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BRIEF COMMUNICATION

Trends in the Incidence of First Acute Myocardial Infarction in Metropolitan and Regional Areas of the Hunter Region

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Introduction There is conflicting information regarding the contemporary incidence of first acute myocardial infarction (AMI) in Australia. We sought to document the regional variations in first AMI incidence in a large health district.

Methods We identified all patients presenting with first AMI in the Hunter region of New South Wales from 2004 to 2013. We calculated age and gender adjusted incidence of AMI and evaluated differences between patients from regional and metropolitan areas. We assessed 30-day and 12-month outcomes, including mortality, through linkage with the NSW Registry of Births Deaths and Marriages.

Results The incidence of first AMI in regional areas was persistently higher throughout the study compared to metropolitan areas (IRR 1.244; 95% CI 1.14–1.35; $p \leq 0.001$). There were no significant differences between regional and metropolitan areas in 30-day and 12-month outcomes following presentation with first AMI.

Conclusions The study demonstrates persistently higher rates in regional compared to metropolitan areas, supporting the need for implementation of targeted intervention and prevention strategies.

Keywords Acute myocardial infarction • Incidence • Mortality

Introduction

We have previously reported on the long-term trends in the incidence of acute myocardial infarction (AMI). This study allowed for the inclusion of patients with recurrent AMI. Two Australian studies have provided conflicting results when assessing the incidence of first ever AMI [1,2]. The aims of this study were to compare the age and gender adjusted incidence of first ever AMI in Metropolitan and Regional areas and assess their 30-day and 12-month outcomes.

Materials and Methods

The Hunter Area Cardiac and Stroke Outcomes Unit prospectively identified all admissions in the Hunter New

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England health district with acute myocardial infarction. All patients were included in the database if they had an International Classification of Diseases, 10th revision (ICD 10) code of I21 or an International Classification of Diseases, 9th revision (ICD 9 code) of 410 on discharge from any Hunter New England Health hospital during the admission dates of 1 January 2004 and 31 December 2013. ICD 10 sub codes included were I21.0, I21.1, I21.2, I21.3, I21.4; I21.9. To identify patients presenting with first AMI, we used an 8-year look-back period to exclude patients with a prior hospitalisation with AMI. Patients discharged from hospital within 24 hours were excluded from the patient sample as these would not be suggestive of true AMI. The study was approved by the Hunter New England Local Health District Human Research Ethics Committee.

Patients were grouped into two geographical regions (Metropolitan and Regional) as previously described [3]. In brief, the local government areas, Newcastle and Lake Macquarie, were classified as ''Metropolitan'' while the local government areas of Port Stephens, Cessnock, Maitland, Singleton, Muswellbrook, Upper Hunter and Dungog were classified as ''Regional''. Annual population statistics were provided by the Australian Bureau of Statistics (ABS) and the ABS Standard Population from 2001 was used to standardise incidence rates using 10-year age strata and the direct-method of standardisation. Mortality data was provided by the NSW Registry of Births, Deaths and Marriages. Poisson log-link linear regression was used to assess the estimated annual change in AMI rates and the relationship between remoteness and incidence of first AMI. Comparison of case fatality rates were conducted using chi-square tests. All statistical analyses were conducted using STATA version 14 (STATA Corp).

Results

During 2004 to 2013, a total of 7,473 patients were identified presenting with first-ever AMI. Mean age on presentation was 67.1 (SD 14.5) years for men and 74.3 (SD 13.7) years for women ($p < 0.001$). The mean age at presentation was significantly different between Regional and Metropolitan areas (70.8 years vs 68.9 years; $p = 0.003$). Both Metropolitan and Regional areas saw a reduction in the incidence of first AMI over the study period (Figure 1). After adjustment for age and gender, there was a significantly higher incidence of AMI for Regional areas compared to Metropolitan areas (IRR 1.244; 95% CI 1.14–1.35; $p \leq 0.001$).

During a total of 41,774 patient years of follow-up, 4,573 (61.2%) patients survived. There were 1,137 cardiac deaths and 1,763 non-cardiac deaths. There were no statistically significant differences in case fatality between Metropolitan and Regional areas at 30 days (7.5 vs 7.6%), 6 months (13.0% vs 12.9%) or 12 months (16.8% vs 17.0%) (Figure 2).

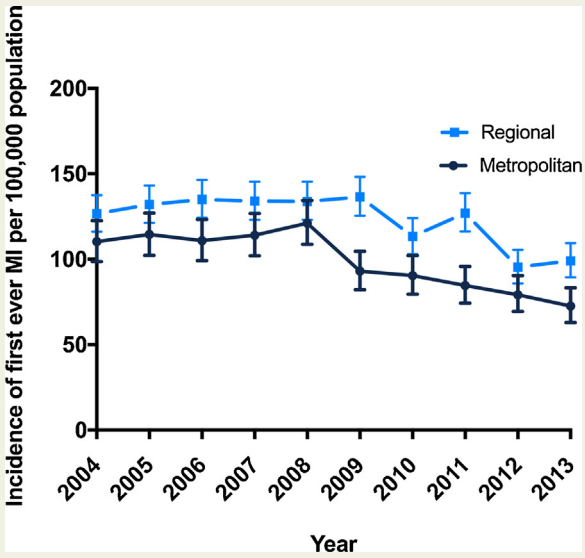

Figure 1 Age adjusted incidence of first acute myocardial infarction (AMI) according to geographic area over a 10-year time period.

Discussion

We have demonstrated higher incidence of first AMI in Regional areas compared to Metropolitan areas, with similar 30-day and 12-month case fatality. These results highlight the significant progress in systems of care throughout the Hunter region for the diagnosis and treatment of patients with AMI [4]. However, they also indicate that research is required to explore the reasons for a persistently higher incidence of first AMI in Regional areas.

Our results have similarities to a recent Western Australian study which found overall AMI rates to be decreasing in metropolitan areas, while regional and remote areas reported an increase [2]. Both our study and the Western Australian study have reported an overall decline in first AMI incidence, driven mainly by reductions in metropolitan areas. This contrasts with a nationwide study which reported an overall increase in first AMI incidence rates [1]. The similarity between the Western Australian study and ours may reflect the similar methodology used to avoid double counting patients presenting to two separate hospitals within the one admission. A large contemporary study which followed geographical incidence of AMI in America showed significant regional difference but concluded these differences were narrowing over the last decade [5]. Many reasons for a higher incidence in regional areas can be speculated and are likely related to reduced access to outpatient specialist care [6], access to general practitioners [7], and higher smoking rates [8].

The underlying reasons for the near identical 30-day and 12-month outcomes following AMI in regional and metropolitan patients may be due to the contemporary systems of care in place to assist in the diagnosis and treatment of patients with AMI. The pre-hospital thrombolysis and primary angioplasty service commenced mid-way through the study period (2008), and has shown similar outcomes with

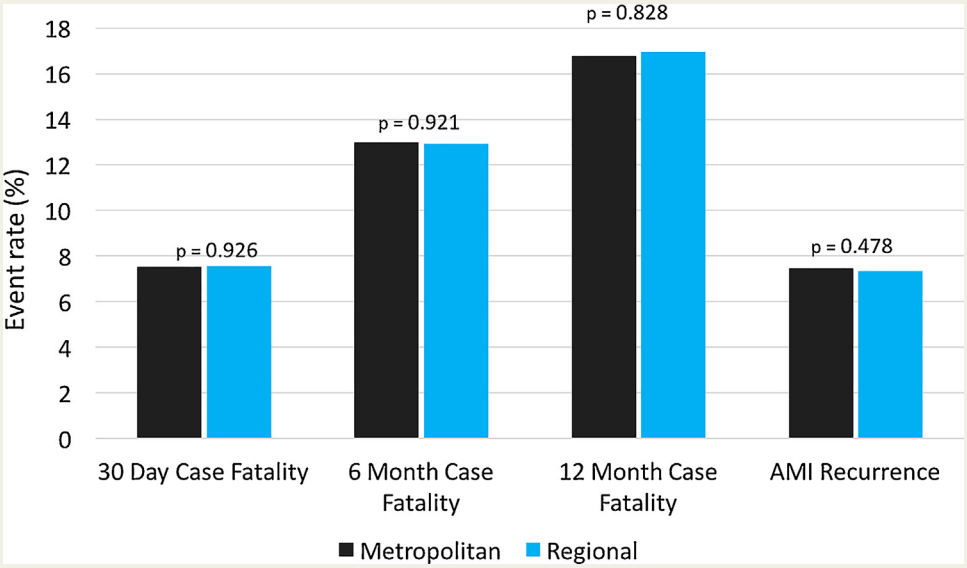

Figure 2 Comparison of recurrent acute myocardial infarction (AMI), 30-day, 6-month and 12-month case fatality between Regional and Metropolitan patients.

both reperfusion methods [4]. This service alone is unlikely to be responsible for the similar case fatality outcomes, as it only covers 5 years of the study period and does not include patients with NSTEMI. Compared to international cohorts of patients with first AMI, our 30-day and 1-year mortality rates were comparable or lower [9,10].

Limitations of the study include the reliance on diagnostic coding which may not accurately reflect the true incidence of AMI. There may be variation in the reporting and subsequent coding of AMI across the region which may affect the results. Secondly, patient level information regarding comorbidities and risk factors may contribute to the observed difference in incidence.

Conclusions

The study demonstrates an overall declining incidence of first AMI with persistently higher rates in regional compared to metropolitan areas, supporting the need for implementation of targeted intervention and prevention strategies.

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