Performance of comorbidity indices in measuring outcomes after acute myocardial infarction in Australia Indigenous and non-Indigenous patients

Condon, John; YOU, J; Mcdonnell, Joseph

Published in:
Internal Medicine Journal

DOI:
10.1111/j.1445-5994.2011.02539.x

Published: 01/07/2012

Document Version
Peer reviewed version

Received Date: 22-Nov-2010

Accepted Date: 28-Apr-2011

The performance of co-morbidity indices in measuring outcomes after acute myocardial infarction in Australia Indigenous and non-Indigenous patients

Short title: AMI co-morbidity and survival.

John R Condon MPH, PhD, FAFPHM, Principal Research Fellow (1,2)

Jiqiong You, MSc, MBA, MB BSc, Research Officer (1)

Joseph McDonnell, MSc, Statistician (2).

(1) Health Gains Planning, Department of Health and Families, Northern Territory Government

(2) Menzies School of Health Research, Charles Darwin University.

Correspondence

John R Condon, Health Gains Planning, Department of Health and Families

Postal Address: PO Box 40596, Casuarina, NT 0811

e-mail: john.condon@menzies.edu.au

Tel: +61 3 9819 2245

Fax: +61 8 8985 8075

Word count for the main text: 3070

Word count of the abstract: 249

Authors' contributions

Intellectual planning: JY 65%, JRC 30%, JM 5%

Experimental work: JY 90%, JRC 10%, JM 0%

Intellectual analysis of data: JY 50%, JRC 40%, JM 10%

Writing paper: JY 30%, JRC 65%, JM 5%

Abstract

Background

Indigenous Australians have higher prevalence of chronic diseases and worse acute care outcomes than other Australians. The extent to which higher chronic disease co-morbidity levels are responsible for their worse outcomes is not clear, and the performance of co-morbidity indices has not been assessed for this population with very high co-morbidity levels.

Methods

Using hospital separations data, the Charlson and Elixhauser co-morbidity indices were used to measure chronic disease prevalence in 2035 Indigenous and non-Indigenous patients hospitalised after their first AMI in the Northern Territory of Australia between 1992 and 2004, and to adjust for co-morbidity in multivariate analysis of mortality outcomes (in-hospital and long-term deaths from coronary heart disease and all-causes). Index performance was assessed by the difference between C-statistic, AIC-statistic and estimate of excess Indigenous mortality in models with and without co-morbidity adjustment.

Results

Co-morbidity index scores were higher for Indigenous than non-Indigenous patients and increased considerably over time, at least partly because of information bias. Indigenous patients' higher risk of in-hospital all-cause death was almost fully explained by their higher co-morbidity levels. Their higher risk of long-term CHD and all-cause death was partially explained by higher co-morbidity levels. Charlson and Elixhauser indices performed satisfactorily and similarly in this population.

Conclusion

Co-morbidity indices performed well in a population with very high chronic disease prevalence. After adjusting for co-morbidity, short-term outcomes were similar for Indigenous and non-Indigenous AMI patients but co-morbidity at the time of the acute episode only partly explained the worse long-term outcomes for Indigenous patients.

Key words

Aboriginal Australian; Acute Myocardial Infarction; survival; co-morbidity; validation;

Introduction

Indigenous Australians have worse outcomes from hospital treatment of serious illness than do other Australians.[1,2] They also have higher prevalence of chronic conditions, but it is not clear to what extent this contributes to their worse treatment outcomes. Few of the studies of treatment outcomes for Indigenous Australians have used co-morbidity indices to investigate the contribution of higher chronic disease burden to their worse treatment outcomes, and there has been no report of an assessment of the performance of established co-morbidity indices for this population.

Co-morbidity indexes have been developed over the past two decades to measure the burden of co-morbid chronic conditions as predictors of treatment outcomes and to adjust for variations in co-morbidities when comparing treatments or patient groups. Co-morbidity indexes have been used in a wide range of settings; for example, the Charlson Co-morbidity Index has been used to more precisely predict prognosis after diagnosis with localised prostate cancer[3] and after commencement of dialysis for end-stage kidney failure,[4] and to adjust for patient co-morbidity levels when measuring outcomes after complex surgical procedures in high-volume compared with low-volume hospitals.[5]

The Charlson Co-morbidity Index is the most widely used when studying hospital inpatient treatment; the Elixhauser Co-morbidity Index has been developed more recently for the same purpose. The Charlson Index is a weighted frequency measure of the number of diagnosed chronic conditions

(from a list of 17 specified conditions); the weight assigned to each of the 17 conditions was derived from a study of the excess risk of death associated with each condition. The Charlson Co-morbidity Index score ('Charlson score') is calculated for each patient by identifying any of the 17 specified conditions that the patient has been diagnosed with and summing the weights assigned to these conditions.[6] The Elixhauser Index is a list of 31 conditions that are included as individual conditions to adjust for co-morbidity when analysing treatment outcomes.[7]

Both the Charlson and Elixhauser Indices have been validated as useful prognostic indicators for chronic disease co-morbidity.[8-11] However, few studies have been reported that compare their performance as predictors of short-term and long-term mortality and there have been no reports of their performance in a minority group with much greater chronic disease prevalence than the general population.

We have previously reported that Indigenous residents of the Northern Territory (NT) suffering their first Acute Myocardial Infarction (AMI) have lower long-term survival than non-Indigenous patients, although survival rates for both groups have improved in recent years. We now report on the performance of the Charlson and Elixhauser Indices on this cohort of Indigenous and non-Indigenous AMI patients. We have compared the prevalence of each of the chronic conditions in each index and the co-morbidity score (the weighted Charlson score and the number of Elixhauser conditions) for Indigenous and

non-Indigenous patients; compared the index score at the AMI admission to that derived from previous admissions for patients that had been admitted to hospital shortly before the AMI admission; compared the co-morbidity score for patients with a previous admission to that for those without a previous admission; and assessed the performance of the two co-morbidity scores in explaining the lower survival of Indigenous patients after an AMI.

Methods

The data sources and methods used to identify AMI cases and their vital status have been reported previously.[12] In brief, NT residents who suffered their first AMI in the period 1/1/1992 to 31/12/2004 were identified from the NT hospital separations dataset and the NT Death Register, and deaths that occurred in these AMI patients up to 31/12/2004 were identified using the same sources and the National Death Index. We excluded 1114 people who died of an AMI without hospital treatment, leaving 2035 hospitalised patients.

Co-morbidity prevalence and scores

For each patient the presence of each of the Charlson Index chronic conditions (excluding AMI) was identified from the hospital inpatient data for the AMI admission and the weighted Charlson score calculated; the same was done for each condition in the Elixhauser Index. The prevalence of each chronic condition, the average Charlson score, and the average Elixhauser score (i.e. the unweighted number of conditions present) were then calculated for Indigenous and non-Indigenous patients for the AMI admission. We used the

'consensus' versions of the Charlson and Elixhauser indices that were developed in 2005 by agreement of three international research groups for use with data coded in the International Classification of Diseases (ICD) Version 10, including mapping algorithms to apply the indices to older data coded in ICD Version 9.[13]

Measuring co-morbidity: AMI admission compared with previous admissions

For 734 patients who had one or more hospital admissions in the 18 months before their AMI admission ('previous admissions'), the prevalence of each condition and average index scores were also calculated from their previous admissions data using the combined diagnosis codes for all previous admissions. Each condition was counted only once for patients with more than one previous admission. Same-day admissions (mostly for dialysis and procedures), were excluded because diagnosis codes (other than the principal diagnosis) were not recorded for most same-day admissions.

For each index, agreement between the scores measured at the AMI admission and from previous admissions was assessed by comparing: the mean score for all patients; the proportion of patients with the same score and the Kappa measure for exact agreement; and the proportion of patients with the previous admissions score within +/-1 unit of the AMI admission score.

Index scores were compared for Indigenous and non-Indigenous patients as the crude mean score for each group, and in multivariate regression analysis

adjusted for age at AMI, sex, year of AMI and urban/remote residence. Zero-inflated negative binomial regression modelling was used for multivariate analysis because the data was over-dispersed weighted count data with a high proportion of zero scores (Charlson 49%, Elixhauser 27%).

Outcome measures

Four mortality outcomes were examined: death during the AMI inpatient admission (in-hospital death) from Coronary Heart Disease (CHD) and from any cause; and long-term mortality (to 31/12/04) from CHD and from any cause. In-hospital death was analysed as a binomial outcome using logistic regression modelling. The long-term mortality rate was analysed using proportional hazards regression modelling. Terms included in regression models were: age at diagnosis (by single year, based on the median age of 58 years), sex (female compared with male), year of diagnosis (by single year based on the middle year of 1998), place of residence (remote compared with urban), indigenous status (Indigenous compared with non-Indigenous), and Charlson index score or Elixhauser conditions measured at the AMI admission. The Charlson score was included as an ordinal variable with scores above four truncated as ‘four or more’; including the index score as indicator variables did not improve model fit. The Elixhauser conditions were included as 31 separate indicator variables. The effect of co-morbid chronic conditions on the excess mortality of Indigenous AMI patients was assessed by comparing the effect size for the indigenous status variable (odds ratio in logistic models and hazard ratio in proportional hazards models) in a model that did not include the index score with one that did.

Place of residence was not associated with any of the four outcomes and was not included in the final models. In models of long-term mortality, an interaction term between indigenous status and age was included because the effect of age was found to be different for Indigenous compared with non-Indigenous patients. Interaction terms for ‘Indigenous status and sex’ and ‘Indigenous status and year of diagnosis’ were tested but not included in final models because the effect of sex and year of diagnosis was found to be similar for Indigenous compared with non-Indigenous patients.

Model performance was also assessed using the C statistic and the AIC statistic. The C statistic measures the ability of the predictive model to discriminate among those who did and did not die. A value of C=0.5 indicates random prediction and C=1 indicates perfect prediction. The AIC statistic (Akaike information criterion) is a measure of the goodness of fit of an estimated statistical model with the lowest AIC value indicating the best model.[14]

Stata version 10 was used for statistical analysis. The study was approved by the Australian Institute of Health and Welfare Ethics Committee (reference number 389) and the Human Research Ethics Committee of the NT Department of Health and Families and Menzies School of Health Research (reference number 05/38).

Results

AMI cases

2035 NT residents were identified as having a hospital inpatient admission for treatment of a first AMI in 1992-2004 (Table 1), of whom 818 (40%) were Indigenous. Compared to non-Indigenous AMI patients, the Indigenous patients were more likely to be younger; female; live in a remote area; and to have had one or more inpatient admissions in the 18 months prior to their first AMI.

[Insert Table 1 here]

Prevalence of co-morbid conditions and Co-morbidity Scores

Compared with non-Indigenous patients, Indigenous patients had similar or lower prevalence of most of the 16 individual Charlson Index conditions but much higher prevalence (approximately ten percentage points higher) of three conditions: diabetes, diabetes complications and renal disease (Table 2). The average Charlson score was 59% higher for Indigenous than non-Indigenous patients. For the Elixhauser Index, the prevalence of alcohol abuse was also much higher for Indigenous than non-Indigenous patients. In multivariate analysis Charlson scores were higher for Indigenous, female and older patients, but not for remote residents (Table 3). Charlson score increased by an average of 7.6% per year, or by 141% between 1992 and 2004.

[Insert Table 2 here]

[Insert Table 3 here]

[Insert Figure 1 here]

The results of analyses using the Charlson score are presented in detail, with comments on the results for comparable analyses using the Elixhauser score.

Co-morbidity measured at AMI admission compared with previous admissions

The average Charlson score and the prevalence of almost all individual conditions were higher for patients with a previous admission than for those without (Table 4 & Table 5). For patients with a previous admission, the Charlson score for each patient at the AMI admission was the same as that calculated from previous admissions for 52% of patients (kappa 0.38), and was within +/- one unit of the score from previous admissions for 83% of patients. The prevalence of co-morbid conditions and the average Charlson score were similar when calculated at the AMI admission or when calculated from previous admissions. For Indigenous patients, the average Charlson score was the same at the AMI admission and previous admissions; the prevalence of congestive cardiac failure (which may be a complication of the AMI rather than a pre-existing co-morbidity) was higher at the AMI admission while the prevalence of pulmonary disease and diabetes was lower. For non-Indigenous patients the average Charlson score was slightly higher at the AMI admission but this difference was not statistically significant, (difference=-0.14, 95%CI -0.40, 0.12);

the prevalence of congestive heart disease was twice as high at the AMI admission compared with previous admissions. Similar results were found for the Elixhauser Index (Data not shown).

[Insert Table 4 here]

[Insert Table 5 here]

Mortality outcomes

In-hospital CHD mortality was similar for Indigenous and non-Indigenous AMI patients after adjustment for sex, age at AMI and year of AMI (Table 6). In-hospital CHD mortality decreased considerably for both groups between 1992 and 2004 (OR 0.88 per year). In-hospital all-cause mortality was higher for Indigenous than non-Indigenous patients after adjustment for sex, age and year; adjustment for co-morbidity score almost fully explained the excess mortality of Indigenous patients. Long-term CHD mortality and all-cause mortality were higher for Indigenous than non-Indigenous patients, after adjustment for sex, age and year; adjustment for chronic disease co-morbidity only partly reduced this disparity.

There was little difference between Charlson and Elixhauser Indexes in their ability to adjust for co-morbidity in analysis of any of the four outcomes (Table 6). Inclusion of the Charlson and Elixhauser scores had similar effects on the estimate for the indigenous status term (compared to the baseline model) for all four outcomes. Inclusion of the Elixhauser score tended to increase the C

statistic more than did the Charlson score but by only a small amount and with overlapping confidence intervals; there was no consistent effect on the AIC statistic.

In analysis restricted to patients with a previous admission, co-morbidity scores calculated from previous admissions did not perform better than scores calculated from the AMI admission (Data not shown).

[Insert Table 6 here]

Discussion

Co-morbidity scores were higher for Indigenous than non-Indigenous AMI patients, before and after adjustment for sex, age and year of AMI, reflecting the higher prevalence of many chronic diseases in the Indigenous population. However the prevalence of many specific conditions was not higher for Indigenous patients; the higher co-morbidity scores were largely driven by much higher prevalence of kidney disease, diabetes and its complications. Given that all patients in this study have had an AMI, it is not surprising that the difference in chronic disease prevalence between Indigenous and non-Indigenous people is not as high as in the general population.

These prevalence rates may be an under-estimate because the diagnoses recorded for each patient in the hospital separations data may be incomplete, but that is unlikely to have a major effect on the comparison of Indigenous with non-Indigenous patients; the degree of incomplete coding of chronic conditions is likely to be similar for Indigenous and non-Indigenous patients because diagnosis coding is done by the same coders using the clinical records of the same clinicians for both groups. Co-morbidity scores increased over time for both Indigenous and non-Indigenous patients; this is probably due, at least in part, to recording of more diagnosis codes per patient in hospital separations data rather than solely due to an increase in chronic disease prevalence.

Co-morbidity scores were higher for patients with than without previous admissions. This is as would be expected; people with a chronic condition are

more likely to be admitted to hospital for treatment of that condition or a related complication than people with no chronic conditions. For patients with a previous admission, the prevalence of congestive cardiac failure was considerably higher at the AMI admission than at previous admissions, indicating that the prevalence measured at the AMI admission is not all pre-existing disease but does include complications of the AMI. However, the finding that the total co-morbidity scores were similar whether measured at the AMI admission or from previous admissions is reassuring that measuring co-morbidity at the AMI admission does not seriously over-estimate co-morbidity levels.

Co-morbidity indices appeared to perform satisfactorily in analysis of short-term and long-term mortality outcomes. For in-hospital death, Indigenous AMI patients suffered no disadvantage (compared with non-Indigenous patients) in CHD survival and their disadvantage in all-cause mortality was almost fully explained by their excess co-morbidity. For long-term mortality, Indigenous patients had a large disadvantage in both CHD and all-cause deaths. Adjustment for co-morbidity explained 30-40% of this disadvantage; the unexplained excess does not appear to be due to incomplete adjustment for co-morbidity because the same co-morbidity measures were used for in-hospital deaths.

Acute care outcomes are similar for Indigenous and non-Indigenous AMI patients (after allowing for Indigenous patients' greater co-morbidity), but once back in the community setting Indigenous patients' serious disadvantage in

many social, economic and other factors (education, housing, employment, income and self-worth, etc)[15] continues to exert a strong negative influence. Studies of long-term mortality after diagnosis of cancer have also found that Indigenous patients' lower survival rates could not be fully explained after adjustment for stage of disease at diagnosis, co-morbidity and treatment factors.[16-18]

There was little difference between Elixhauser and Charlson Indices in measuring relative co-morbidity levels for Indigenous compared with non-Indigenous people and adjusting for co-morbidity in analysis of short-term and long-term mortality outcomes.

Other researchers using co-morbidity indices derived retrospectively from clinical records and administrative data have cautioned that these indices are unlikely to fully capture all relevant co-morbidities and so are unlikely to fully adjust for chronic disease co-morbidity. In this study these indices almost fully explained the excess in-hospital all-cause mortality for Indigenous patients, indicating that these indices measure chronic disease very well, although it may be that they measure the excess of chronic disease in Indigenous compared with other Australians but do not fully measure all chronic disease; the fact that only three conditions accounted for most of the excess in Indigenous co-morbidity scores may be relevant here.

On the other hand, the increased recording of diagnoses over time in hospital morbidity data[19] undermines our confidence in co-morbidity scores to some extent. If co-morbidity scores have increased over time to a much greater extent than actual chronic disease prevalence, does this mean that co-morbidity scores measure co-morbidity more accurately in more recent than earlier years, or that they now over-estimate serious co-morbidity and perform less well than in previous years? This issue needs further investigation.

This study provides evidence that both the Charlson and Elixhauser Indices perform adequately in measuring and adjusting for chronic disease co-morbidity in a population with very high co-morbidity levels, for AMI patients at least. This needs to be confirmed for patients with other conditions before these indices can be used with confidence in studies of treatment outcomes for all Indigenous patients. On a more general issue, it is reassuring that we found no evidence that measuring the co-morbidity score at the index admission introduces a bias because of inclusion of complications of the index condition rather than pre-existing chronic diseases, although again this only applies to AMI patients.

Of particular significance is the result that Indigenous AMI patients apparently suffer no disadvantage in short-term outcomes compared to non-Indigenous patients with similar co-morbidity levels: a smaller proportion of Indigenous than non-Indigenous AMI patients died in-hospital after an AMI, and although Indigenous patients were more likely to be younger their CHD deaths were not higher after adjusting for age, sex and year of AMI and their excess all-cause

deaths was entirely due to their excess of chronic diseases. Hospital treatment for Indigenous AMI patients in the NT seems to be as effective as for non-Indigenous patients. The outcomes for long-term mortality were not as good; Indigenous patients suffered excess mortality for both CHD and all-cause mortality which was not fully explained by excess chronic disease co-morbidity. Effective acute care services are very important in dealing with the serious health problems of Indigenous people, but it appears that increasing acute care services is not the highest priority to close the gap in health status and life expectancy between Indigenous and other Australians.

Funding and competing interests

This study was undertaken without additional funding by staff of the Northern Territory Government Department of Health and Families and the Menzies School of Health Research. There are no financial or non-financial competing interests that the authors need to declare.

Acknowledgements

The authors would like to acknowledge the support and help from the following staff and organisations: acute care staff and data warehouse team of the Northern Territory Department of Health and Families for assistance with data access; and the National Death Index team at the Australian Institute of Health and Welfare for conducting data matching.

References

1. Condon JR, Armstrong BK, Barnes T, Zhao Y. Cancer incidence and survival for indigenous Australians in the Northern Territory. *Aust N Z J Public Health* 2005;29(2):123-8.

2. Cass A, Cunningham J, Snelling P, Wang Z, Hoy W. Renal transplantation for Indigenous Australians: identifying the barriers to equitable access. *Ethn Health* 2003;8(2):111-9.

3. Albertsen PC, Moore DF, Shih W, Lin Y, Li H, Lu-Yao GL. Impact of comorbidity on survival among men with localized prostate cancer. *J Clin Oncol* 2011;29(10):1335-41.

4. Hemmelgarn BR, Manns BJ, Quan H, Ghali WA. Adapting the Charlson Comorbidity Index for use in patients with ESRD. *Am J Kidney Dis* 2003;42(1):125-32.

5. Urbach DR, Bell CM, Austin PC. Differences in operative mortality between high- and low-volume hospitals in Ontario for 5 major surgical procedures: estimating the number of lives potentially saved through regionalization. *CMAJ* 2003;168(11):1409-14.

6. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40(5):373-83.

7. Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Med Care* 1998;36(1):8-27.

8. Li B, Evans D, Faris P, Dean S, Quan H. Risk adjustment performance of Charlson and Elixhauser comorbidities in ICD-9 and ICD-10 administrative databases. *BMC Health Serv Res* 2008;8:12

9. Southern DA, Quan H, Ghali WA. Comparison of the Elixhauser and Charlson/Deyo methods of comorbidity measurement in administrative data. *Med Care* 2004;42(4):355-60.

10. Needham DM, Scales DC, Laupacis A, Pronovost PJ. A systematic review of the Charlson comorbidity index using Canadian administrative databases: a perspective on risk adjustment in critical care research. *J Crit Care* 2005;20(1):12-9.

11. de Groot V, Beckerman H, Lankhorst GJ, Bouter LM. How to measure comorbidity. a critical review of available methods. *J Clin Epidemiol* 2003;56(3):221-9.

12. You J, Condon JR, Zhao Y, Guthridge S. Incidence and survival after acute myocardial infarction in Indigenous and non-Indigenous people in the Northern Territory, 1992-2004. *Med J Aust* 2009;190(6):298-302.

13. Quan H, Sundararajan V, Halfon P, Fong A, Burnand B, Luthi JC, Saunders LD, Beck CA, Feasby TE, Ghali WA. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care* 2005;43(11):1130-9.

14. Akaike H. A New Look at the Statistical Model Identification. *IEEE Transactions on Automatic Control* 1974;19(6):716-23.

15. ABS & AIHW. 2005 The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2005. *AIHW*. AIHW cat. no.14; ABS cat. no. 4704.0.

16. Condon JR, Barnes T, Armstrong BK, Selva-Nayagam S, Elwood JM. Stage at diagnosis and cancer survival for Indigenous Australians in the Northern Territory. *Med J Aust* 2005;182(6):277-80.

17. Valery PC, Coory M, Stirling J, Green AC. Cancer diagnosis, treatment, and survival in Indigenous and non-Indigenous Australians: a matched cohort study. *Lancet* 2006;367(9525):1842-8.

18. Hall SE, Bulsara CE, Bulsara MK, Leahy TG, Culbong MR, Hendrie D, Holman CD. Treatment patterns for cancer in Western Australia: does being Indigenous make a difference? *Med J Aust* 2004;181(4):191-4.

19. Zhao YJ, Condon JR, Guthridge SL, You JQ. Living longer with a greater health burden - changes in the burden of disease and injury in the Northern Territory Indigenous population, between 1994-1998 and 1999-2003. *Aust N Z J Public Health* 2010;34(s1):S93-S98

Tables and Figures

Table 1 Demographic features of AMI inpatients, NT 1992-2004

	Indigenous	Non-Indigenous	All persons
	n=818	n=1217	n=2035
Median age (years)	51	60	56
Male (%)	61	76	70
Remote resident (%)	73	23	43
Previous admission (%)	48	28	36
In-hospital death, CHD (%)[1]	4.9	7.4	6.4
In-hospital death, all causes (%)	9.7	12.5	11.4

1. CHD: Coronary heart disease

Table 2 Prevalence of individual conditions[a] and co-morbidity scores for Charlson and Elixhauser indices at AMI admission, AMI cases 1992-2004.

	Indigenous		Non-Indigenous		Difference[b]	
Charlson						
Congestive heart failure	19.9	(17.2 - 22.7)	16.4	(14.4 - 18.5)	3.5	(0.1 - 6.9)
Peripheral vascular disease	2.9	(1.8 - 4.1)	4.5	(3.4 - 5.7)	-1.6	(-3.3 - 0.1)
Cerebral vascular accident	2.6	(1.5 - 3.7)	4.3	(3.1 - 5.4)	-1.7	(-3.4 - -0.1)
Dementia	0.5	(0.0 - 1.0)	1.8	(1.1 - 2.6)	-1.3	(-2.3 - -0.3)
Pulmonary disease	12.2	(10.0 - 14.5)	10.4	(8.7 - 12.2)	1.8	(-1.0 - 4.6)
Connective tissue disorder	0.4	(-0.1 - 0.8)	1.0	(0.4 - 1.5)	-0.6	(-1.4 - 0.1)
Peptic ulcer	0.4	(-0.1 - 0.8)	0.9	(0.4 - 1.4)	-0.5	(-1.3 - 0.2)
Liver disease	1.6	(0.7 - 2.5)	0.9	(0.4 - 1.4)	0.7	(-0.3 - 1.6)
Diabetes	28.6	(25.5 - 31.7)	15.9	(13.8 - 17.9)	12.8	(9.1 - 16.4)
Diabetes complication	15.4	(12.9 - 17.9)	5.3	(4.0 - 6.5)	10.1	(7.6 - 12.7)
Paraplegia	1.8	(0.9 - 2.8)	1.7	(1.0 - 2.5)	0.1	(-1.1 - 1.3)
Renal disease	13.6	(11.2 - 15.9)	4.5	(3.4 - 5.7)	9.1	(6.6 - 11.5)
Cancer	1.2	(0.5 - 2.0)	1.4	(0.7 - 2.1)	-0.2	(-1.2 - 0.8)
Metastatic cancer	0.2	(-0.1 - 0.6)	0.7	(0.3 - 1.2)	-0.5	(-1.1 - 0.2)
Severe liver disease	1.0	(0.3 - 1.7)	0.3	(0.0 - 0.7)	0.7	(0.0 - 1.3)
HIV	0.0	(0.0 - 0.0)	0.1	(-0.1 - 0.2)	-0.1	(-0.3 - 0.1)
Co-morbidity score[c]	1.37	(1.26-1.48)	0.86	(0.78-0.93)	0.5	(0.39-0.64)
Elixhauser						
Congestive heart failure	19.9	(17.2 - 22.7)	16.4	(14.4 - 18.5)	3.5	(0.1 - 6.9)
Cardiac arrhythmias	10.4	(8.3 - 12.5)	14.3	(12.3 - 16.3)	-3.9	(-6.9 - -1.0)
Valvular disease	4.4	(3.0 - 5.8)	2.1	(1.3 - 2.9)	2.4	(0.8 - 3.9)
Pulmonary circulation disorders	0.9	(0.2 - 1.5)	0.6	(0.2 - 1.0)	0.3	(-0.5 - 1.0)
Peripheral vascular disorders	2.9	(1.8 - 4.1)	4.5	(3.4 - 5.7)	-1.6	(-3.3 - 0.1)
Hypertension, uncomplicated	34.6	(31.3 - 37.9)	29.8	(27.3 - 32.4)	4.8	(0.6 - 8.9)
Hypertension, complicated	0.7	(0.2 - 1.3)	0.6	(0.2 - 1.0)	0.2	(-0.6 - 0.9)
Paralysis	1.8	(0.9 - 2.8)	1.7	(1.0 - 2.5)	0.1	(-1.1 - 1.3)
Other neurological disorders	2.2	(1.2 - 3.2)	1.9	(1.1 - 2.7)	0.3	(-0.9 - 1.6)
Chronic pulmonary disease	12.2	(10.0 - 14.5)	10.4	(8.7 - 12.2)	1.8	(-1.0 - 4.6)
Diabetes, uncomplicated	25.6	(22.6 - 28.6)	14.5	(12.6 - 16.5)	11.0	(7.5 - 14.5)
Diabetes, complicated	15.5	(13.0 - 18.0)	5.6	(4.3 - 6.9)	9.9	(7.3 - 12.6)
Hypothyroidism	1.8	(0.9 - 2.8)	1.2	(0.6 - 1.8)	0.7	(-0.4 - 1.7)
Renal failure	13.5	(11.1 - 15.8)	4.4	(3.3 - 5.6)	9.0	(6.6 - 11.4)
Liver disease	2.4	(1.4 - 3.5)	1.3	(0.7 - 2.0)	1.1	(0.0 - 2.3)
Peptic ulcer disease excluding bleeding	0.1	(-0.1 - 0.4)	0.6	(0.2 - 1.0)	-0.5	(-1.0 - 0.1)
AIDS/HIV	0.0	(0.0 - 0.0)	0.1	(-0.1 - 0.2)	-0.1	(-0.3 - 0.1)
Lymphoma	0.1	(-0.1 - 0.4)	0.2	(-0.1 - 0.4)	0.0	(-0.4 - 0.3)
Metastatic cancer	0.2	(-0.1 - 0.6)	0.7	(0.3 - 1.2)	-0.5	(-1.1 - 0.2)
Solid tumor without metastasis	1.1	(0.4 - 1.8)	1.2	(0.6 - 1.8)	0.0	(-1.0 - 0.9)
Rheumatoid arthritis/ collagen vascular diseases	0.5	(0.0 - 1.0)	1.1	(0.5 - 1.7)	-0.6	(-1.4 - 0.2)
Coagulopathy	1.7	(0.8 - 2.6)	0.8	(0.3 - 1.3)	0.9	(-0.1 - 1.9)
Obesity	4.8	(3.3 - 6.2)	4.2	(3.1 - 5.3)	0.6	(-1.2 - 2.4)
Weight loss	1.0	(0.3 - 1.7)	0.3	(0.0 - 0.5)	0.7	(0.1 - 1.4)
Fluid and electrolyte disorders	8.6	(6.6 - 10.5)	5.3	(4.1 - 6.6)	3.2	(1.0 - 5.4)
Blood loss anemia	1.2	(0.5 - 2.0)	0.3	(0.0 - 0.5)	1.0	(0.3 - 1.7)
Deficiency anemia	4.3	(2.9 - 5.7)	1.0	(0.4 - 1.5)	3.3	(2.0 - 4.6)
Alcohol abuse	15.3	(12.8 - 17.8)	4.3	(3.1 - 5.4)	11.0	(8.5 - 13.5)
Drug abuse	1.2	(0.5 - 2.0)	0.3	(0.0 - 0.7)	0.9	(0.2 - 1.6)
Psychoses	0.7	(0.2 - 1.3)	0.4	(0.1 - 0.8)	0.3	(-0.3 - 1.0)
Depression	0.5	(0.0 - 1.0)	1.2	(0.6 - 1.9)	-0.7	(-1.6 - 0.1)
Co-morbidity score[c]	1.9	(1.8-2.0)	1.3	(1.2-1.4)	0.6	(0.5-0.7)

a. Proportion (%) of patients with each condition, separately for Indigenous and non-Indigenous patients, with 95% confidence interval.
b. Difference (Indigenous minus non-Indigenous), with 95% confidence interval.
c. Average score per patient, with 95% confidence interval.

Table 3 Factors associated with higher Charlson score[a]

	Rate ratio	(95% CI)
Indigenous status	1.36	(1.16-1.59)
Age (per one year of age)	1.01	(1.01-1.02)
Sex[b]	1.24	(1.10-1.39)
Year (per one calendar year)	1.08	(1.06-1.09)
Remote residence	0.96	(0.85-1.09)

a. Multivariate analysis using zero-inflated negative binomial regression.
b. Female compared with male.

Table 4 Patients without a previous admission: prevalence of individual conditions[a] and Charlson score.

Without previous admission	Indigenous		Non-Indigenous		Difference[b]	
Congestive heart failure	16.1	(12.6-19.6)	13.4	(11.2-15.7)	2.7	(-1.4 - 6.7)
Peripheral vascular disease	2.6	(1.1-4.1)	3.2	(2.0-4.4)	-0.7	(-2.6 - 1.3)
Cerebral vascular accident	1.2	(0.1-2.2)	3.7	(2.4-4.9)	-2.5	(-4.4 - -0.6)
Dementia	0.2	(-0.2-0.7)	1.3	(0.5-2.0)	-1.0	(-2.1 - 0.1)
Pulmonary disease	8.2	(5.6-10.8)	5.7	(4.2-7.3)	2.4	(-0.4 - 5.3)
Connective tissue disorder	0.2	(-0.2-0.7)	0.8	(0.2-1.4)	-0.6	(-1.5 - 0.3)
Peptic ulcer	0.2	(-0.2-0.7)	0.8	(0.2-1.4)	-0.6	(-1.5 - 0.3)
Liver disease	1.4	(0.3-2.5)	0.7	(0.1-1.2)	0.7	(-0.4 - 1.8)
Diabetes	26.3	(22.2-30.5)	15.0	(12.6-17.4)	11.3	(6.8 - 15.8)
Diabetes complication	9.6	(6.8-12.4)	2.9	(1.8-4.0)	6.7	(4.2 - 9.2)
Paraplegia	1.4	(0.3-2.5)	1.4	(0.6-2.2)	0.0	(-1.3 - 1.4)
Renal disease	7.0	(4.6-9.4)	2.3	(1.3-3.3)	4.7	(2.5 - 6.9)
Cancer	0.2	(-0.2-0.7)	0.5	(0.0-0.9)	-0.2	(-0.9 - 0.5)
Metastatic cancer	0.0	(0.0-0.0)	0.2	(-0.1-0.5)	-0.2	(-0.7 - 0.2)
Severe liver disease	0.5	(-0.2-1.1)	0.3	(0.0-0.7)	0.1	(-0.6 - 0.8)
HIV	0.0	(0.0-0.0)	0.0	(0.0-0.0)	0.0	(0.0 - 0.0)
Charlson score[c]	0.94	(0.82-1.06)	0.60	(0.54-0.67)	0.34	(0.21-0.47)

a. Proportion (%) of patients with each condition, separately for Indigenous and non-Indigenous patients, with 95% confidence interval.
b. Difference (Indigenous minus non-Indigenous), with 95% confidence interval.
c. Average score per patient, with 95% confidence interval.

Table 5 Patients with a previous admission: prevalence of individual conditions[a] and Charlson score.

	Recorded in previous admissions						Recorded at AMI admission					
With previous admission	Indigenous		Non-Indigenous		Difference[b]		Indigenous		Non-Indigenous		Difference[b]	
Congestive heart failure	17.7	(13.9-21.6)	11.9	(8.5-15.3)	5.85	(0.7 - 11.0)	24.2	(19.9-28.4)	24.1	(19.5-28.6)	0.11	(-6.1 - 6.3)
Peripheral vascular disease	5.4	(3.1-7.7)	11	(7.7-14.3)	-5.62	(-9.6 - -1.7)	3.3	(1.5-5.1)	7.8	(5.0-10.7)	-4.48	(-7.8 - -1.2)
Cerebral vascular accident	5.7	(3.3-8.0)	5.8	(3.3-8.3)	-0.14	(-3.5 - 3.2)	4.1	(2.1-6.1)	5.8	(3.3-8.3)	-1.68	(-4.8 - 1.5)
Dementia	0.3	(-0.2-0.8)	4.6	(2.4-6.9)	-4.38	(-6.6 - -2.2)	0.8	(-0.1-1.6)	3.2	(1.3-5.1)	-2.42	(-4.4 - -0.4)
Pulmonary disease	22.9	(18.7-27.1)	19.4	(15.2-23.6)	3.46	(-2.5 - 9.4)	16.7	(13.0-20.4)	22.3	(17.9-26.7)	-5.61	(-11.3 - 0.1)
Connective tissue disorder	1.5	(0.3-2.8)	1.2	(0.0-2.3)	0.38	(-1.3 - 2.1)	0.5	(-0.2-1.2)	1.4	(0.2-2.7)	-0.94	(-2.3 - 0.5)
Peptic ulcer	0.5	(-0.2-1.2)	3.2	(1.3-5.1)	-2.67	(-4.6 - -0.8)	0.5	(-0.2-1.2)	1.2	(0.0-2.3)	-0.65	(-2.0 - 0.7)
Liver disease	2.3	(0.8-3.8)	1.2	(0.0-2.3)	1.15	(-0.8 - 3.1)	1.8	(0.5-3.1)	1.4	(0.2-2.7)	0.35	(-1.5 - 2.2)
Diabetes	36.5	(31.7-41.3)	20.3	(16.0-24.6)	16.21	(9.6 - 22.8)	31.1	(26.5-35.7)	18	(13.9-22.0)	13.13	(6.9 - 19.4)
Diabetes complication	19.8	(15.8-23.8)	10.1	(6.9-13.3)	9.65	(4.4 - 14.9)	21.9	(17.7-26.0)	11.3	(7.9-14.7)	10.55	(5.1 - 16.0)
Paraplegia	1.8	(0.5-3.1)	1.7	(0.4-3.1)	0.06	(-1.9 - 2.0)	2.3	(0.8-3.8)	2.6	(0.9-4.3)	-0.3	(-2.5 - 2.0)
Renal disease	19.3	(15.3-23.2)	9	(6.0-12.0)	10.29	(5.2 - 15.4)	20.8	(16.8-24.9)	10.1	(6.9-13.3)	10.68	(5.4 - 16.0)
Cancer	2.8	(1.2-4.5)	5.5	(3.1-7.9)	-2.68	(-5.6 - 0.2)	2.3	(0.8-3.8)	3.8	(1.7-5.8)	-1.45	(-3.9 - 1.0)
Metastatic cancer	0.8	(-0.1-1.6)	1.2	(0.0-2.3)	-0.39	(-1.8 - 1.0)	0.5	(-0.2-1.2)	2	(0.5-3.5)	-1.51	(-3.1 - 0.1)
Severe liver disease	0.5	(-0.2-1.2)	0.3	(-0.3-0.9)	0.22	(-0.7 - 1.2)	1.5	(0.3-2.8)	0.3	(-0.3-0.9)	1.25	(-0.2 - 2.7)
HIV	0	(0.0-0.0)	0	(0.0-0.0)	0	(0.0 - 0.0)	0	(0.0-0.0)	0.3	(-0.3-0.9)	-0.29	(-0.8 - 0.2)
Charlson score[c]	1.84	(1.64-2.04)	1.36	(1.17-1.54)	0.48	(0.21-0.76)	1.84	(1.66-2.01)	1.50	(1.31-1.68)	0.34	(0.09-0.59)

a. Proportion (%) of patients with each condition, separately for Indigenous and non-Indigenous patients, with 95% confidence interval.
b. Difference (Indigenous minus non-Indigenous), with 95% confidence interval.
c. Average score per patient, with 95% confidence interval.

Table 6 Multivariate analysis of four outcomes: baseline model and models including Charlson or Elixhauser Co-morbidity Score

	Baseline model		Baseline plus Charlson score		Baseline plus Elixhauser index	
In-hospital CHD death[a]						
Indigenous status[c]	1.07	(0.70-1.63)	0.91	(0.59-1.40)	0.98	(0.62-1.55)
Sex[c,d]	1.39	(0.95-2.05)	1.32	(0.90-1.94)	1.33	(0.89-2.00)
Age[c]	1.05	(1.03-1.06)	1.04	(1.03-1.06)	1.04	(1.03-1.06)
Year of diagnosis[c]	0.88	(0.83-0.92)	0.85	(0.81-0.90)	0.86	(0.82-0.91)
Co-morbidity score[c] / Index	-		1.38	(1.19-1.59)	ns	
AIC[e]	888	(778-987)	872	(759-970)	892	(750-958)
C-statistic[e]	.73	(0.69-0.78)	0.76	(0.72-0.80)	0.79	(0.75-0.82)
In-hospital all-cause death[a]						
Indigenous status[c]	1.40	(1.01-1.94)	1.08	(0.76-1.52)	1.07	(0.73-1.56)
Sex[c]	1.37	(1.01-1.86)	1.28	(0.94-1.75)	1.37	(0.98-1.92)
Age[c]	1.07	(1.06-1.08)	1.06	(1.05-1.07)	1.06	(1.05-1.08)
Year of diagnosis[c]	0.94	(0.90-0.97)	0.90	(0.86-0.93)	0.89	(0.85-0.93)
Co-morbidity score / Index	-		1.64	(1.47-1.84)	ns	
AIC	1274	(1163-1382)	1202	(1091-1295)	1164	(1020-1225)
C-statistic	0.75	(0.72-0.78)	0.80	(0.76-0.83)	0.84	(0.82-0.87)
Long-term CHD death[b]						
Indigenous status[c]	1.71	(1.33-2.21)	1.44	(1.11-1.87)	1.49	(1.14-1.95)
Sex[c]	1.04	(0.83-1.31)	0.97	(0.77-1.21)	0.99	(0.78-1.26)
Age[c]	1.07	(1.06-1.08)	1.06	(1.05-1.07)	1.06	(1.05-1.07)
Year of diagnosis[c]	0.91	(0.88-0.94)	0.89	(0.86-0.91)	0.90	(0.87-0.93)
Interaction Indigenous status by age	0.97	(0.95-0.99)	0.97	(0.95-0.99)	0.97	(0.96-0.99)
Co-morbidity score / Index	-		1.41	(1.30-1.53)	ns	
AIC	4791	(4297-5258)	4734	(4286-5214)	4765	(4226-5197)
C-statistic	0.72	(0.70-0.75)	0.75	(0.72-0.78)	0.76	(0.75-0.80)
Long-term all-cause death[b]						
Indigenous status[c]	1.94	(1.62-2.32)	1.56	(1.30-1.87)	1.55	(1.28-1.88)
Sex[c]	1.11	(0.94-1.31)	1.00	(0.85-1.18)	1.02	(0.86-1.21)
Age[c]	1.07	(1.06-1.08)	1.06	(1.05-1.07)	1.06	(1.05-1.07)
Year of diagnosis[c]	0.96	(0.93-0.98)	0.93	(0.90-0.95)	0.93	(0.90-0.95)
Interaction Indigenous status by age	0.98	(0.97-0.99)	0.98	(0.97-0.99)	0.98	(0.97-0.99)
Co-morbidity score / Index	-		1.52	(1.43-1.61)	ns	
AIC	9130	(8535-9697)	8959	(8387-9515)	8952	(8326-9480)
C-statistic	0.71	(0.69-0.73)	0.76	(0.74-0.77)	0.77	(0.76-0.79)

a. In-hospital death outcomes analysed by logistic regression, results are odd ratio with 95% confidence interval.
b. Long-term death outcomes analysed by proportional hazards regression, results are hazard ratio with 95% confidence interval.
c. Terms in the regression model.
d. Female compared to male
e. Statistics for the overall regression model.
ns. Results for each of the 31 individual conditions included in the model are not shown

Figure 1 Distribution of Charlson and Elixhauser scores by Indigenous status

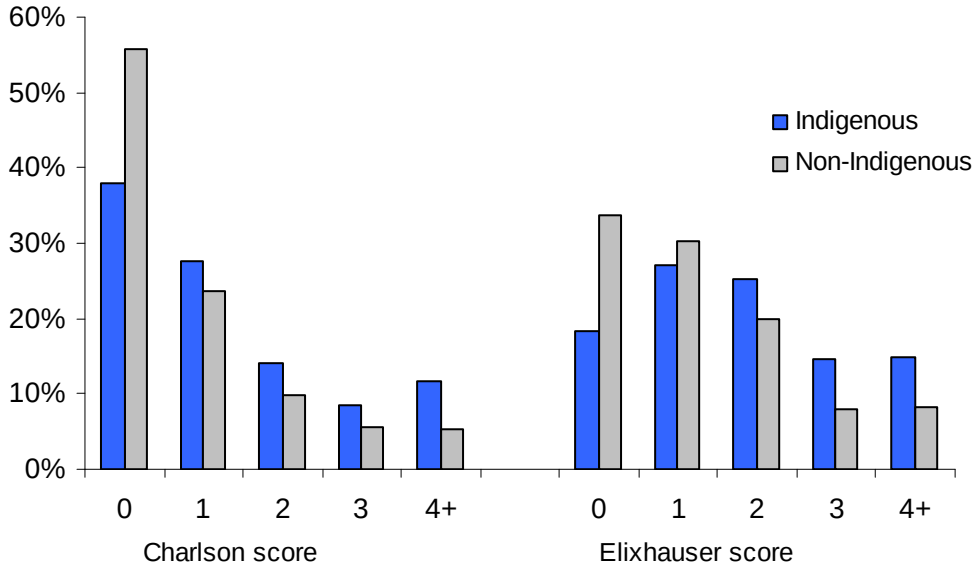

Table 4A Patients without a previous admission: prevalence of individual conditions[a] and Elixhauser score.

Without previous admission	Indigenous		Non-Indigenous		Difference[b]	
Congestive heart failure	16.1	(12.6-19.6)	13.4	(11.2-15.7)	2.7	(-1.4 - 6.7)
Cardiac arrhythmias	8.9	(6.2-11.6)	12.2	(10.0-14.3)	-3.3	(-6.9 - 0.3)
Valvular disease	2.6	(1.1-4.1)	1.9	(1.0-2.9)	0.6	(-1.1 - 2.3)
Pulmonary circulation disorders	0.2	(-0.2-0.7)	0.7	(0.1-1.2)	-0.5	(-1.3 - 0.4)
Peripheral vascular disorders	2.6	(1.1-4.1)	3.2	(2.0-4.4)	-0.7	(-2.6 - 1.3)
Hypertension, uncomplicated	33.3	(28.9-37.8)	27.2	(24.2-30.1)	6.2	(0.9 - 11.4)
Hypertension, complicated	0.5	(-0.2-1.1)	0.5	(0.0-0.9)	0.0	(-0.8 - 0.8)
Paralysis	1.4	(0.3-2.5)	1.4	(0.6-2.2)	0.0	(-1.3 - 1.4)
Other neurological disorders	0.9	(0.0-1.8)	1.1	(0.4-1.9)	-0.2	(-1.4 - 1.0)
Chronic pulmonary disease	8.2	(5.6-10.8)	5.7	(4.2-7.3)	2.4	(-0.4 - 5.3)
Diabetes, uncomplicated	24.0	(20.0-28.1)	14.1	(11.8-16.4)	9.9	(5.5 - 14.3)
Diabetes, complicated	9.6	(6.8-12.4)	3.0	(1.9-4.1)	6.6	(4.0 - 9.1)
Hypothyroidism	0.7	(-0.1-1.5)	0.8	(0.2-1.4)	-0.1	(-1.1 - 0.9)
Renal failure	7.0	(4.6-9.4)	2.2	(1.2-3.1)	4.8	(2.6 - 7.0)
Liver disease	1.9	(0.6-3.2)	1.1	(0.4-1.9)	0.7	(-0.6 - 2.1)
Peptic ulcer disease excluding bleeding	0.0	(0.0-0.0)	0.6	(0.1-1.1)	-0.6	(-1.3 - 0.1)
AIDS/HIV	0.0	(0.0-0.0)	0.0	(0.0-0.0)		
Lymphoma	0.0	(0.0-0.0)	0.0	(0.0-0.0)		
Metastatic cancer	0.0	(0.0-0.0)	0.2	(-0.1-0.5)	-0.2	(-0.7 - 0.2)
Solid tumor without metastasis	0.2	(-0.2-0.7)	0.5	(0.0-0.9)	-0.2	(-0.9 - 0.5)
Rheumatoid arthritis/ collagen vascular diseases	0.2	(-0.2-0.7)	0.9	(0.3-1.6)	-0.7	(-1.6 - 0.3)
Coagulopathy	0.7	(-0.1-1.5)	0.7	(0.1-1.2)	0.0	(-1.0 - 1.0)
Obesity	6.5	(4.2-8.9)	4.8	(3.4-6.2)	1.7	(-0.9 - 4.3)
Weight loss	0.5	(-0.2-1.1)	0.0	(0.0-0.0)	0.5	(0.0 - 0.9)
Fluid and electrolyte disorders	5.8	(3.6-8.1)	3.9	(2.6-5.2)	1.9	(-0.5 - 4.3)
Blood loss anemia	0.9	(0.0-1.8)	0.2	(-0.1-0.5)	0.7	(-0.1 - 1.5)
Deficiency anemia	2.1	(0.7-3.5)	0.6	(0.1-1.1)	1.5	(0.3 - 2.7)
Alcohol abuse	13.3	(10.1-16.5)	3.8	(2.5-5.1)	9.5	(6.6 - 12.4)
Drug abuse	1.9	(0.6-3.2)	0.3	(0.0-0.7)	1.5	(0.5 - 2.6)
Psychoses	0.2	(-0.2-0.7)	0.5	(0.0-0.9)	-0.2	(-0.9 - 0.5)
Depression	0.2	(-0.2-0.7)	0.7	(0.1-1.2)	-0.5	(-1.3 - 0.4)
Elixhauser score[c]	1.50	(1.37-1.63)	1.06	(0.99-1.14)	0.44	(0.30-0.58)

a. Proportion (%) of patients with each condition, separately for Indigenous and non-Indigenous patients, with 95% confidence interval.

b. Difference (Indigenous minus non-Indigenous), with 95% confidence interval.

c. Average score per patient, with 95% confidence interval.

Table 5A Patients with a previous admission: prevalence of individual conditions[a] and Elixhauser score.

	Recorded in previous admissions						Recorded at AMI admission					
With previous admission	Indigenous		Non-Indigenous		Difference[b]		Indigenous		Non-Indigenous		Difference[b]	
Congestive heart failure	17.7	(13.9-21.6)	11.9	(8.5-15.3)	5.9	(0.7 - 11.0)	24.2	(19.9-28.4)	24.1	(19.5-28.6)	0.1	(-6.1 - 6.3)
Cardiac arrhythmias	6.7	(4.2-9.2)	13.0	(9.5-16.6)	-6.4	(-10.6 - -2.1)	12.1	(8.8-15.3)	19.7	(15.5-23.9)	-7.6	(-12.9 - -2.4)
Valvular disease	5.7	(3.3-8.0)	2.3	(0.7-3.9)	3.3	(0.5 - 6.2)	6.4	(4.0-8.9)	2.3	(0.7-3.9)	4.1	(1.1 - 7.1)
Pulmonary circulation disorders	0.5	(-0.2-1.2)	1.2	(0.0-2.3)	-0.7	(-2.0 - 0.7)	1.5	(0.3-2.8)	0.3	(-0.3-0.9)	1.3	(-0.2 - 2.7)
Peripheral vascular disorders	5.4	(3.1-7.7)	11.0	(7.7-14.3)	-5.6	(-9.6 - -1.7)	3.3	(1.5-5.1)	7.8	(5.0-10.7)	-4.5	(-7.8 - -1.2)
Hypertension, uncomplicated	35.7	(30.9-40.5)	29.6	(24.7-34.4)	6.2	(-0.6 - 13.0)	36.0	(31.2-40.8)	36.5	(31.4-41.6)	-0.5	(-7.5 - 6.4)
Hypertension, complicated	2.1	(0.6-3.5)	1.2	(0.0-2.3)	0.9	(-0.9 - 2.7)	1.0	(0.0-2.0)	0.9	(-0.1-1.9)	0.2	(-1.3 - 1.6)
Paralysis	1.8	(0.5-3.1)	1.7	(0.4-3.1)	0.1	(-1.9 - 2.0)	2.3	(0.8-3.8)	2.6	(0.9-4.3)	-0.3	(-2.5 - 2.0)
Other neurological disorders	5.1	(2.9-7.3)	4.9	(2.6-7.2)	0.2	(-3.0 - 3.4)	3.6	(1.7-5.5)	3.8	(1.7-5.8)	-0.2	(-2.9 - 2.6)
Chronic pulmonary disease	22.9	(18.7-27.1)	19.4	(15.2-23.6)	3.5	(-2.5 - 9.4)	16.7	(13.0-20.4)	22.3	(17.9-26.7)	-5.6	(-11.3 - 0.1)
Diabetes, uncomplicated	31.4	(26.7-36.0)	19.4	(15.2-23.6)	11.9	(5.6 - 18.3)	27.2	(22.8-31.7)	15.7	(11.8-19.5)	11.6	(5.6 - 17.6)
Diabetes, complicated	20.1	(16.1-24.0)	10.4	(7.2-13.7)	9.6	(4.4 - 14.9)	22.1	(18.0-26.2)	12.2	(8.7-15.6)	9.9	(4.4 - 15.4)
Hypothyroidism	3.6	(1.7-5.5)	1.7	(0.4-3.1)	1.9	(-0.5 - 4.2)	3.1	(1.4-4.8)	2.0	(0.5-3.5)	1.1	(-1.3 - 3.4)
Renal failure	19.0	(15.1-22.9)	9.0	(6.0-12.0)	10.0	(5.0 - 15.1)	20.6	(16.5-24.6)	10.1	(6.9-13.3)	10.4	(5.2 - 15.7)
Liver disease	2.6	(1.0-4.2)	1.4	(0.2-2.7)	1.1	(-0.9 - 3.2)	3.1	(1.4-4.8)	1.7	(0.4-3.1)	1.3	(-0.9 - 3.6)
Peptic ulcer disease excluding bleeding	0.5	(-0.2-1.2)	2.3	(0.7-3.9)	-1.8	(-3.5 - -0.1)	0.3	(-0.2-0.8)	0.6	(-0.2-1.4)	-0.3	(-1.3 - 0.6)
AIDS/HIV	0.0	(0.0-0.0)	0.0	(0.0-0.0)	0.0	(0.0 - 0.0)	0.0	(0.0-0.0)	0.3	(-0.3-0.9)	-0.3	(-0.8 - 0.2)
Lymphoma	0.3	(-0.2-0.8)	0.6	(-0.2-1.4)	-0.3	(-1.3 - 0.6)	0.3	(-0.2-0.8)	0.6	(-0.2-1.4)	-0.3	(-1.3 - 0.6)
Metastatic cancer	0.8	(-0.1-1.6)	1.2	(0.0-2.3)	-0.4	(-1.8 - 1.0)	0.5	(-0.2-1.2)	2.0	(0.5-3.5)	-1.5	(-3.1 - 0.1)
Solid tumor without metastasis	2.6	(1.0-4.2)	4.6	(2.4-6.9)	-2.1	(-4.8 - 0.6)	2.1	(0.6-3.5)	2.9	(1.1-4.7)	-0.8	(-3.1 - 1.4)
Rheumatoid arthritis/ collagen vascular diseases	1.5	(0.3-2.8)	1.2	(0.0-2.3)	0.4	(-1.3 - 2.1)	0.8	(-0.1-1.6)	1.4	(0.2-2.7)	-0.7	(-2.2 - 0.8)
Coagulopathy	1.3	(0.2-2.4)	1.2	(0.0-2.3)	0.1	(-1.5 - 1.7)	2.8	(1.2-4.5)	1.2	(0.0-2.3)	1.7	(-0.4 - 3.7)
Obesity	3.1	(1.4-4.8)	1.2	(0.0-2.3)	1.9	(-0.2 - 4.0)	2.8	(1.2-4.5)	2.6	(0.9-4.3)	0.2	(-2.1 - 2.6)
Weight loss	1.0	(0.0-2.0)	1.4	(0.2-2.7)	-0.4	(-2.0 - 1.2)	1.5	(0.3-2.8)	0.9	(-0.1-1.9)	0.7	(-0.9 - 2.3)
Fluid and electrolyte disorders	12.1	(8.8-15.3)	10.1	(6.9-13.3)	1.9	(-2.6 - 6.5)	11.6	(8.4-14.8)	9.0	(6.0-12.0)	2.6	(-1.8 - 7.0)
Blood loss anemia	1.8	(0.5-3.1)	1.7	(0.4-3.1)	0.1	(-1.9 - 2.0)	1.5	(0.3-2.8)	0.3	(-0.3-0.9)	1.3	(-0.2 - 2.7)
Deficiency anemia	7.2	(4.6-9.8)	3.8	(1.7-5.8)	3.4	(0.1 - 6.8)	6.7	(4.2-9.2)	2.0	(0.5-3.5)	4.7	(1.7 - 7.7)
Alcohol abuse	20.1	(16.1-24.0)	6.1	(3.6-8.6)	14.0	(9.0 - 18.9)	17.5	(13.7-21.3)	5.5	(3.1-7.9)	12.0	(7.3 - 16.7)
Drug abuse	1.5	(0.3-2.8)	0.6	(-0.2-1.4)	1.0	(-0.5 - 2.5)	0.5	(-0.2-1.2)	0.3	(-0.3-0.9)	0.2	(-0.7 - 1.2)
Psychoses	1.8	(0.5-3.1)	0.9	(-0.1-1.9)	0.9	(-0.8 - 2.6)	1.3	(0.2-2.4)	0.3	(-0.3-0.9)	1.0	(-0.3 - 2.3)

Depression	2.1	(0.6-3.5)	3.2	(1.3-5.1)	-1.1	(-3.4 - 1.2)	0.8	(-0.1-1.6)	2.6	(0.9-4.3)	-1.8	(-3.7 - 0.0)
Elixhauser score[c]	2.38	(2.17-2.59)	1.78	(1.58-1.99)	0.60	(0.30-0.89)	2.34	(2.18-2.50)	1.94	(1.77-2.12)	0.40	(0.17-0.63)

a. Proportion (%) of patients with each condition, separately for Indigenous and non-Indigenous patients, with 95% confidence interval.

b. Difference (Indigenous minus non-Indigenous), with 95% confidence interval.

c. Average score per patient, with 95% confidence interval.

Figure 1 Distribution of Charlson and Elixhauser scores by Indigenous status