

# Thirty-day in-hospital revascularization and mortality rates after acute myocardial infarction in seven Canadian provinces

Helen Johansen PhD<sup>1</sup>, Susan E Brien PhD<sup>2</sup>, Philippe Finès PhD<sup>1</sup>, Julie Bernier MSc<sup>1</sup>, Karin Humphries MSc MBA DSc<sup>3</sup>, Therese A Stukel PhD<sup>4</sup>, William A Ghali MD MPH<sup>2</sup>; for the Canadian Cardiovascular Outcomes Research Team

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**BACKGROUND:** Recent clinical trials have demonstrated benefit with early revascularization following acute myocardial infarction (AMI). Trends in and the association between early revascularization after (ie, 30 days or fewer) AMI and early death were determined.

**METHODS AND RESULTS:** The Statistics Canada Health Person-Oriented Information Database, consisting of hospital discharge records for seven provinces from the Canadian Institute for Health Information Hospital Morbidity Database, was used. If there was no AMI in the preceding year, the first AMI visit within a fiscal year for a patient 20 years of age or older was included. Times to death in hospital and to revascularization procedures were counted from the admission date of the first AMI visit. Mixed model regression analyses with random slopes were used to assess the relationship between early revascularization and mortality. The overall rate of revascularization within 30 days of AMI increased significantly from 12.5% in 1995 to 37.4% in 2003, while the 30-day mortality rate decreased significantly from 13.5% to 10.6%. There was a linearly decreasing relationship – higher regional use of revascularization was associated with lower mortality in both men and women.

**CONCLUSIONS:** These population-based utilization and outcome findings are consistent with clinical trial evidence of improved 30-day in-hospital mortality with increased early revascularization after AMI.

**Key Words:** Acute myocardial infarction; Administrative data; Mortality; Outcomes research; Revascularization

The treatment of acute myocardial infarction (AMI) has evolved considerably over the past 20 years, most notably with the introduction of pharmacological reperfusion therapy and, more recently, acute revascularization procedures (1-3). For the latter, a systematic review of randomized trials comparing the use of angioplasty versus intravenous thrombolytic therapy for ST segment elevation AMI concluded that primary percutaneous coronary intervention (PCI) is more efficacious in reducing short-term mortality than thrombolytic therapy (4). With respect to patients with non-ST segment elevation AMI or unstable angina, early invasive treatment strategies (ie, angiography and revascularization via PCI or coronary artery bypass graft [CABG] surgery) within seven days of admission with AMI have also been shown to have a greater sustained reduction in mortality and morbidity compared with a noninvasive, primarily medical management approach (5-9).

Despite the evidence from these clinical trials, it is not clear whether a strategy of early invasive treatment has been widely adopted to treat AMI or whether a strategy of early revascularization has improved 30-day in-hospital mortality after AMI in usual care settings outside of clinical trials. Using national hospital discharge data

## Taux de revascularisation et de mortalité perhospitalières à 30 jours après l'infarctus du myocarde dans sept provinces canadiennes

**HISTORIQUE :** De récents essais cliniques ont démontré l'avantage d'une revascularisation précoce après l'infarctus aigu du myocarde (IAM). Les tendances quant à la revascularisation précoce (c.-à-d., après 30 jours ou moins) dans l'IAM et son lien avec la mortalité précoce ont été déterminés.

**RÉSULTATS :** Les auteurs ont utilisé la Base de données sur la santé orientée vers la personne de Statistique Canada, composée des dossiers de congés hospitaliers pour sept provinces de la Base de données sur la morbidité de l'Institut canadien d'information sur la santé. En l'absence d'IAM au cours de l'année précédente, les premières visites pour IAM à l'intérieur d'une année fiscale pour les patients de 20 ans ou plus ont été compilées. Le temps avant décès à l'hôpital ou avant revascularisation a été calculé à partir de la date de l'admission lors d'une première visite pour IAM. Les auteurs ont procédé à des analyses de régression selon un modèle mixte avec courbes aléatoires afin d'évaluer le lien entre la revascularisation précoce et la mortalité. Le taux global de revascularisation dans les 30 jours suivant l'IAM a significativement augmenté, de 12,5 % en 1995 à 37,4 % en 2003, tandis que le taux de mortalité à 30 jours a significativement diminué de 13,5 % à 10,6 %. On a noté un lien linéairement décroissant – l'utilisation régionale plus élevée de la revascularisation a été associée à une mortalité moindre chez les hommes et chez les femmes.

**CONCLUSIONS :** Ces résultats basés dans la population sur l'utilisation et l'issue de l'intervention concordent avec les conclusions des essais cliniques quant à l'amélioration de la mortalité perhospitalière dans les 30 jours associée à un taux plus élevé de revascularisation précoce après l'IAM.

describing care in seven Canadian provinces, the present study assessed trends in the use of early (ie, within 30 days) revascularization after hospitalization with AMI at a population level, investigated provincial and sex differences, and investigated the association between early revascularization and 30-day in-hospital mortality following AMI. Findings from these analyses will contribute to the existing literature by demonstrating the extent to which the evidence from clinical trials is being adopted in usual AMI care, and whether the benefits observed in clinical trials are also observed in usual care settings. Some earlier work by health region for the first and last year has been published previously (10).

## METHODS

### Data sources

The Health Person-Oriented Information Database, created by Statistics Canada and built using data from the Canadian Institute for Health Information Hospital Morbidity Database, was used for the present study. This database contains records of hospital use by individual patients in all Canadian provinces, excluding newborns, patients who

<sup>1</sup>Statistics Canada, Ottawa, Ontario; <sup>2</sup>University of Calgary, Calgary, Alberta; <sup>3</sup>University of British Columbia, Vancouver, British Columbia;

<sup>4</sup>Institute for Clinical Evaluative Sciences, Toronto, Ontario

Correspondence: Dr Helen Johansen, Health Analysis Division, RH Coats Building, 24th floor, Statistics Canada, 100 Tunney's Pasture Driveway, Ottawa, Ontario K1A 0T6. Telephone 613-951-4273, fax 613-951-3959, e-mail helen.johansen@statcan.gc.ca

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are not residents of a Canadian province, and those without a usable patient identification number.

#### Data sources and study variables

Provinces studied included Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and Alberta. Prince Edward Island was excluded because it does not provide in-province revascularization. Newfoundland and Labrador was excluded because it had inconsistent coding for AMI over the time period studied. British Columbia was excluded because of differences in the coding of patients who died in hospital.

The *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) and *The Canadian Enhancement of The International Classification of Diseases, Tenth Revision* (ICD-10-CA) were used. Patients were included if they were admitted to a hospital with a most responsible diagnosis of AMI (ICD-9-CM 410; ICD-10-CA I21 or I22) or if they had a coronary artery disease code as the most responsible diagnosis (ICD-9-CM 414; ICD-10-CA I251) and AMI in any other diagnostic code position plus a revascularization procedure. Moreover, AMI events that occurred in the four- to eight-week period following an earlier AMI were not included so that AMIs coded by ICD-9-CM would be consistent with AMIs coded by ICD-10-CA (11-14). Revascularization includes two types of procedures: PCI (ICD-9-CM 36.01, 36.02, 36.05; ICD-10-CA/Canadian Classification of Health Interventions 1.IJ.26, 1.IJ.50, 1.IJ.57) and CABG surgery (ICD-9-CM 36.1; ICD-10-CA/Canadian Classification of Health Interventions 1.IJ.76). Patient comorbidity was characterized using the Charlson comorbidity index derived using the ICD-9-CM to ICD-10-CA coding algorithm conversions developed by Quan et al (15).

Within the seven jurisdictions, the first AMI visit within a fiscal year for a patient 20 years of age or older was included. Patients were excluded if they had been hospitalized with AMI within the preceding year. This was done to derive a homogeneous patient population with new AMI events. The selected patients were followed for one year to determine the occurrence of revascularization procedures and in-hospital mortality.

#### Statistical analyses

Average age, Charlson comorbidity index and length of stay were determined for men and women, both separately and together. Linear regression models were used to test trends for mean values of patient characteristics. Direct standardization by five-year age group and sex was performed for both 30-day revascularization and 30-day mortality rates for each province and each year. The standard population used was the population of AMI patients in the seven studied provinces in fiscal year 1995. Linear regression analyses were performed to test for linear trends.

Although individual data were obtained, an ecological study design was used to investigate the relationship between revascularization and death within 30 days. Data were not analyzed at the individual level because there would be both selection bias regarding who gets revascularized and survival bias because some patients would not have survived long enough to receive therapy. A scatter plot of provincial age-standardized 30-day mortality versus 30-day revascularization rates for each year, by province, was plotted separately for men and women. The methodology was standard. A mixed-effects linear model of 30-day mortality as a function of 30-day revascularization was built to describe the relationship observed in the scatter plot. In this model, a random effect of the province was taken into account due to the high variability between provinces. The model chosen had a random effect on the slopes of the provinces and fixed intercept. It was preferred over three other models (a model with a random effect on the intercept and a fixed slope, a model with random effects both on the intercept and on the slope, and a model with fixed effects on both the intercept and the slope) because it produced the lowest value of Akaike's information criterion. Each province was weighted equally in the regression. Thus, the trends were not driven by the larger provinces.

SAS version 9.1.3 (SAS Institute Inc, USA), particularly PROC MIXED (16), was used for analysis.

## RESULTS

### Description of the AMI case population

Overall, there were 400,384 AMI patients 20 years of age and older from the nine-year period and seven provinces studied (Table 1). Among these, 258,133 were men and 142,251 were women. The average age of AMI patients was 63.8 years for men and 71.7 years for women in 1995, and 64.9 years for men and 73.4 years for women in 2003. There was also a significant increase in the average Charlson comorbidity index score (1.8 in 1995 versus 2.0 in 2003).

Despite the increase in age and the average Charlson comorbidity index score, the average length of hospital stay decreased over time (10.8 days in 1995 versus 9.8 days in 2003) and the in-hospital mortality rate within 30 days of AMI also decreased significantly over the study period (13.5% in 1995 versus 10.6% in 2003). These significant changes over time occurred for both men and women (Table 1).

### Use of revascularization within 30 days

The overall rate of revascularization within 30 days of AMI increased significantly from 12.5% in 1995 to 37.4% in 2003 (Table 1). In the 30 days after hospitalization for AMI, 8.6% of AMI patients underwent PCI, and 4.6% had CABG surgery in 1995. By 2003, these rates increased to 30.6% and 8.1%, respectively. An increased rate of PCI relative to CABG surgery was also observed during the time frame studied, indicating an increased preference for PCI as the method for revascularization. Both men and women experienced significant increases in revascularization rates over the study period, and for both sexes, PCI rates were greater than CABG surgery rates (Table 1). However, the rate of revascularization in men remained higher than in women in 2003 (43.3% versus 27.1%).

A significant increase in revascularization rate was found for each of the seven jurisdictions (Figure 1A). Saskatchewan and Quebec had the greatest increases in revascularization rates (from 17.5% in 1995 to 52.5% in 2003, and 14.7% in 1995 to 47.6% in 2003, respectively). Manitoba, meanwhile, had the smallest rate change, from 15.5% to 32.0% (Appendix 1).

Variability in revascularization rates across provinces was still apparent in 2003 (Figure 1A). For the most part, provinces with higher revascularization rates in 1995 continued to have higher rates in 2003. In 2003, Saskatchewan had the highest revascularization rate (52.5%), followed by Alberta (51.3%). Manitoba had the lowest revascularization rate (32.0%) (Appendix 1).

Both PCI and CABG rates increased over time in all provinces studied, except for CABG rates in New Brunswick (Appendix 1). The rate of increase was greater for PCI as shown by the PCI/CABG surgery ratios, which increased from 1.9 to 3.8 over the study years (Table 1).

### Thirty-day in-hospital mortality trends after AMI

Age-standardized hospital mortality rates 30 days after hospitalization for AMI decreased significantly in both men and women from 1995 to 2003 (Figure 1B and Appendix 1). Furthermore, age- and sex-standardized 30-day in-hospital mortality rates after AMI hospitalization decreased significantly between 1995 and 2003 in all jurisdictions (Figure 1B). In 2003, the lowest 30-day in-hospital mortality rate was in Alberta (7.1%) and the highest was in New Brunswick (11.5%) (Appendix 1).

### Relationship between provincial revascularization rates and mortality

The scatter plot depicting the relationship between age-standardized provincial 30-day mortality rates versus revascularization rates illustrates an overall decline in mortality with an increasing revascularization rate over the study period in both men and women (Figure 2). While the relationship between revascularization and mortality was scattered both within and between provinces, there was an overall association of improvement in survival with increased procedures. When the age-standardized rates (one data point per province and year for men and women separately) for 30-day revascularization and death were put into a mixed effects, random-slope model, the overall

**TABLE 1**  
**Characteristics of patients 20 years of age and older who were hospitalized with acute myocardial infarction (AMI) in seven Canadian provinces by sex and year**

Men and women combined	1995	1996	1997	1998	1999	2000	2001	2002	2003	Linear slope*
Patients, n	42,156	43,599	43,233	42,635	43,762	45,390	46,132	46,742	46,735	605
Age, years, mean	66.6	66.9	66.9	67.2	67.3	67.6	67.9	67.8	68.0	0.17
Female, %	35.0	35.2	35.3	34.8	35.8	35.6	36.0	35.5	36.3	0.13
Charlson index, mean	1.8	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	0.02
Length of stay, days, mean	10.8	10.4	10.1	10.0	10.2	10.3	10.2	10.0	9.8	-0.07
30-day revascularization rate†	12.5	13.5	15.4	18.8	21.5	24.8	29.1	35.5	37.4	3.32
30-day PCI rate†	8.6	9.2	10.6	13.5	15.9	19.0	22.7	29.1	30.6	2.95
30-day CABG rate†	4.6	4.9	5.4	5.9	6.4	6.7	7.3	8.0	8.1	0.46
PCI/CABG ratio	1.9	1.9	2.0	2.3	2.5	2.8	3.1	3.6	3.8	0.26
30-day in-hospital mortality rate†	13.5	13.1	12.7	12.4	12.2	11.4	11.1	10.8	10.6	-0.38
<b>Men</b>										
Patients, n	27,384	28,234	27,963	27,783	28,102	29,231	29,507	30,147	29,782	331
Age, years, mean	63.8	64.1	64.2	64.4	64.4	64.6	64.9	64.7	64.9	0.13
Charlson index, mean	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	0.02
Length of stay, days, mean	10.2	10.0	9.6	9.5	9.7	9.8	9.7	9.6	9.3	-0.07
30-day revascularization rate†	14.4	15.5	17.5	21.2	24.2	28.4	33.5	41.0	43.3	3.85
30-day PCI rate†	9.7	10.4	11.9	14.9	17.7	21.4	25.8	33.3	35.0	3.40
30-day CABG rate†	5.4	5.7	6.4	6.9	7.5	7.9	8.7	9.4	9.8	0.57
PCI/CABG ratio	1.8	1.8	1.9	2.2	2.4	2.7	2.9	3.5	3.6	0.25
30-day in-hospital mortality rate†	10.9	10.4	10.3	10.1	9.8	9.0	9.3	8.8	8.6	-0.29
<b>Women</b>										
Patients, n	14,772	15,365	15,270	14,852	15,660	16,159	16,625	16,595	16,953	274
Age, years, mean	71.7	72.1	72.0	72.6	72.5	73.0	73.1	73.4	73.4	0.22
Charlson index, mean	1.9	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.1	0.03
Length of stay, days, mean	11.8	11.2	11.0	10.9	11.0	11.1	11.1	10.9	10.7	-0.08
30-day revascularization rate†	9.2	9.9	11.4	14.3	16.7	18.3	21.1	25.7	27.1	2.38
30-day PCI rate†	6.6	7.0	8.4	10.8	12.8	14.6	17.1	21.4	22.9	2.16
30-day CABG rate†	3.0	3.5	3.5	4.1	4.5	4.5	4.7	5.4	5.1	0.28
PCI/CABG ratio	2.2	2.0	2.4	2.7	2.8	3.2	3.6	4.0	4.5	0.30
30-day in-hospital mortality rate†	18.3	18.1	17.1	16.9	16.4	15.9	14.4	14.5	14.0	-0.58

\*All trends are statistically significant at  $P < 0.05$ ; †Rate per 100 AMI patients. CABG Coronary artery bypass graft; PCI Percutaneous coronary intervention

trend in revascularization rates versus mortality rates in the 30 days following AMI demonstrated a linear decrease over the time period (1995 to 2003). For men, the mortality rate as a function of revascularization rate was as follows:

$$\text{Mortality rate} = 13.7 - 0.107 * \text{revascularization rate.}$$

That is, for every 1% increase in revascularization rate, the mortality rate was decreased by 0.107% in men. For women, there was a significantly greater decrease in mortality with increased revascularization:

$$\text{Mortality rate} = 16.1 - 0.176 * \text{revascularization rate.}$$

That is, for every 1% increase in revascularization rate, there was a corresponding 0.176% decrease in mortality rate in women (Figure 2).

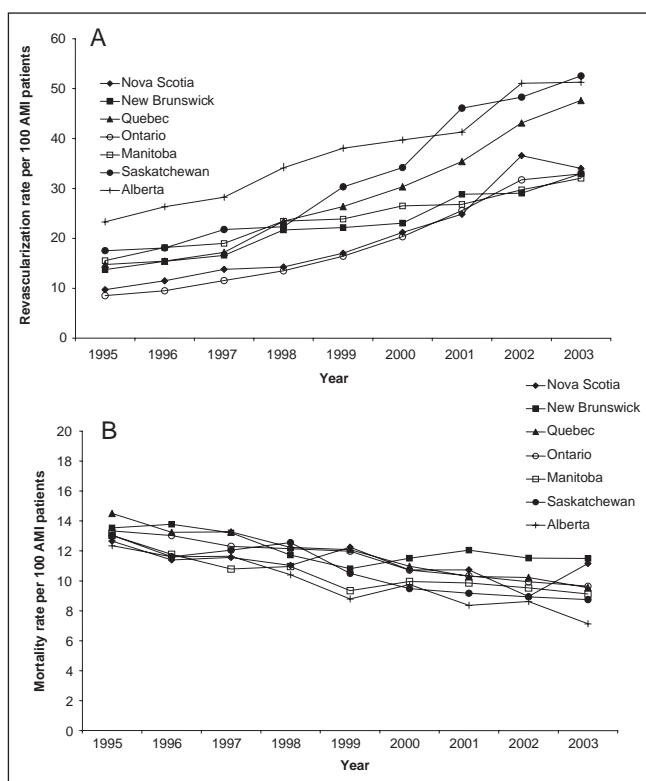
## DISCUSSION

Using a nationally representative database, we have demonstrated a marked increase in the use of revascularization (ie, PCI and CABG surgery) within 30 days of AMI over a nine-year study period that is accompanied by a temporal improvement in 30-day in-hospital mortality (ie, decrease in mortality rate). These general findings were seen in both men and women. Furthermore, a positive correlation between improved 30-day in-hospital mortality and increased early revascularization rates was demonstrated across all jurisdictions.

Our findings demonstrate a general uptake of evidence-based practice on a national scale. Over the nine-year study period (1995 to 2003), the rate of revascularization in AMI patients within 30 days of the event increased significantly across all jurisdictions. This study period

encompasses publication of many studies including randomized trials, narrative reviews and systematic reviews comparing revascularization with medical thrombolysis treatment for AMI (2,4,8,17). Furthermore, the American Heart Association/American College of Cardiology practice guidelines for the management of patients with AMI were first published in 1996 and updated in 1999 (18), stating early revascularization after AMI as the optimal care practice (19). This suggests that over the study period, the evidence published in the literature and endorsed via practice guidelines were increasingly adopted as usual care practices for the treatment of AMI.

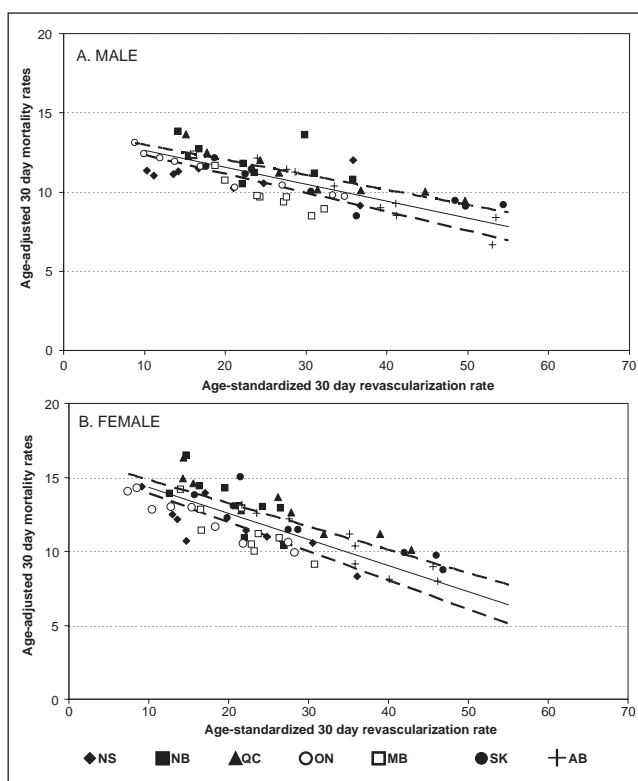
Despite the improved 30-day in-hospital mortality rate observed across all jurisdictions included in the study, there were still variations in early revascularization and survival rates across provinces. Furthermore, there is still a difference in revascularization rates between men and women, which was consistent across the nine-year study period that may or may not be clinically appropriate. Despite the uptake of early revascularization strategies in response to the demonstration of improved outcomes with early revascularization in trials such as existing primary PCI studies (2,4,9), and in trials such as the Fast Revascularization during InStability in Coronary artery disease (FRISC) trial (5,6), the Treat Angina with Aggrastat and Determine Cost of Therapy with an Invasive or Conservative Strategy (TACTICS) trial (8) and the Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications (CADILLAC) trial (20), there still may not be a widespread endorsement of early revascularization for all AMI patients. Thus, there may remain room for improvement in the early treatment of AMI. The present findings have implications for randomized trials such as TACTICS, FRISC and



**Figure 1** **A** Age-standardized rates of revascularization within 30 days of hospitalization for acute myocardial infarction (AMI), 1995 to 2003. **B** Age-standardized in-hospital mortality rates within 30 days following hospitalization for AMI, 1995 to 2003. For data values, see Appendix 1

CADILLAC (and ensuing authoritative systematic reviews [4,9]) that demonstrate benefit from early revascularization after AMI (2,5,6,8,20). Our findings demonstrate trends consistent with a benefit of early revascularization after AMI in the context of usual care and at a population level when examined at the provincial level over time, but alternative interpretations are also implicated. They also corroborate those of Stenestrand and Wallentin (21) who, using AMI patient registry data, demonstrated an increase in early revascularization and similarly improved outcomes after AMI. Therefore, outside of the randomized trial settings, we have demonstrated a correlation between increasing revascularization rates and decreasing 30-day in-hospital mortality rates that is consistent with other studies that have demonstrated improved outcomes with early revascularization after AMI in a nationally representative, population-based group of AMI patients.

The scatter plot shown in Figure 2 supports the need to consider factors other than the receipt of revascularization to account for the lowering hospital mortality rate in AMI patients over time. Not surprisingly, our earlier study (10) performed at a subprovincial health region level found higher variations in this relationship. We speculate that this effect could arise from a combination of factors including better prehospital care, improved and faster diagnosis of AMI and improved use of various medical therapies, such as beta-blockers and statins, in the initial period of hospitalization for AMI (18,22). Another possible explanation could be the increased use of preventive therapy for AMI as a result of the publication of numerous trials and guidelines (23-27) for the treatment of cardiovascular disease risk factors such as hypertension and dyslipidemia. Evidence is emerging to suggest that long-term treatment of cardiovascular disease patients with angiotensin-converting enzyme inhibitors or statins may have beneficial, long-term effects beyond their immediate indications (28,29). Therefore, it is possible that these effects of preventive therapies may attenuate ischemic damage and, thus, improve outcomes in patients receiving them before an AMI.



**Figure 2** Age-standardized 30-day in-hospital mortality rates versus age-standardized 30-day revascularization rates by sex and seven provinces from 1995 to 2003 in Canada. Nine yearly points are plotted per province. The mean trend line from random-slope mixed model (solid line) with upper and lower limits (dashed lines) is shown. AB Alberta; MB Manitoba; NB New Brunswick; NS Nova Scotia; ON Ontario; QC Quebec; SK Saskatchewan. Data from Statistics Canada

**Limitations**

The current study has several limitations, predominantly relating to the administrative data source that was used. The present study has standard ecological study limitations, in which inferences cannot be made to the outcomes of individual patients but, rather, to the ‘average’ AMI patient residing in each region. Clinical factors such as type of AMI and severity (size of infarct and ejection fraction) are not captured in this database, making it difficult to directly link our findings to those of the FRISC and TACTICS trials for non-ST elevation myocardial infarction and thrombolysis versus PCI trials for ST elevation myocardial infarction. Information regarding treatment processes outside of revascularization procedures, such as time to thrombolysis or medication administration on admission, was not available in the administrative data. Finally, our outcome analysis was confined to follow-up deaths occurring in hospital facilities. We were not able to link the administrative data to longitudinal mortality databases to capture any deaths that might have occurred outside of acute care hospitals, and reductions in length of stay equate to a decreased chance of dying in hospital. However, the 30-day in-hospital mortality rate has been shown to be a good estimate of the total 30-day mortality rate (30). Weighing against these shortcomings are some important strengths including the multijurisdictional nature of the data and the fact that the data represent an entire population of AMI patients.

Another study limitation is that the data that we accessed for the present study only extended to calendar year 2003 – the final year of data that were available to us through Statistics Canada. As such, there is a need to consider factors in recent years that may have affected revascularization rates (PCI and CABG surgery). These include drug-eluting stents, which were introduced as an innovative technology that reduces rates of target-vessel restenosis and, thus,

repeat PCI procedures (31). They have also, perhaps, increased the number of patients undergoing PCI rather than CABG surgery, even in the context of complex lesions that might have previously been shunted toward CABG surgery (32). A second important development is that Canadian provinces have infused substantial dollars into tertiary care cardiac services to reduce waiting times and increase access to revascularization (33). Collectively, such factors are likely to have influenced rates of PCI and CABG surgery after acute coronary syndromes in unpredictable ways that make speculation about subsequent revascularization trends challenging.

## CONCLUSIONS

We present results showing improved 30-day in-hospital mortality rates and greater rates of 30-day revascularization after AMI from a population-based analysis of early AMI patients. These results are consistent with the evidence reported in clinical trials. Furthermore, we present data from seven Canadian provinces that provide a snapshot of early AMI

care and short-term in-hospital mortality rates across most of the country. This information is useful for the development of effective AMI treatment strategies and highlights the persisting need for improvement in care following AMI.

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**DISCLOSURES:** The authors have no competing interests.

## APPENDIX 1

### Age- and sex-standardized 30-day in-hospital mortality rate and 30-day rate of revascularization types in patients 20 years of age and older hospitalized with acute myocardial infarction by province (seven provinces) and year (1995 to 2003) in Canada

30-day in-hospital mortality rate	1995	1996	1997	1998	1999	2000	2001	2002	2003	Linear slope*
Nova Scotia	12.7	11.4	11.6	11.0	12.2	10.7	10.7	8.9	11.2	-0.26*
New Brunswick	13.5	13.8	13.2	11.7	10.8	11.5	12.1	11.5	11.5	-0.29*
Quebec	14.5	13.2	13.3	12.2	12.1	11.0	10.3	10.2	9.5	-0.6*
Ontario	13.3	13	12.3	12.2	12.0	10.7	10.3	9.9	9.6	-0.49*
Manitoba	13.0	11.8	10.8	11.0	9.3	9.9	9.8	9.5	9.1	-0.42*
Saskatchewan	13.0	11.6	12.0	12.6	10.5	9.5	9.2	8.9	8.7	-0.57*
Alberta	12.3	11.6	11.6	10.4	8.8	9.8	8.4	8.6	7.1	-0.62*
<b>30-day revascularization rate</b>										
Nova Scotia	9.7	11.5	13.8	14.2	17.0	21.2	24.8	36.6	34.0	3.4*
New Brunswick	13.7	15.4	16.6	21.7	22.2	23.0	28.8	29.1	33.0	2.4*
Quebec	14.7	15.4	17.2	23.4	26.4	30.3	35.4	43.1	47.6	4.3*
Ontario	8.5	9.5	11.5	13.5	16.4	20.3	25.6	31.7	32.9	3.3*
Manitoba	15.5	18.2	19.0	23.4	23.9	26.5	26.8	29.7	32.0	2.0*
Saskatchewan	17.5	18.1	21.8	22.3	30.3	34.2	46.1	48.3	52.5	4.9*
Alberta	23.3	26.3	28.3	34.2	38.1	39.7	41.3	51.1	51.3	3.6*
<b>30-day CABG rate</b>										
Nova Scotia	4.4	4.4	4.8	5.0	5.5	4.7	6.5	8.9	7.9	0.51*
New Brunswick	5.2	5.4	4.3	4.3	5.9	5.2	5.9	5.5	5.2	0.07*
Quebec	4.6	4.7	5.2	6.3	6.2	6.7	7.4	9.1	9.9	0.65*
Ontario	4.1	4.7	5.3	5.7	6.5	7.2	7.7	7.9	8.0	0.53*
Manitoba	6.9	7.6	8.0	9.6	8.9	8.3	9.1	8.2	10.3	0.27*
Saskatchewan	4.6	4.3	6.9	5.5	7.1	8.9	9.2	10.4	11.6	0.91*
Alberta	5.4	6.7	6.0	7.4	9.1	7.8	9.2	9.9	8.7	0.49*
<b>30-day PCI rate</b>										
Nova Scotia	5.7	7.5	9.5	9.8	12.0	16.7	19.9	30.3	27.9	3.08*
New Brunswick	8.9	10.3	12.4	17.7	16.6	17.9	23.7	24.2	28.4	2.37*
Quebec	11.0	11.4	12.7	17.9	21.3	24.9	29.0	35.4	39.4	3.75*
Ontario	4.9	5.3	6.7	8.3	10.7	13.9	18.5	25.4	26.0	2.90*
Manitoba	9.5	11.3	11.7	15.0	15.9	18.9	18.5	22.1	22.6	1.71*
Saskatchewan	14.4	15.0	16.1	18.0	24.3	26.7	39.6	41.8	44.6	4.28*
Alberta	18.7	20.8	23.0	27.9	30.2	33.0	33.3	43.7	44.3	3.28*
<b>30-day PCI/CABG rate</b>										
Nova Scotia	1.3	1.7	2.0	1.9	2.2	3.6	3.1	3.4	3.5	0.30*
New Brunswick	1.7	1.9	2.9	4.1	2.8	3.4	4.0	4.4	5.5	0.40*
Quebec	2.4	2.4	2.4	2.8	3.4	3.7	3.9	3.9	4.0	0.24*
Ontario	1.2	1.1	1.3	1.5	1.7	1.9	2.4	3.2	3.2	0.29*
Manitoba	1.4	1.5	1.5	1.6	1.8	2.3	2.0	2.7	2.2	0.15*
Saskatchewan	3.1	3.5	2.3	3.3	3.4	3.0	4.3	4.0	3.8	0.13*
Alberta	3.4	3.1	3.8	3.8	3.3	4.2	3.6	4.4	5.1	0.18*

Data presented as %. \*Trend is significant at  $P < 0.05$ . CABG Coronary artery bypass graft; PCI Percutaneous coronary intervention

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