Likelihood of coronary angiography among First Nations patients with acute myocardial infarction

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Abstract

Background: Morbidity due to cardiovascular disease is high among First Nations people. The extent to which this may be related to the likelihood of coronary angiography is unclear. We examined the likelihood of coronary angiography after acute myocardial infarction (MI) among First Nations and non–First Nations patients.

Methods: Our study included adults with incident acute MI between 1997 and 2008 in Alberta. We determined the likelihood of angiography among First Nations and non–First Nations patients, adjusted for important confounders, using the Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease (APPROACH) database.

Results: Of the 46 764 people with acute MI, 1043 (2.2%) were First Nations. First Nations patients were less likely to receive angiography within 1 day after acute MI (adjusted odds ratio [OR] 0.73, 95% confidence interval [CI] 0.62–0.87). Among First Nations and non–First Nations patients who underwent angiography (64.9%), there was no difference in the likelihood of percutaneous coronary intervention (PCI) (adjusted hazard ratio [HR] 0.92, 95% CI 0.83–1.02) or coronary artery bypass grafting (CABG) (adjusted HR 1.03, 95% CI 0.85–1.25). First Nations people had worse survival if they received medical management alone (adjusted HR 1.38, 95% CI 1.07–1.77) or if they underwent PCI (adjusted HR 1.38, 95% CI 1.06–1.80), whereas survival was similar among First Nations and non–First Nations patients who received CABG.

Interpretation: First Nations people were less likely to undergo angiography after acute MI and experienced worse long-term survival compared with non–First Nations people. Efforts to improve access to angiography for First Nations people may improve outcomes.

Although cardiovascular disease has been decreasing in Canada,[1] First Nations people have a disproportionate burden of the disease. First Nations people in Canada have a 2.5-fold higher prevalence of cardiovascular disease than non–First Nations people,[2] with hospital admissions for cardiovascular-related events also increasing.[3]

The prevalence of cardiovascular disease in First Nations populations is presumed to be reflective of the prevalence of cardiovascular risk factors.[4–7] However, the disproportionate increase in rates of hospital admission suggests that suboptimal management of cardiovascular disease or its risk factors may also influence patient outcomes.[2,3] Racial disparities in the quality of cardiovascular care resulting in adverse outcomes have been documented, although most studies have focused on African-American, Hispanic and Asian populations.[8,9] As a result, it is unclear whether suboptimal delivery of guideline-recommended treatment contributes to increased cardiovascular morbidity and mortality among First Nations people.[10–12]

We undertook a population-based study involving adults with incident acute myocardial infarction (MI) to examine the receipt of guideline-recommended coronary angiography among First Nations and non–First Nations patients.[10–12] Among patients who underwent angiography, we sought to determine whether there were differences between First Nations and non–First Nations patients in the likelihood of revascularization and long-term survival.

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Methods

Study population

We did a population-based cohort study involving people 18 years of age and older using databases from Alberta Health and from the Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease (APPROACH).[13–15] The APPROACH database is a prospective data collection initiative that collects detailed clinical information on all patients undergoing coronary angiography in Alberta since 1995, including information on coronary anatomy, left ventricular ejection fraction and smoking status.[15] Alberta has a population of about 3.6 million, and there are 3 cardiac catheterization laboratories in Alberta: 2 located in Edmonton and 1 located in Calgary.

Patients admitted to hospital with incident acute MI (International Classification of Diseases, 9th revision, code 410; International Statistical Classification of Diseases and Related Health Problems, 10th revision, code I21) from Apr. 1, 1997, until Mar. 31, 2008, were identified from the Alberta Health database of hospital admissions. To identify patients, we used the most responsible diagnosis or complication that occurred after admission.[16] This algorithm has a sensitivity of 88.8%, specificity of 92.8% and positive predictive value of 88.5% for identifying acute MI.[16] We excluded patients who had an acute MI during the 3-year washout period (Apr. 1, 1994, to Mar. 31, 1997) to ensure that only incident cases of acute MI were included. The date of hospital admission for incident acute MI served as the index date for all analyses. For patients with multiple acute MIs during the study, we evaluated care for only the first acute MI. Patients were linked between the databases using their personal health number.[13–15]

First Nations status and covariates

We used the Alberta Health Population Registry to identify patients with First Nations status, defined as any individual registered under the Indian Act. Health care for First Nations people is administered through the First Nations and Inuit Health Branch of Health Canada.[17] Based on the 2006 Canadian census, about 81% of the self-identified First Nations population is registered under the Indian Act.[18] However, people with First Nations status represent about 53% of the Aboriginal population.[17] We searched the registry for patients from Apr. 1, 1993, to Mar. 31, 2008, who had an indicator of First Nations status at any time. We classified this group as "First Nations" and the remainder as "non–First Nations" (reference cohort). Aboriginal people in Alberta not registered under the Indian Act were included in the non–First Nations comparison group.[18]

We used the 2006 Canadian census and the postal code of each participant to determine median household income.[19] We used ArcGIS software (version 9.1, Esri) to determine the shortest distance by road (in kilometres) between each patient's residence and the closest cardiac catheterization laboratory.[20] This distance was categorized, as in prior work, into the following categories: 0–50 km, 50.1–150 km, 150.1–300 km and greater than 300 km.[21] We used validated algorithms to define diabetes and hypertension.[22,23] Comorbidities, excluding diabetes and acute MI, were based on the Deyo classification of the Charlson comorbidity index validated by Quan and colleagues.[24] We included the year of acute MI diagnosis to account for changing treatment recommendations over time.

Outcomes

Primary outcomes were receipt of coronary angiography within 1 day, 30 days and 1 year after admission for acute MI. Secondary outcomes included receipt of coronary revascularization (percutaneous coronary intervention [PCI] or coronary artery bypass grafting [CABG]) up to 1 year after angiography, and long-term survival.

Given that coronary angiography and revascularization are recommended for those with ST elevation MI (including those with failed thrombolytic therapy),[10–12] and for those with non–ST elevation MI in certain circumstances,[10–12,25–27] we conducted a sensitivity analysis among the subgroup with ST elevation MI who underwent coronary angiography.

We identified all-cause mortality from the Statistics Canada Vital Statistics database of Alberta Health.[28]

Statistical analysis

We compared baseline characteristics by First Nations status. We used logistic regression models to compare the likelihood of coronary angiography within 1 day, and Cox proportional hazards models to compare the likelihood of angiography within 30 days and 1 year of acute MI among First Nations and non–First Nations patients, adjusting for all covariates. We tested for potential interaction between First Nations status and both quintiles of median household income and distance to the nearest cardiac catheterization laboratory in each model.

Among the subset of patients who underwent coronary angiography, we evaluated likelihood of revascularization within 1 year and long-term survival (follow-up to Mar. 31, 2009) using Cox proportional hazards models, adjusting for covariates,

Table 1: Characteristics of patients with acute myocardial infarction, by First Nations status

Characteristic	No. (%) of patients*		p value
	First Nations, *n* = 1043	Non–First Nations, *n* = 45 721	
Age, yr, mean ± SD	59.2 ± 12.7	67.9 ± 14.1	< 0.001
Sex, female	351 (33.7)	15 558 (34.0)	0.8
Distance to closest cardiac catheterization laboratory, km			< 0.001
Missing	2 (0.2)	98 (0.2)	
≤ 50	358 (34.3)	26 802 (58.6)	
50.1–150	248 (23.8)	7 177 (15.7)	
150.1–300	303 (29.1)	9 192 (20.1)	
> 300	132 (12.7)	2 452 (5.4)	
Income quintile			< 0.001
Missing	142 (13.6)	2 130 (4.7)	
1st (lowest)	456 (43.7)	9 353 (20.5)	
2nd	143 (13.7)	9 404 (20.6)	
3rd	112 (10.7)	8 942 (19.6)	
4th	90 (8.6)	8 235 (18.0)	
5th (highest)	100 (9.6)	7 657 (16.7)	
Diabetes	565 (54.2)	15 487 (33.9)	< 0.001
Hypertension	844 (80.9)	38 084 (83.3)	0.047
Year of acute myocardial infarction diagnosis			0.1
1997	61 (5.8)	2 741 (6.0)	
1998	83 (8.0)	3 673 (8.0)	
1999	80 (7.7)	3 793 (8.3)	
2000	72 (6.9)	3 785 (8.3)	
2001	80 (7.7)	4 040 (8.8)	
2002	93 (8.9)	4 402 (9.6)	
2003	95 (9.1)	4 506 (9.9)	
2004	97 (9.3)	4 378 (9.6)	
2005	127 (12.2)	4 431 (9.7)	
2006	116 (11.1)	4 360 (9.5)	
2007	112 (10.7)	4 437 (9.7)	
2008†	27 (2.6)	1 175 (2.6)	
Comorbidities			
Cancer	58 (5.6)	5 075 (11.1)	< 0.001
Cerebrovascular disease	93 (8.9)	6 002 (13.1)	< 0.001
Heart failure	299 (28.7)	13 887 (30.4)	0.2
COPD	423 (40.6)	12 925 (28.3)	< 0.001
Dementia	21 (2.0)	2 853 (6.2)	< 0.001
HIV/AIDS	2 (0.2)	33 (0.1)	0.2
Metastatic cancer	7 (0.7)	978 (2.1)	0.002
Mild liver disease	42 (4.0)	728 (1.6)	< 0.001
Moderate/severe liver disease	14 (1.3)	223 (0.5)	< 0.001
Paraplegia/hemiplegia	21 (2.0)	914 (2.0)	0.9
Peptic ulcer disease	122 (11.7)	2 782 (6.1)	< 0.001
Peripheral vascular disease	106 (10.2)	5 825 (12.7)	0.02
Renal disease	122 (11.7)	4 752 (10.4)	0.2
Rheumatologic disease	58 (5.6)	1 621 (3.5)	0.001

COPD = chronic obstructive pulmonary disease, SD = standard deviation.
*Unless stated otherwise.
†Data ended Mar. 31, 2008.

as well as smoking status, coronary anatomy and ejection fraction (as a measure of severity of coronary disease). In these models, we calculated time to outcome or censoring from the date of angiography to the date on which the patients were censored (i.e., Mar. 31, 2009, or emigration from the province) or the date when the outcome occurred, ensuring there were no losses to follow-up. A Cox proportional hazards model was fitted to determine if survival after angiography varied by treatment received, followed by analyses stratified by treatment strategy. Finally, we assessed survival for all patients after acute MI by plotting the risk-adjusted survival curves from the proportional hazards model using the corrected group prognosis method.[29] A survival curve for each of the risk factors was calculated, after which an average survival curve was calculated as a weighted average of the individual survival curves. We then used the resulting risk-adjusted survival curves to compare the survival of First Nations and non–First Nations patients while adjusting for the differences in risk factors, irrespective of the size of the differences.

The proportional hazards assumption was satisfied for all multivariable models. We also modelled the cumulative incidence of coronary angiography and revascularization within 1 year of acute MI, treating death as a competing risk, and using the competing proportional subdistribution hazard approach.[30] Also, because sociodemographic factors, including income and distance of a person's residence to the closest cardiac catheterization laboratory, may be considered a component of ethnic background and result in overadjustment, we did not adjust for these variables initially, but repeated all analyses, adjusting for income and distance to the closest cardiac catheterization laboratory from each patient's residence in the full models.[31] Patients with missing income data were included in the analysis as a "missing" category, whereas those with missing distance to the closet cardiac catheterization laboratory (< 0.2%) were excluded from the analysis. We did the analyses using SAS version 9.3 (SAS Institute Inc.) and Stata 11.1 MP (StataCorp LP).

Ethics approval

The Conjoint Health Research Ethics Board at the University of Calgary gave ethics approval.

Results

Of the 46 764 patients who experienced an incident acute MI during the study period, 1043 (2.2%) were First Nations. Compared with the non–First Nations group, First Nations patients were younger (mean age 59.2 v. 67.9 yr), more likely to have diabetes (54.2% v. 33.9%) and less likely to live within 50 km of the closest cardiac catheterization laboratory (34.3% v. 58.6%) (Table 1). The median follow-up was 3.7 (interquartile range [IQR] 1.4–6.8) years.

Coronary angiography after acute MI

Overall, 30 358 (64.9%) patients underwent coronary angiography after acute MI. Of these, 186 (26.3%) First Nations patients and 10 279 (34.7%) non–First Nations patients underwent coronary angiography within 1 day after their acute MI (unadjusted odds ratio [OR] 0.75, 95% CI 0.64–0.88) (Table 2). After adjustment for all covariates, First Nations patients were still less likely to receive coronary angiography within 1 day compared with non–First Nations patients (OR 0.73, 95% CI 0.62–0.87). First Nations patients were also less likely to receive angiography within 30 days (HR 0.82, 95% CI 0.76–0.90) and 1 year (HR 0.83, 95% CI 0.77–

Table 2 (part 1 of 2): Full model with unadjusted and adjusted estimates for odds of angiography within 1 day after acute myocardial infarction

Covariate	Unadjusted OR (95% CI)	Adjusted OR* (95% CI)
First Nations status		
Non–First Nations	1.00 (ref)	1.00 (ref)
First Nations	0.75 (0.64–0.88)	0.73 (0.62–0.87)
Age, yr		
18–45	1.00 (ref)	1.00 (ref)
46–65	0.79 (0.73–0.86)	0.81 (0.74–0.88)
66–75	0.47 (0.43–0.51)	0.59 (0.54–0.66)
76–85	0.26 (0.24–0.28)	0.36 (0.32–0.40)
≥ 86	0.07 (0.06–0.09)	0.10 (0.09–0.12)
Sex		
Male	1.00 (ref)	1.00 (ref)
Female	0.61 (0.58–0.64)	0.84 (0.80–0.89)
Distance from residence to the nearest cardiac catheterization laboratory, km		
≤ 50	1.00 (ref)	1.00 (ref)
50.1–150	0.49 (0.46–0.52)	0.48 (0.45–0.51)
150.1–300	0.32 (0.30–0.34)	0.30 (0.28–0.33)
> 300	0.33 (0.29–0.37)	0.27 (0.24–0.31)
Income quintile		
1st (lowest)	1.00 (ref)	1.00 (ref)
2nd	1.07 (1.00–1.15)	1.07 (0.99–1.15)
3rd	1.05 (0.98–1.12)	1.04 (0.96–1.12)
4th	1.03 (0.96–1.11)	0.99 (0.92–1.07)
5th (highest)	1.13 (1.05–1.21)	1.10 (1.02–1.19)
Missing	0.77 (0.68–0.86)	1.07 (0.93–1.22)
Diabetes	0.74 (0.71–0.78)	0.86 (0.81–0.90)
Hypertension	0.73 (0.69–0.77)	0.94 (0.88–1.00)

Continued

0.90), after adjustment for all covariates (Table 3). We did not find a significant interaction between First Nations status and income or distance to the closest cardiac catheterization laboratory.

Among the subset of patients with ST elevation MI who underwent coronary angiography, we found no difference in timing of coronary angiography after adjustment for differences in all covariates (1 d: OR 0.88, 95% CI 0.62–1.18; 30 d: HR 0.98, 95% CI 0.86–1.11; 1 yr: HR 0.97, 95% CI 0.85–1.11).

Treatment and survival after coronary angiography

First Nations patients were more likely to be current smokers across all treatment modalities (Table 4). Among those who underwent CABG, coronary anatomy and ejection fraction were similar for First Nations and non–First Nations patients. However, First Nations patients who received PCI or medical management had low-risk to normal coronary anatomy compared with non–First Nations patients.

We found no statistically significant difference for time to PCI (median 0.5 d for both groups, $p = 0.5$) or CABG (median 13 d among First Nations patients v. 11 d among non–First Nations patients, $p = 0.7$). After adjustment, First Nations patients were as likely to receive PCI (HR 0.92, 95% CI 0.83–1.02) and CABG (HR 1.03, 95% CI 0.85–1.25) as non–First Nations patients (Table 5). However, First Nations patients had increased long-term mortality (HR 1.30, 95% CI 1.09–1.55) (Figure 1). Mortality was higher among First Nations than non–First Nations patients who received medical management (HR 1.38, 95% CI 1.07–1.77) or PCI (HR 1.38, 95% CI 1.06–1.80), with similar survival for those who underwent CABG (HR 0.91, 95% CI 0.56–1.47) (Table 6).

In analyses that accounted for the competing risk of death, similar patterns in the cumulative incidence of coronary angiography and revascularization at 1 year were evident (data available on request).

Table 2 (part 2 of 2): Full model with unadjusted and adjusted estimates for odds of angiography within 1 day after acute myocardial infarction

Covariate	Unadjusted OR (95% CI)	Adjusted OR* (95% CI)
Year of acute MI diagnosis		
1997	1.00 (ref)	1.00 (ref)
1998	1.48 (1.26–1.75)	1.50 (1.26–1.78)
1999	1.88 (1.60–2.21)	1.99 (1.68–2.35)
2000	2.13 (1.81–2.49)	2.25 (1.91–2.65)
2001	2.63 (2.26–3.07)	2.88 (2.45–3.38)
2002	3.53 (3.04–4.11)	4.00 (3.42–4.68)
2003	3.47 (2.99–4.03)	4.00 (3.42–4.68)
2004	3.80 (3.27–4.41)	4.44 (3.80–5.20)
2005	4.40 (3.79–5.10)	5.43 (4.65–6.34)
2006	4.19 (3.61–4.86)	5.09 (4.36–5.94)
2007	5.42 (4.68–6.28)	6.41 (5.49–7.48)
2008	5.49 (4.59–6.58)	6.67 (5.51–8.09)
Cancer	0.56 (0.52–0.61)	0.85 (0.77–0.93)
Cerebrovascular disease	0.40 (0.37–0.43)	0.74 (0.67–0.81)
Heart failure	0.44 (0.41–0.46)	0.93 (0.87–0.99)
COPD	0.54 (0.51–0.57)	0.76 (0.72–0.81)
Dementia	0.18 (0.15–0.21)	0.39 (0.33–0.46)
HIV/AIDS	1.39 (0.67–2.89)	0.78 (0.34–1.76)
Metastatic cancer	0.26 (0.21–0.34)	0.38 (0.29–0.50)
Mild liver disease	0.68 (0.56–0.83)	0.77 (0.63–0.95)
Moderate/severe liver disease	0.32 (0.20–0.50)	0.36 (0.22–0.58)
Paraplegia/hemiplegia	0.36 (0.29–0.45)	0.64 (0.50–0.82)
Peptic ulcer disease	0.61 (0.55–0.67)	0.87 (0.78–0.97)
Peripheral vascular disease	0.46 (0.43–0.50)	0.79 (0.72–0.86)
Renal disease	0.33 (0.30–0.36)	0.49 (0.43–0.54)
Rheumatologic disease	0.68 (0.59–0.77)	0.96 (0.84–1.11)

Note: CI = confidence interval, COPD = chronic obstructive pulmonary disease, MI = myocardial infarction, OR = odds ratio, ref = reference group.
*Adjusted based on all variables in the table.

Interpretation

In this large population-based study, we evaluated receipt of guideline-recommended angiography for acute MI among First Nations people. We found that First Nations patients were less likely to undergo coronary angiography after acute MI than non–First Nations patients, even after adjusting for differences in important sociodemographic variables. Further, First Nations patients had an increased risk of mortality after acute MI compared with non–First Nations patients. Given that early invasive interventions improve outcomes in ST elevation MI, and in some cases in non–ST elevation MI, efforts to improve access to angiography for First Nations patients may improve their long-term outcomes.[10–12,25–27] Our results provide insight into the treatment and outcomes of coronary disease in this high-risk population.

Prior studies have documented that First Nations people have less access to specialists than non–First Nations people for conditions treated medically and those requiring an invasive procedure.[31–34] Shah and colleagues[33] reported that relative utilization rates for referral care–sensitive procedures (i.e., procedures for which a referral from primary care is necessary to access the specialists or centres that provide the procedure)

were significantly lower in the Aboriginal than non-Aboriginal population in Ontario. Similarly, we found that First Nations patients were less likely than non–First Nations patients to undergo angiography, but were as likely to receive revascularization procedures once they had undergone angiography. This suggests that decisions for further management after angiography are applied similarly for First Nations and non–First Nations patients but that differences exist in decisions about angiography. This may be related to factors pertaining to the patient, provider or health care system. We also found that, despite similar revascularization rates, First Nations patients experienced worse survival after undergoing PCI or receiving medical management. The extent to which treatment gaps may be contributing to health inequities for various ethnic groups has been described.[35] Potential explanations for the treatment gaps are varied, ranging from cultural barriers for medication use to cost of therapies, urban versus rural location of residence and health care delivery that is not culturally sensitive.[36] Although we were able to adjust for distance to the closest cardiac catheterization laboratory in our analysis, differences in processes of

Table 3: Unadjusted and adjusted likelihood of coronary angiography (n = 46 764)*

Time since acute MI	Unadjusted OR/HR (95% CI)	Adjusted OR/HR (95% CI)	
		Partial adjustment†	Full adjustment‡
1 d	OR: 0.75 (0.64–0.88)	OR: 0.57 (0.48–0.67)	OR: 0.73 (0.62–0.87)
30 d	HR: 0.96 (0.88–1.04)	HR: 0.72 (0.66–0.78)	HR: 0.82 (0.76–0.90)
1 yr	HR: 0.99 (0.92–1.07)	HR: 0.74 (0.68–0.80)	HR: 0.83 (0.77–0.90)

Note: CI = confidence interval, HR = hazard ratio, OR = odds ratio, MI = myocardial infarction.
*Reference category is non–First Nations status.
†Adjusted for age, sex, diabetes, hypertension, year of acute MI diagnosis and comorbidities listed in Table 1.
‡Adjusted for age, sex, diabetes, hypertension, year of acute MI diagnosis, comorbidities listed in Table 1, distance to closest cardiac catheterization laboratory and income quintiles.

Table 4: Coronary anatomy, ejection fraction and smoking status, by treatment after angiography and First Nations status

Variable	CABG			PCI			Medical management		
	Non–First Nations, % (n = 4 179)	First Nations, % (n = 108)	p value	Non–First Nations, % (n = 17 503)	First Nations, % (n = 381)	p value	Non–First Nations, % (n = 7 970)	First Nations, % (n = 217)	p value
Coronary anatomy			0.7			0.02			0.002
Normal	0.2	0.0		0.3	1.3		7.8	14.7	
Minimal disease*	0.3	0.0		0.8	0.5		13.1	14.3	
Low risk	10.7	14.8		64.0	64.3		40.5	42.9	
High risk	58.8	60.2		31.9	29.4		29.6	19.8	
Left main	29.4	25.0		2.2	3.1		7.9	7.4	
Missing	0.6	0.0		0.6	1.3		1.2	0.9	
Ejection fraction, %			0.4			0.001			0.07
> 50	45.7	45.4		53.1	46.7		52.9	47.0	
35–50	32.6	35.2		27.5	26.5		24.8	22.6	
< 35	9.5	12.0		4.8	8.7		9.2	12.0	
Ventriculogram not done	8.2	3.7		9.3	12.1		7.9	10.1	
Missing	4.0	3.7		5.4	6.0		5.2	8.3	
Smoking status			< 0.001			< 0.001			< 0.001
No smoking	34.5	17.6		34.9	17.8		37.9	22.1	
Prior smoking	34.0	32.4		27.0	19.2		31.2	22.1	
Present smoking	31.5	50.0		38.1	63.0		31.0	55.8	

Note: CABG = coronary artery bypass grafting, PCI = percutaneous coronary intervention.
*Defined as a lesion with less than 50% stenosis.

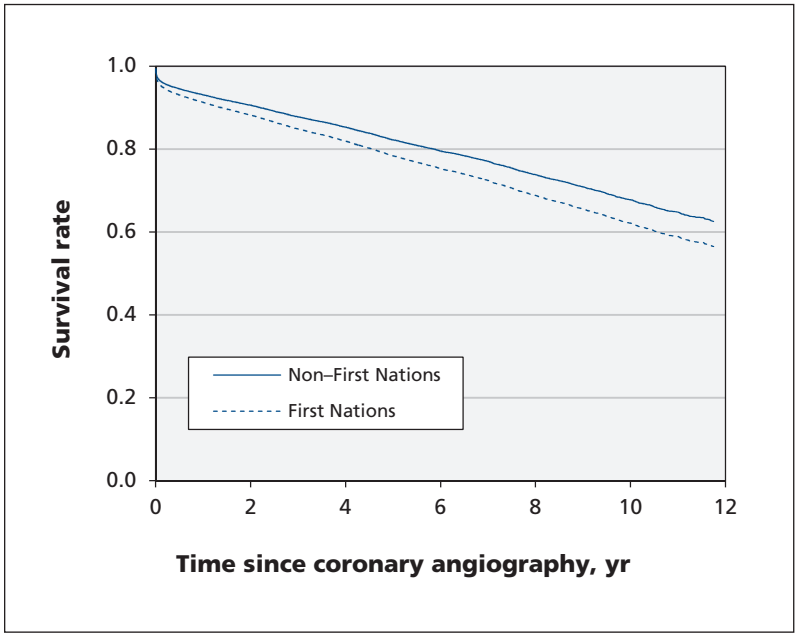

Figure 1: Survival rate after coronary angiography among First Nations and non–First Nations patients, adjusted for treatment type (percutaneous coronary intervention, coronary artery bypass grafting, no revascularization), age, sex, diabetes, hypertension, comorbidities, year of acute myocardial infarction diagnosis, quintile of median household income, driving distance to the closest cardiac catheterization laboratory, ejection fraction, smoking status and coronary anatomy.

care and follow-up for First Nations people, such as access to cardiac rehabilitation programs, may be contributing to their increased likelihood of mortality after acute MI.

Strengths and limitations

The strengths of our study include its population-based design spanning more than a decade, and detailed clinical information, which permitted us to adjust for important prognostic factors.

Our study also has important limitations. It is likely that some First Nations patients were identified as non–First Nations if they were not registered under the Indian Act. Therefore, our results may not be generalizable to the overall Aboriginal population, or to First Nations people who are not registered under the Indian Act.[17] However, according to the 2006 Canadian census, 81% of the self-identified First Nations population are registered under the Indian Act.[18]

Our data set does not contain complete information on receipt of medications for acute MI, including long-term therapies such as angiotensin receptor blockers or angiotensin-converting enzyme inhibitors, β-blockers, antiplatelet agents and statins, or acute therapies such as thrombolytics.[37] As a result, we were unable to assess

Table 5: Hazard ratios for likelihood of percutaneous coronary intervention and coronary artery bypass grafting after coronary angiography (*n* = 30 358)*

	No. (%) of patients			Adjusted HR (95% CI)	
Treatment	Non–First Nations (*n* = 29 652)	First Nations (*n* = 706)	Unadjusted HR (95% CI)	Partial adjustment†	Full adjustment‡
PCI	17 503 (59.0)	381 (54.0)	0.89 (0.80–0.98)	0.89 (0.80–0.99)	0.92 (0.83–1.02)
CABG	4 179 (14.1)	108 (15.3)	0.96 (0.79–1.16)	1.04 (0.86–1.25)	1.03 (0.85–1.25)

Note: CABG = coronary artery bypass grafting, CI = confidence interval, HR = hazard ratio, MI = myocardial infarction, PCI = percutaneous coronary intervention.
*Reference category is non–First Nations status.
†Adjusted for age, sex, diabetes, hypertension, year of acute MI diagnosis, comorbidities listed in Table 1, ejection fraction, smoking status and coronary anatomy.
‡Adjusted for age, sex, diabetes, hypertension, year of acute MI diagnosis, comorbidities listed in Table 1, ejection fraction, smoking status, coronary anatomy, income quintiles and distance to closest cardiac catheterization laboratory.

Table 6: Hazard ratios for all-cause mortality after coronary angiography (*n* = 30 358), by treatment subgroup*

	No. (%) of patients			Adjusted HR (95% CI)	
Treatment	Non–First Nations (*n* = 29 652)	First Nations (*n* = 706)	Unadjusted HR (95% CI)	Partial adjustment†	Full adjustment‡
Medical management	2 365 (8.0)	61 (8.6)	0.99 (0.76–1.28)	1.40 (1.09–1.80)	1.38 (1.07–1.77)
PCI	2 672 (9.0)	69 (9.8)	1.24 (0.98–1.57)	1.38 (1.06–1.80)	1.38 (1.06–1.80)
CABG	997 (3.4)	17 (2.4)	0.67 (0.42–1.07)	0.89 (0.55–1.44)	0.91 (0.56–1.47)

Note: CABG = coronary artery bypass grafting, CI = confidence interval, HR = hazard ratio, MI = myocardial infarction, PCI = percutaneous coronary intervention.
*Reference category is non–First Nations.
†Adjusted for age, sex, diabetes, hypertension, year of acute MI diagnosis, comorbidities listed in Table 1, ejection fraction, smoking status and coronary anatomy.
‡Adjusted for age, sex, diabetes, hypertension, year of acute MI diagnosis, comorbidities listed in Table 1, ejection fraction, smoking status, coronary anatomy, income quintiles and distance to closest cardiac catheterization laboratory.

whether there was a difference in receipt of medications between First Nations and non–First Nations patients.

We were unable to differentiate between ST elevation MI and non–ST elevation MI in our full study cohort (i.e., those identified as having acute MI based on International Classification of Diseases codes). Recognizing that treatment can differ for these 2 events,[10–12,25–27] particularly timing of cardiac catheterization, we evaluated likelihood of receipt of angiography at different time points (1 d, 30 d and 1 yr) in both our full cohort and in our subgroup of patients identified with ST elevation MI who underwent angiography (i.e., those identified as having ST elevation MI using APPROACH data).

We were unable to account for patient or provider preferences, or other factors that may explain differences in receipt of angiography. We do not believe this negates our study results, given that the primary aim of our study was to evaluate likelihood of angiography following acute MI.

Conclusion

We found that First Nations patients were less likely than non–First Nations patients to receive coronary angiography after hospital admission for acute MI, but were equally likely to receive revascularization after angiography. Survival, however, was worse among First Nations patients after angiography. Given the benefit of invasive intervention in people with acute MI, efforts to improve access to angiography after acute MI among First Nations patients along with the use of medical therapy that has been proven effective may improve outcomes.

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