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Management of the acute cardiac patient in the Australian rural setting: A 12 month retrospective study

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ABSTRACT

Background: Rural cardiac patients may require transfer to tertiary health services for ongoing acute cardiac management. The time required to transfer is a consideration in determining appropriate clinical care. There is little published data reporting acute cardiac management in the Australian regional setting that reviews factors determining transfer to a tertiary centre.
Purpose: This paper reports the findings of a quantitative, retrospective study conducted to identify demographic differences and potential predictors to urban transfer for ongoing acute cardiac management for patients presenting to a regional hospital with suspected acute myocardial infarction.
Methods: Using a purpose designed tool an audit of 204 files from June 2009 to July 2010 was conducted for all patients admitted to a regional hospital having a discharge diagnosis of acute myocardial infarction or angina. Patient demographics, clinical outcomes, concordance with treatment guidelines, and possible predictors of treatment decisions were investigated.
Findings: Patients younger than 65 years ($p < 0.001$), unemployed ($p < 0.01$) and with acute electrocardiograph changes ($p < 0.01$) were more likely to be transferred to a tertiary centre. Treatment guidelines concordance for acute cardiac care ranged from 70% to 79% for all patients.
Conclusions: Although presenting patients were treated in a timely manner consistent with national guidelines, to be younger, unemployed or have electrocardiograph changes was a greater predictor to urban transfer. It is unknown if these differences in transferring or not to a tertiary centre contribute to poorer long-term cardiac outcomes for rural patients. Further evaluations are warranted.

Introduction

Cardiovascular disease (CVD) has been the major cause of death in Australia for many decades. Over three million Australians have a long term CVD.[1] However, the mortality rate attributed to CVD varies by the recorded prevalence of risk factors and with this, geographic location. A 2007 publication outlined that cardiovascular death rates are 20–40% higher in regional and remote Australia and seen in younger patients when compared to urban areas.[2] This is in addition to the reported differences between men and women in regional areas.[3]

Acute Coronary Syndrome (ACS) is one of the largest subsets of CVD and can be further subdivided into angina and acute myocardial infarction (AMI). An AMI is classified as a ST-segment Elevation Myocardial Infarction (STEMI) or Non ST-segment Elevation Myocardial Infarction (NSTEMI). The distinction influences clinical management. Despite the technology to treat coronary heart disease, research demonstrates the critical determinant on health outcomes for patients following an AMI is 'time to treatment'.[4]

Treatment of a STEMI typically involves rapid re-establishment of blood flow either by means of Percutaneous Coronary Intervention (PCI) to the affected vessel or fibrinolytic therapy (FT) to relieve obstruction and re-establish coronary blood flow.[5,6] The choice of revascularisation therapy is time dependant. Both local and international treatment guidelines recommend immediate PCI

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in the presence of a STEMI.[7] Greater than 12 h from symptom onset indicates treatment with PCI can be deferred and FT is recommended.[7–9] A PCI is performed in tertiary referral centres, which are predominantly located in the metropolitan centres in Australia. Given the geographical distances regional Australians are faced with to access tertiary centres, optimal health outcomes are affected. Travel time is often greater than 2 h by road or fixed wing aircraft. This is in addition to time taken to find and secure a monitored bed in an appropriate facility as well as patient handover for transfer. The total time taken to transfer as a consequence is significant in the Australian rural context for health outcomes.

The aim of this study was to describe health and transfer outcomes for people presenting to a regional hospital having a discharge diagnosis of AMI. The socio-demographic and transfer destinations of a regional cohort were examined to identify potential differences between transferred and non-transferred patients experiencing a STEMI, and to identify possible predictors to transfer.

Methods

A quantitative retrospective study was conducted. Prospective Human Research Ethics Committee (HREC) approval was obtained from the university and hospitals committees (approval numbers: FHEC10/138 and JHEC/354/10/14, respectively). A 'waiver of consent' was applied for in the HREC applications based on the requirements outlined in the 'National Statement on Ethical Conduct in Human Research'.[10] A waiver of consent is applicable when the study fulfils the criteria of a low risk study and there are sufficient measures in place to ensure the privacy and confidentiality of all those whose records data are to be collected from.[10]

A purpose designed tool was developed following the national guidelines.[5,7] The chart audit tool comprised of seven categories: socio-demographic, mode of presentation, clinical findings, and multidisciplinary referrals made during this admission, length of stay, discharge diagnosis and medications commenced during this admission. All Emergency Department (ED) presentations with a confirmed discharge diagnosis of AMI, i.e. ICD-10 codes of I20 or I21, whose file confirmed being an Australian citizen, greater than 18 years of age, and alive at time of transfer in the 12 month study period were examined. The health information services at the regional hospital generated a list in chronological order for the period of June 2009–July 2010 that fulfilled the inclusion criteria. All patient files were de-identified by health information service staff prior to access by the researcher.

The study site was an Australian inner regional city of approximately 100,000 people spanning two states.[11] It is approximately 300 km from one tertiary referral centre and approximately 600 km from another in the opposite direction.

Data collected were organised into two primary categories: those patients transferred and those patients not transferred to a tertiary referral centre for ongoing cardiac care. All data were entered into an electronic database and analysed using SPSS V18. Descriptive statistics were calculated for all results. Inferential statistics to investigate relationships between discrete variables were conducted. Data were examined to observe for a normal distribution. Chi-square and an analysis of variance (ANOVA) were used to test any correlation between variables generated by the chart audit. Analysis of co-variance (ANCOVA) was used to test between group comparisons to predict the dependent variable of transfer for ongoing care while controlling for variables that may affect the outcome (i.e. age, sex, co-morbidities). Pearson's Correlation was used to test bivariate relationships and Mann–Whitney *U* was used for non-parametric testing.

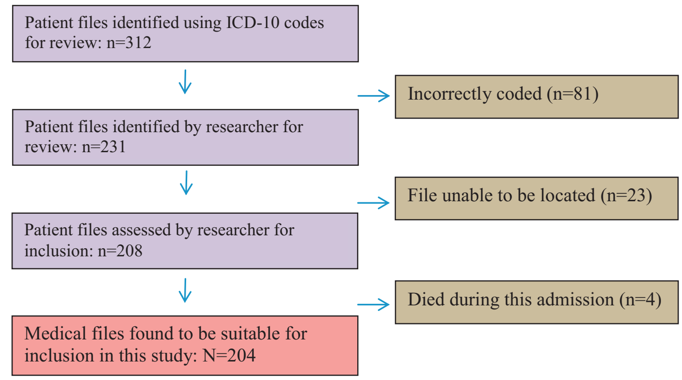

Fig. 1. Flow chart of study inclusion and exclusion criteria.

To test the hypothesis of differences between the groups a one way ANOVA was used. To compare time to treatment between the groups an independent Student's *t*-test was selected. Frequency calculations were used to test for concordance with treatment guidelines with an ANCOVA used to control for the effect of co-morbidities (namely, Chronic Obstructive Pulmonary Disease) on concordance. In addition, a step-wise regression was used to test the secondary hypothesis of best predictors of timely transfer.

Results

Patient files of those admitted to the study site in the study period coded with an ICD-10 discharge diagnosis of I21 (AMI) and its' subsets were evaluated. A flow diagram was constructed to assist in the scrutiny of this study's design (see Fig. 1). This approach is consistent with the 'strengthening the reporting of observational studies in epidemiology' (STROBE) statement.[12]

Of the 204 medical files that satisfied the study criteria, 139 patients (68%) arrived at the regional hospital's Emergency Department (ED) via ambulance, of which 23 (11%) had been transferred from a peripheral hospital post an acute cardiac event. Approximately one third of patients ($n = 65$, 32%) arrived via private vehicle. Within this latter group, 17 (8%) had been referred on to the regional hospital by a local specialist or general medical practitioner.

The most common time of day for presentation to the ED was 12:00 h The most common day of the week to present to the ED at this regional hospital with chest pain was shared between Thursday and Saturday ($n = 36$, 17% for both days). The median length of hospital stay (skewness = 2.62) was 2 days (IQR_{1-3}: 1–3.5 days). Ninety nine patients (49%) were transferred to the metropolitan setting for ongoing cardiac management.

The mean age of the sample reviewed was 69 years (SD: 14; range 34–95 years) of which 132 (64%) patients were male. The employment status of 131 patients (63%) was recorded as retired. Of these patients, 25 (19%) had Department of Veterans Affairs (DVA) health care entitlements and 36 patients (27%) had Department of Health and Ageing (DoHA) entitlements.

Place of residence was recorded in most of the patient files. The majority of the sample ($n = 159$, 81%), lived with family members or friends, 27 (14%) lived alone. An aged care facility, as the primary place of residence, was recorded for 10 patients (5%). Community services i.e. meals on wheels and/or home help were recorded as services in use prior to this hospital admission in just 35 (16%) of all files reviewed.

Demographic data and acute clinical experience were compared between patients who were transferred to a tertiary centre for further treatment ($n = 99$, 48.5%) and those who remained at the regional hospital ($n = 105$, 51.5%). The difference in years for those transferred ($M = 63$, $SD = 13$) and those not transferred ($M = 74$,