



*the* Métis  
Nation *of*  
Ontario

# CARDIOVASCULAR DISEASE IN THE MÉTIS NATION OF ONTARIO

**TECHNICAL REPORT**  
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## BACKGROUND AND RATIONALE

Métis people comprise approximately 30% of the Aboriginal population in Canada, according to the 2006 census<sup>1</sup>. The Métis people trace their ancestry to the offspring of European men and First Nations women, and are a distinct Aboriginal people set apart from First Nations and Inuit by language, culture, and history<sup>2</sup>. At present there are few specific population-based health data or subsequent peer-reviewed studies on the Métis population<sup>1-3</sup>.

The health and healthcare of the Métis are a primary interest of the Métis Nation of Ontario (MNO), the sole representative body for the Métis in Ontario. The purpose of the MNO is to support and further the development of self-government institutions for the Métis Nation of Ontario and to represent and advocate for the distinct interests of the Métis people of Ontario<sup>2</sup>. In order to examine population-based data on cardiovascular disease and its consequences in the Métis population of Ontario, the MNO launched a research initiative with funding from the Public Health Agency of Canada.

Because Ontario health data do not include identifiers for individuals' ethnic or cultural background, an alternative way of identifying the Métis population was needed. In order to access health administrative data for the province of Ontario necessary for this initiative, a research agreement was developed between the MNO and the Institute for Clinical Evaluative Sciences (ICES). ICES is an independent, non-profit organization, whose core business is to conduct research that contributes to the effectiveness, quality, equity and efficiency of health care and health services in Ontario<sup>4</sup>. Key to the knowledge produced at ICES is its ability to anonymously link population-based health information on an individual patient basis, using unique ICES identifiers that ensure the privacy and confidentiality of health information. Linked data allows researchers to obtain a more comprehensive view of specific health care issues than could be achieved with unlinked data. The research agreement between the MNO and ICES permits linkage of the MNO citizenship registry with Ontario healthcare administrative data in a secure environment. The following report describes the data linkage, the analytic methods undertaken, and the results of the analysis related to cardiovascular disease and its outcomes among the Métis, for the period 2006 to 2008.

## LITERATURE REVIEW

Cardiovascular disease is the leading cause of death and disability in Canada, accounting for 36% of deaths. Accordingly, cardiovascular disease presents a tremendous cost burden on the Canadian health care system<sup>5</sup>. Fortunately, cardiovascular disease is largely preventable and treatment can relieve symptoms, improve quality of life, and reduce the possibility of early death<sup>6</sup>.

Currently there is a scarcity of published information relating to the burden of cardiovascular disease in the Métis community. According to the Aboriginal People's Survey 2006, approximately 7% of Métis respondents reported having "heart problems"<sup>7</sup>. Using similar self-reporting methods, the 2006 Métis Nation British Columbia Provincial Survey found that 27.2% of respondents or their family members had heart disease<sup>8</sup>. Tjepkema et al<sup>9</sup> used the Canadian census mortality follow-up study to compare mortality rates of Métis and Registered Indian adults to the non-Aboriginal population. They found that rates were significantly higher in the Métis compared to the non-Aboriginal population; for circulatory diseases overall, there were 247.9 deaths per 100,000 among Métis men compared with 192.5 among non-Aboriginal men; 160.9 deaths per 100,000 among Métis women compared with 94.0 among non-Aboriginal women. This report also found that circulatory system disease accounted for the highest proportion (33%) of the deaths in the Métis.

The burden of cardiovascular disease in the living is not known. In this report the rates of six cardiovascular diseases in a cohort of Métis persons were evaluated: (1) acute myocardial infarction / unstable angina (also termed acute coronary syndromes or ACS), (2) congestive heart failure, (3) cerebrovascular disease, (4) atrial fibrillation, (5) congenital heart disease, and (6) rheumatic heart disease.

## RESEARCH METHODS

### DATA SOURCES

Formed in 1994, the MNO is the representative body for Métis persons in Ontario. The Registry of the Métis Nation of Ontario issues Métis citizenship to those who can supply genealogical documentation and proof of Métis Nation ancestry<sup>10</sup>. The MNO's Citizenship Registry as of spring, 2005 was provided to ICES.

Initial data cleaning of the citizenship registry included range checks and removal of duplicate records. Individual MNO citizens were then linked with the Registered Persons Database (RPDB), a registry of all persons eligible for a health card in Ontario. Of the 14,480 individuals in the citizenship registry, 14,021 were successfully linked (96.8%), of whom 12,814 (88.5%) had a valid Ontario address recorded in the RPDB and a valid Ontario health card number on April 1 2006. This is the Métis population that was studied in this report; in the report, we refer to them simply as "the Métis", or "the Métis population". All other Ontario residents with a valid Ontario health card number were considered to be part of the general population.

Each person's health card number was then anonymized using a reproducible encryption algorithm. The encrypted health card number could then be linked with other Ontario healthcare administrative data sources, all of which share the same encrypted health card number to identify individuals. As a result, individuals can be linked between data sources and across time. These other administrative data sources include the following databases:

- The Discharge Abstracts Database (DAD), which records detailed information about each hospitalization to an Ontario hospital, including diagnoses and procedures performed during hospitalization.
- The Ontario Health Insurance Plan (OHIP) database, which records all fee-for-service billing claims from Ontario physicians for consultations, visits and procedures.
- The National Ambulatory Care Reporting System (NACRS) database, which contains diagnostic information related to all emergency department visits in Ontario.

### EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE

The burden of cardiovascular disease in the MNO was determined by identifying rates of six types of cardiovascular disease in the MNO Citizenship Registry, through linkage with the DAD, OHIP or NACRS, fiscal years 2006 to 2009 (three-year period). Once overall rates in the MNO Citizenship Registry and general population were obtained, age- and sex-adjusted rates were determined to facilitate comparison of rates in the two groups. The six types of disease are listed in Table 1, along with their corresponding ICD-9 and ICD-10 codes, and the algorithms utilized to define each case. For chronic diseases, incidence was assessed, whereby only cases without a prior case in the previous 5 years were included. To allow for one year of follow-up, only two years (fiscal years 2006 and 2007) were assessed for incident rates. For diseases that are more acute in nature, prevalence was assessed; because no follow-up information was assessed on prevalent rates, three years of data were utilized for prevalence (fiscal years 2006 to 2008).

**Table 1 :** Cardiovascular disease types and corresponding definitions.

DISEASE	DEFINITION	ICD-9 CODES	ICD-10 CODES
		(OHIP)	(DAD & NACRS)
Acute coronary syndromes	DAD (1 claim/year)	410	I21, I22, I23, I24.9, I20.0, I20.1
Congestive heart failure	DAD (1 claim/year) <i>or</i> OHIP claims (2 claims/year) <i>or</i> NACRS (2 claims/year)	428	I50
Cerebrovascular disease (stroke)	DAD (1 claim/year)		I60, I61, I63, I64
Atrial fibrillation	DAD (1 claim/year) <i>or</i> NACRS (2 claims/year)		I48
Congenital heart disease	DAD (1 claim/year) <i>or</i> OHIP (2 claims/year)	745, 746, 747	A50.5, Q20, Q21, Q22, Q23, Q24, Q25, Q26
Rheumatic heart disease	DAD (1 claim/year) <i>or</i> OHIP claims (2 claims/year)	391	I01, I05.0, I06

## OUTCOMES OF CARDIOVASCULAR DISEASE

Outcomes of cardiovascular disease were evaluated by examining rates of death and hospital re-admissions following the incident index event. Mortality was assessed at one year following the incident index cardiovascular event. Rate of hospital re-admissions was assessed up to 1 year following the incident index cardiovascular event. Rates were age- and sex-standardized using indirect standardization. The indirect method of risk-adjustment was applied where the risk-adjusted rate for the Métis was defined as the [crude rate for Métis / predicted rate for Métis] \* crude rate entire cohort, where the predicted rate is generated by logistic regression modelling for dichotomous outcomes (e.g. cardiovascular event, mortality), or using Poisson models for continuous (count) outcome variables (e.g. readmissions). Independent variables in the models included ethnicity (Métis versus other); age, and sex. p-values associated with ethnicity are presented.

## FINDINGS

### DEMOGRAPHIC CHARACTERISTICS OF THE POPULATIONS

**Table 2 :** Demographic characteristics of the Métis Nation of Ontario citizenship registry versus the Ontario Métis population identified in the 2006 Census.

Characteristic	Métis Nation of Ontario Citizenship Registry	Ontario Métis people identified in the 2006 Census
Number of persons	12,814	73,605
Median Age (IQR)	43 (31-54)	33 (not available)
Sex		
Female	46.5 %	50.0 %
Male	53.5 %	50.0 %

IQR: interquartile range

The MNO Citizenship Registry included in this analysis represents approximately 18% of the total Métis population of Ontario, based on self-report in the 2006 Census by Statistics Canada<sup>7</sup>. The people included in the citizenship registry are older and more likely to be male.

**Table 3 :** Demographic characteristics of the Métis Nation of Ontario citizenship registry versus the rest of the general population of Ontario.

Characteristic		Métis Nation of Ontario Citizenship Registry	General population
Number of persons		12,814	13,445,390
Median Age (IQR)		43 (31-54)	38 (20-53)
Sex (%)	Female	46.5	50.5
	Male	53.5	49.5
Income Quintile* (%)	1 (lowest)	22.8	20.3
	2	20.6	19.8
	3	20.4	19.5
	4	18.0	19.7
	5 (highest)	16.9	19.6
	Missing	1.6	1.1
Local Health Integration Network (LHIN) (%)			
	Erie St. Clair	3.3	5.1
	South West	3.7	7.1
	Waterloo Wellington	2.3	5.4
	Hamilton Niagara Haldimand Brant	6.3	10.5
	Central West	1.2	6.1
	Mississauga Halton	1.8	8.5
	Toronto Central	2.4	9.3
	Central	2.2	12.7
	Central East	4.8	11.7
	South East	3.4	3.7
	Champlain	5.2	9.5
	North Simcoe Muskoka	17.1	3.3
	North East	28.4	4.4
	North West	16.7	1.9

\* Income quintile was determined from postal codes obtained from the RPDB and neighbourhood-level median household income from Statistics Canada census data. Quintiles range from poorest (Q1) to wealthiest (Q5).

The median age of the Métis population was slightly older and there were slightly more males than in the general population. Distribution over income quintiles is lower than the general population, and almost half of MNO Citizens live in the North of the province, with the largest group in the North East.

**Table 4 :** Demographic characteristics of the Métis Nation of Ontario citizenship registry utilized specifically in the analyses of (1) acute coronary syndromes, (2) congestive heart failure, (3) cerebrovascular disease, (4) atrial fibrillation, versus the rest of the Ontario population.

Characteristic		Métis Nation of Ontario Citizenship Registry	General population
Number of persons, age 20+		12,550	10,014,4002
Median Age (IQR)		44 (32-54)	45 (34-58)
Sex (%)	Female	46.4	51.1
	Male	53.6	48.9

These four cardiovascular diseases usually only affect adults and, when they do occur in children, they are a significantly different disease. Because of this the analyses was limited to those age 20+ years. After removal of those less than age 20, the Métis population remaining for analyses was younger and more male than the rest of the population over the age of 20.

## EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE

**Table 5a :** Prevalence rates of cardiovascular disease per 100 persons, April 1, 2006 to March 31, 2009 (three year period), crude and age/sex standardized rates.

Cases per 100 population	Métis	General population	p-value
<b>Acute Coronary Syndromes</b>			
Crude Rate	1.44	1.11	
Standardized Rate (95% CI)	1.94 (1.73-2.15)	1.11 (1.1-1.12)	<0.0001
<b>Congestive Heart Failure</b>			
Crude Rate	1.07	1.4	
Standardized Rate (95% CI)	1.79 (1.53-2.05)	1.4 (1.39-1.41)	0.0038
<b>Cerebrovascular Disease</b>			
Crude Rate	0.32	0.37	
Standardized Rate (95% CI)	0.5 (0.36-0.63)	0.37 (0.37-0.38)	0.0673

CI: Confidence Interval

Prevalence of acute coronary syndromes and congestive heart failure were 1.8 and 1.3 times higher in the Métis, while cerebrovascular disease (strokes) showed a trend toward higher rates in the Métis population (1.4 times that of the general population).

**Table 5b :** Incident cases of cardiovascular disease per 100 persons, April 1, 2006 to March 31, 2008 (two year period), crude and age/sex standardized rates.

Cases per 100 population	Métis	General population	p-value
<b>Atrial Fibrillation</b>			
Crude Rate	0.13	0.11	
Standardized Rate (95% CI)	0.19 (0.12-0.26)	0.11 (0.1-0.11)	0.0142
<b>Congenital Heart Disease</b>			
Crude Rate	0.00	-	
Standardized Rate (95% CI)	0.00	-	n/a
<b>Rheumatic Heart Disease</b>			
Crude Rate	0.00	-	
Standardized Rate (95% CI)	0.00	-	n/a

CI: Confidence Interval

Incidence of atrial fibrillation was 1.7 times higher in the Métis population during the two year period, while there were no cases of congenital heart disease or rheumatic heart disease in this cohort.

**Table 6 :** Prevalent cases of cardiovascular disease per 100 persons, by age and sex, April 1, 2006 to March 31, 2009.

Cases per 100 population	Métis (%)	95% confidence interval	General population (%)	95% confidence interval
<b>Acute Coronary Syndromes</b>				
Males				
20-64 years	1.2	(0.9, 1.5)	0.8	(0.7, 0.8)
65-74 years	6.7	(4.6, 8.8)	3.7	(3.6, 3.7)
75+ years	11.8	(6.3, 17.2)	6.3	(6.2, 6.4)
<b>Overall</b>	1.8	(1.5, 2.2)	1.4	(1.4, 1.4)
Females				
20-64 years	0.5	(0.3, 0.7)	0.3	(0.3, 0.3)
65-74 years	5.1	(3, 7.2)	2.1	(2, 2.1)
75+ years	5.1	(1.6, 8.5)	4.6	(4.6, 4.7)
<b>Overall</b>	1	(0.7, 1.2)	0.9	(0.8, 0.9)
<b>Congestive Heart Failure</b>				
Males				
20-64 years	0.6	(0.4, 0.8)	0.5	(0.5, 0.5)
65-74 years	5.7	(3.7, 7.7)	4.3	(4.3, 4.4)
75+ years	14	(8.1, 19.8)	10.6	(10.5, 10.7)
<b>Overall</b>	1.3	(1, 1.6)	1.5	(1.5, 1.5)
Females				
20-64 years	0.2	(0.1, 0.4)	0.3	(0.3, 0.3)
65-74 years	5.3	(3.2, 7.5)	2.8	(2.8, 2.9)
75+ years	6.3	(2.5, 10.1)	8.9	(8.8, 8.9)
<b>Overall</b>	0.8	(0.6, 1)	1.3	(1.3, 1.3)
<b>Cerebrovascular Disease</b>				
Males				
20-64 years	0.3	(0.2, 0.5)	0.1	(0.1, 0.2)
65-74 years	1.1	(0.2, 2.1)	1.1	(1.1, 1.1)
75+ years	2.2	(0, 4.7)	2.3	(2.3, 2.4)
<b>Overall</b>	0.4	(0.3, 0.6)	0.4	(0.4, 0.4)
Females				
20-64 years	0.1	(0, 0.2)	0.1	(0.1, 0.1)
65-74 years	1.2	(0.1, 2.2)	0.8	(0.8, 0.8)
75+ years	1.9	(0, 4)	2.2	(2.2, 2.3)
<b>Overall</b>	0.2	(0.1, 0.3)	0.4	(0.4, 0.4)



**Table 6, continued** : Cases of cardiovascular disease per 100 persons, by age and sex, April 1, 2006 to March 31, 2009.

Cases per 100 population	Métis	95% confidence interval	General population	95% confidence interval
<b>Atrial Fibrillation</b>				
Males				
20-64 years	0.3	(0.1, 0.4)	0.1	(0.1, 0.1)
65-74 years	1.5	(0.5, 2.6)	0.8	(0.8, 0.8)
75+ years	2.9	(0.1, 5.8)	1.2	(1.2, 1.3)
<b>Overall</b>	0.4	(0.3, 0.6)	0.3	(0.3, 0.3)
Females				
20-64 years	0	(0, 0.1)	0.1	(0.1, 0.1)
65-74 years	1.6	(0.4, 2.8)	0.7	(0.7, 0.7)
75+ years	2.5	(0.1, 5)	1.4	(1.4, 1.4)
<b>Overall</b>	0.2	(0.1, 0.3)	0.3	(0.3, 0.3)
<b>Congenital Heart Disease</b>				
Males				
0-5 years	.	(., .)	0.3	(0.3, 0.3)
6-19 years	0	(0, 0)	0.1	(0.1, 0.1)
20+ years	0	(0, 0.1)	0.1	(0.1, 0.1)
<b>Overall</b>	0	(0, 0.1)	0.1	(0.1, 0.1)
Females				
0-5 years	0	(0, 0)	0.3	(0.3, 0.3)
6-19 years	0	(0, 0)	0.1	(0.1, 0.1)
20+ years	0	(0, 0.1)	0.1	(0.1, 0.1)
<b>Overall</b>	0	(0, 0.1)	0.1	(0.1, 0.1)
<b>Rheumatic Heart Disease</b>				
Males				
0-19 years	0	(0, 0)	0	(0, 0)
20-39 years	0	(0, 0)	0	(0, 0)
40-60 years	0	(0, 0)	0	(0, 0)
60+ years	0	(0, 0)	0	(0, 0)
<b>Overall</b>	0	(0, 0)	0	(0, 0)
Females				
0-19 years	0	(0, 0)	0	(0, 0)
20-39 years	0	(0, 0)	0	(0, 0)
40-60 years	0	(0, 0)	0	(0, 0)
60+ years	0	(0, 0)	0	(0, 0)
<b>Overall</b>	0	(0, 0)	0	(0, 0)

## OUTCOMES OF CARDIOVASCULAR DISEASE CARE

**Table 7 :** Hospital re-admissions within one year of the incident cardiovascular event per 100 persons, April 1, 2006 to March 31, 2008 (two year period), crude and age/sex standardized rates.

Re-admissions within 365 days of Index Event, per 100 population	Métis	General population	p-value
<b>Acute Coronary Syndromes</b>			
Crude Rate	0.06	0.13	
Standardized Rate (95% CI)	0.07 (0.06-0.07)	0.13 (0.13-0.13)	0.1424
<b>Congestive Heart Failure</b>			
Crude Rate	0.29	0.15	
Standardized Rate (95% CI)	0.32 (0.31-0.32)	0.15 (0.15-0.15)	0.0221
<b>Cerebrovascular Disease</b>			
Crude Rate	0.08	0.05	
Standardized Rate (95% CI)	0.08 (0.08-0.08)	0.05 (0.05-0.05)	0.4888
<b>Atrial Fibrillation</b>			
Crude Rate	0.13	0.16	
Standardized Rate (95% CI)	0.12 (0.11-0.14)	0.16 (0.16-0.16)	0.7045

CI: Confidence Interval

Readmission rates for congestive heart failure were over two times higher among the Métis compared with the general population, while no significant differences were found for acute coronary syndromes, cerebrovascular disease, and atrial fibrillation.

**Table 8 :** Mortality at one year following the incident index event, per 100 persons, April 1, 2003 to March 31, 2009, crude and age/sex standardized rates.

Mortality within 365 days of Index Event, per 100 population	Métis	General population	p-value
<b>Acute Coronary Syndromes</b>			
Crude Rate	11.11	17.56	
Standardized Rate (95% CI)	16.91 (6.72-27.1)	17.55 (17.25-17.86)	0.9008
<b>Congestive Heart Failure</b>			
Crude Rate	16.59	25.71	
Standardized Rate (95% CI)	21.84 (14.91-28.76)	25.71 (25.54-25.87)	0.2739
<b>Cerebrovascular Disease</b>			
Crude Rate	20	26.96	
Standardized Rate (95% CI)	26.95 (26.32-27.58)	28.53 (6.95-50.12)	0.8858
<b>Atrial Fibrillation</b>			
Crude Rate	25	9.44	
Standardized Rate (95% CI)	30.95 (15.19-46.71)	9.44 (8.88-9.99)	0.0136

CI: Confidence Interval

The one-year mortality rate for atrial fibrillation was 3.3 times higher in the Métis population, compared with the rest of the population. There were no significant differences in mortality secondary to acute coronary syndromes, congestive heart disease, or cerebrovascular disease, relative to the rest of the population.

## LIMITATIONS

Administrative data have been widely advocated for chronic disease surveillance because they represent an efficient means to obtain population-based measures of disease burden. However, they have a number of limitations.

Diagnostic data in physicians' service claims are not audited for accuracy and while coding of hospital records is more rigorous, accuracy remains imperfect. Several studies have evaluated the accuracy of cardiac coding in Canadian administrative databases either through chart re-abstraction or by comparison with another data source (for instance, clinical registries). According to the 2006 Canadian Cardiovascular Atlas, acute myocardial infarction was the most well studied and accurately coded diagnosis, producing diagnostic agreement or specificity estimates of 90% or more<sup>1</sup>.

The numbers produced in this report are small, given the size of the MNO Citizenship Registry. While a slightly larger registry was available as of 2009, using this cohort to look back in time for diseases with a high mortality rate would likely result in underestimation of the rates of disease in the Métis, since those individuals who died of the disease prior to 2009 would not be included. Thus an analysis of the cohort as of 2006 was chosen, following these individuals forward in time to avoid this bias; but this limited the sample size, particularly for incident rates, where one year of follow-up information was required to ascertain outcomes in these patients.

Lastly, the Citizenship Registry of the MNO may not be representative of the entire Métis population in Ontario. Individuals who are not registered citizens may be different (in demographic, behavioural or clinical terms) than registered citizens, so generalizing these results to all Métis people in Ontario may not be appropriate. These non-registered Métis people were included in the general population of this study.

## DISCUSSION

In this report on cardiovascular disease in the Métis, the most striking finding is the discrepancy between rates of acute coronary syndrome (acute myocardial infarction and unstable angina) in the Métis versus the rest of the Ontario population. After adjusting for age and sex, the prevalence of acute coronary syndrome in the Métis was 1.8 times higher than the rest of the population, at 194 persons per 10,000 Métis, versus 111 per 10,000 in the rest of the population during our three year study period. This corresponds to a rate of acute coronary syndromes in the Métis that is 75% higher than the rest of the population, a rate that has not been previously reported in the literature. The sister report to this one, on diabetes mellitus, found a higher rate of diabetes in the Métis compared to the rest of the Ontario population<sup>12</sup> because diabetes is a significant risk factor for acute coronary syndromes, this finding is consistent with our finding of more acute coronary syndromes in the Métis. Rates of other risk factors (including smoking, hypercholesterolemia, and hypertension) in the Métis are not known, and would be an excellent area for future study.

The prevalence of congestive heart failure was also higher in the Métis, afflicting 179 per 10,000 Métis, compared to 140 per 10,000 in the rest of the population, a 28% relative increase, or 1.3 times higher. Atrial fibrillation is the most common cardiac arrhythmia and may increase the risk of stroke several fold: the incident rate of atrial fibrillation was significantly higher in the Métis relative to the rest of the population, at 19 new cases per 10,000 Métis relative to 11 per 10,000 in the rest of the population, a 72% relative increase, or 1.7 times higher. The increased rate in atrial fibrillation in the Métis did not result in a higher rate of strokes: the prevalent rates of cerebrovascular disease were not statistically different between the groups, although there was a trend toward more strokes in the Métis.

There were no new cases of congenital heart disease, nor rheumatic heart disease among the Métis population during our two year incident period. There are no previous rates reported in the Métis for comparison.

The hospital re-admission rate following an incident event was significantly higher in the Métis only for congestive heart failure. The rate was 32 per 10,000 Métis versus 15 per 10,000 in the rest of the population (a 113%

relative increase). This suggests poorer control of this disease in the Métis, relative to the rest of the population. Re-admission rates for acute coronary syndromes, cerebrovascular disease, and atrial fibrillation did not differ between groups. Given the low number of cases of rheumatic heart disease and congenital heart disease found in the cohort, re-admission rates in these patients were not evaluated.

The one-year mortality rate following an incident event was significantly higher in the Métis with atrial fibrillation, relative to the rest of the population, at 228% greater. However the sample size was small, with confidence intervals that could indicate a difference as small as 52%. Still, this represents a finding that warrants further investigation. Mortality rates following acute coronary syndromes, congestive heart failure, and cerebrovascular disease were similar in the Métis and the rest of the population.

Unfortunately there is little published data with which to compare our results. The major reason few studies have been done about the Métis is the difficulty in defining the cohort: until the registry of the Métis Nation of Ontario (MNO) was created, it was very difficult to identify Métis persons in Ontario health administrative databases. The Métis do not live on reserves or well-demarcated regions, making them impossible to identify by area. The only previous report on the Métis used probabilistic linkage to identify Métis persons, an innovative approach but one that may compromise the accuracy of the cohort. The MNO registry has excellent specificity, allowing us to identify only individuals with Métis citizenship. However, as noted in the Limitations section, our results apply to those who applied for and received MNO citizenship, and may or may not accurately reflect the Métis population as a whole.

## CONCLUSIONS

Of six areas of cardiovascular disease, the Métis in this study had a substantially higher prevalence rate of acute coronary syndromes, a higher prevalence of congestive heart failure and a substantially increased incidence of atrial fibrillation, relative to the rest of the Ontario population. Rates of cerebrovascular disease were not different between the two groups, and there were no new cases of congenital heart disease nor rheumatic heart disease among the Métis in this study. Hospital re-admissions were higher in Métis for congestive heart failure relative to the rest of the population, while there were no differences in re-admissions for acute coronary syndromes, cerebrovascular disease and atrial fibrillation. One-year mortality was significantly greater for the Métis with atrial fibrillation, relative to the rest of the population with this disease; however mortality rates for the other diseases studied were not different.

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