hawken S, Ounpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet* 2004;364:937-52.
 9. Tu JV, Chu A, Rezai MR, et al. The Incidence of Major Cardiovascular Events in Immigrants to Ontario, Canada: The CANHEART Immigrant Study. *Circulation* 2015;132:1549-59.
 10. Mentz RJ, Roessig L, Greenberg BH, et al. Heart Failure Clinical Trials in East and Southeast Asia: Understanding the Importance and Defining the Next Steps. *JACC Heart Fail* 2016;4:419-27.
 11. Krauser DG, Chen AA, Tung R, Anwaruddin S, Baggish AL, Januzzi JL, Jr. Neither race nor gender influences the usefulness of amino-terminal pro-brain natriuretic peptide testing in dyspneic subjects: a ProBNP Investigation of Dyspnea in the Emergency Department (PRIDE) substudy. *J Card Fail* 2006;12:452-7.
 12. Ajayi AA, Balogun MO, Oyewo EA, Ladipo GO. Enalapril in African patients with congestive cardiac failure. *Br J Clin Pharmacol* 1989;27:400-3.
 13. Taylor RS, Sagar VA, Davies EJ, et al. Exercise-based rehabilitation for heart failure. *Cochrane Database Syst Rev* 2014:CD003331.
 14. Newton JD, Blackledge HM, Squire IB. Ethnicity and variation in prognosis for patients newly hospitalised for heart failure: a matched historical cohort study. *Heart* 2005;91:1545-50.
 15. Chow CM, Chu JY, Tu JV, Moe GW. Lack of awareness of heart disease and stroke among Chinese Canadians: results of a pilot study of the Chinese Canadian Cardiovascular Health Project. *Can J Cardiol* 2008;24:623-8.
 16. Blackledge HM, Newton J, Squire IB. Prognosis for South Asian and white patients newly admitted to hospital with heart failure in the United Kingdom: historical cohort study. *BMJ* 2003;327:526-31.
 17. Singh N, Gupta M. Clinical characteristics of South Asian patients hospitalized with heart failure. *Ethn Dis* 2005;15:615-9.
 18. Choi D, Nemi E, Fernando C, Gupta M, Moe GW. Differences in the clinical characteristics of ethnic minority groups with heart failure managed in specialized heart failure clinics. *Jacc* 2014;Heart failure. 2:392-9.

19. Jiang H, Ge J. Epidemiology and clinical management of cardiomyopathies and heart failure in China. *Heart* 2009;95:1727-31.
20. Sanderson JE, Chan SK, Chan WW, Hung YT, Woo KS. The aetiology of heart failure in the Chinese population of Hong Kong--a prospective study of 730 consecutive patients. *Int J Cardiol* 1995;51:29-35.
21. Yip GW, Ho PP, Woo KS, Sanderson JE. Comparison of frequencies of left ventricular systolic and diastolic heart failure in Chinese living in Hong Kong. *Am J Cardiol* 1999;84:563-7.
22. Tso DK, Moe G. Cardiovascular disease in Chinese Canadians: a case-mix study from an urban tertiary care cardiology clinic. *Can J Cardiol* 2002;18:861-9.
23. Gu D, Reynolds K, Wu X, et al. Prevalence of the metabolic syndrome and overweight among adults in China. *Lancet* 2005;365:1398-405.
24. Chinese Society of Cardiology of Chinese Medical A, Editorial Board of Chinese Journal of C. [Guidelines for the diagnosis and management of chronic heart failure]. *Zhonghua Xin Xue Guan Bing Za Zhi* 2007;35:1076-95.
25. Yip GW, Wang M, Wang T, et al. The Hong Kong diastolic heart failure study: a randomised controlled trial of diuretics, irbesartan and ramipril on quality of life, exercise capacity, left ventricular global and regional function in heart failure with a normal ejection fraction. *Heart* 2008;94:573-80.
26. Chan WK, Chan TY, Luk WK, Leung VK, Li TH, Critchley JA. A high incidence of cough in Chinese subjects treated with angiotensin converting enzyme inhibitors. *Eur J Clin Pharmacol* 1993;44:299-300.
27. Woo KS, Nicholls MG. High prevalence of persistent cough with angiotensin converting enzyme inhibitors in Chinese. *Br J Clin Pharmacol* 1995;40:141-4.
28. Yancy CW. Heart failure in African Americans: a cardiovascular engima. *J Card Fail* 2000;6:183-6.
29. Bibbins-Domingo K, Pletcher MJ, Lin F, et al. Racial differences in incident heart failure among young adults. *N Engl J Med* 2009;360:1179-90.
30. Kalogeropoulos A, Georgiopoulou V, Kritchevsky SB, et al. Epidemiology of incident heart failure in a contemporary elderly cohort: the health, aging, and body composition study. *Arch Intern Med* 2009;169:708-15.
31. Dries DL, Exner DV, Gersh BJ, Cooper HA, Carson PE, Domanski MJ. Racial differences in the outcome of left ventricular dysfunction. *N Engl J Med* 1999;340:609-16.
32. Ghali JK, Kadakia S, Cooper R, Ferlinz J. Precipitating factors leading to decompensation of heart failure. Traits among urban blacks. *Arch Intern Med* 1988;148:2013-6.

33. Saunders E. Hypertension in minorities: blacks. *Am J Hypertens* 1995;8:115s-9s.
34. Exner DV, Dries DL, Domanski MJ, Cohn JN. Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction. *N Engl J Med* 2001;344:1351-7.
35. Beta-Blocker Evaluation of Survival Trial I. A trial of the beta-blocker bucindolol in patients with advanced chronic heart failure. *N Engl J Med* 2001;344:1659-67.
36. Yancy CW, Fowler MB, Colucci WS, et al. Race and the response to adrenergic blockade with carvedilol in patients with chronic heart failure. *N Engl J Med* 2001;344:1358-65.
37. Goldstein S, Deedwania P, Gottlieb S, Wikstrand J, Group M-HS. Metoprolol CR/XL in black patients with heart failure (from the Metoprolol CR/XL randomized intervention trial in chronic heart failure). *Am J Cardiol* 2003;92:478-80.
38. Carson P, Ziesche S, Johnson G, Cohn JN. Racial differences in response to therapy for heart failure: analysis of the vasodilator-heart failure trials. *Vasodilator-Heart Failure Trial Study Group. J Card Fail* 1999;5:178-87.
39. Taylor AL, Ziesche S, Yancy C, et al. Combination of isosorbide dinitrate and hydralazine in blacks with heart failure. *N Engl J Med* 2004;351:2049-57.
40. Newbold KB. Problems in search of solutions: health and Canadian aboriginals. *J Community Health* 1998;23:59-73.
41. Anand SS, Yusuf S, Jacobs R, et al. Risk factors, atherosclerosis, and cardiovascular disease among Aboriginal people in Canada: the Study of Health Assessment and Risk Evaluation in Aboriginal Peoples (SHARE-AP). *Lancet* 2001;358:1147-53.
42. Shah BR, Hux JE, Zinman B. Increasing rates of ischemic heart disease in the native population of Ontario, Canada. *Arch Intern Med* 2000;160:1862-6.
43. Burrows NR, Geiss LS, Engelgau MM, Acton KJ. Prevalence of diabetes among Native Americans and Alaska Natives, 1990-1997: an increasing burden. *Diabetes Care* 2000;23:1786-90.
44. Tonelli M, Hemmelgarn B, Manns B, et al. Death and renal transplantation among Aboriginal people undergoing dialysis. *CMAJ* 2004;171:577-82.
45. Macaulay AC. Improving aboriginal health: How can health care professionals contribute? *Can Fam Physician* 2009;55:334-9.

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