

A Review of a Regional Primary Percutaneous Coronary Intervention Service, with a Focus on Door to Reperfusion Times: The 2012 Auckland/Northland Experience



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Aims

Primary percutaneous coronary intervention (PCI) is the optimal management for ST segment elevation myocardial infarction (STEMI) patients. We reviewed the largest primary PCI regional service in New Zealand: the Auckland/Northland service based at Auckland City Hospital, to assess patient management, in particular the door to reperfusion times (DTRTs), and predictors of death in hospital.

Methods

We obtained patient details from a comprehensive prospective database of all primary PCI patients admitted with STEMI from 1/1/12 to 31/12/12 to the Auckland City Hospital cardiac catheterisation laboratory. Of four District Health Boards (DHBs) within the region, two accessed this regional service at all times, and two accessed the Auckland City Hospital cardiac catheterisation laboratory 'after hours': all times except for 08:00 to 16:00 hours on Monday to Friday.

Results

A total of 401 adult patients underwent a primary PCI at the Auckland City Hospital Regional centre for a STEMI presentation, over the 12 months period. The median patient age was 61 years, 77% were male. Overall 183 (46%) (95% CI 41, 51) patients achieved a DTRT of ≤ 90 mins, and 266 (66%) (95% CI 61, 71) a DTRT of ≤ 120 mins, with a clear geographical influence to these times. Of 27 patients with direct transfer to the catheter laboratory from the community, the DTRT was ≤ 120 mins in 24 (92%) (95% CI 72, 96) patients. In-hospital mortality was 24 (6%) patients (95% CI 4, 9).

Abbreviations: ACS, Acute Coronary Syndrome; ACE, Angiotensin Converting Enzyme; ARB, Angiotensin Receptor Blocker; CABG, Coronary Artery Bypass Graft; CAD, Coronary Artery Disease; CVA, Cerebrovascular Accident; LBBB, Left Bundle Branch Block; MI, Myocardial Infarction; NSTEMI, Non ST Segment Elevation Myocardial Infarction; PCI, Percutaneous Coronary Intervention; SD, Standard Deviation; STEMI, ST-Segment Elevation Myocardial Infarction; TIA, Transient Ischaemic Attack

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Conclusions

The 2012 Auckland/Northland primary PCI service delivers good outcomes consistent with current Australasian standards. Although geographical isolation complicates door to reperfusion times, these may potentially be improved by more focus on direct transfer to the cardiac catheterisation laboratory, especially directly from the community.

Keywords

Primary PCI • STEMI • Health Care delivery • ECG • Door to Reperfusion Time

Introduction

Patients presenting with a myocardial infarction associated with ST-segment elevation (STEMI) or a new (or presumed new) left bundle branch block ECG pattern are at the highest risk of death from an acute coronary syndrome (ACS) [1]. In New Zealand in 2012, there were approximately 2,600 patients with this presentation [2]. In-hospital mortality remains high, at 7% for Australian and New Zealand STEMI patients in 2012 [3]. Treatment with early reperfusion within 12 hours of symptom onset significantly lowers patient mortality [4–6]. Urgently restoring myocardial blood supply is paramount as time delays result in the loss of viable myocardium [7], and every minute of delay affects one year mortality [8].

For STEMI patients, a primary percutaneous coronary intervention (PCI) is the optimal method of reperfusing the culprit, occluded artery [9]. Local [10] and overseas programs in Australia [11,12] and in North America [13], designed to allow emergency access to angiography and primary PCI, have been shown to be effective. Guidelines emphasise the need to try to achieve a ‘door to reperfusion time’ (DTRT) of ≤ 90 minutes, and optimally ≤ 60 minutes. If the DTRT is anticipated to be > 120 minutes, fibrinolytic therapy is recommended [5]. If fibrinolytic therapy is given, patients should then access angiography either for a ‘rescue PCI’ if there is failure to reperfuse the culprit artery, or in a ‘routine’ way within 24 hours, if reperfusion has occurred [5].

A careful integration of clinical knowledge with effective service infrastructure is needed to deliver optimal management of STEMI patients. The Auckland/Northland primary PCI Regional program is the largest in New Zealand, reflecting the patient population in the region. It rapidly developed from 2006 when there was a distinct policy change at Auckland City Hospital to offer primary PCI as the default management for all STEMI patients. Fibrinolytic therapy was to be used only in very specific circumstances, such as when there was likely to be a significant time delay before primary PCI could be undertaken. With close collaboration of the other three District Health Board (DHB) cardiology teams within the Auckland/Northern region, STEMI patients were subsequently transferred for treatment within the primary PCI program. This has now become the accepted management for these patients across Greater Auckland and, increasingly, in Northland as well. The program is facilitated by ongoing cooperation between the interventional cardiologists ($n = 10$) from the three main Auckland DHBs, who share an on-call roster covering the out-of-hours interventional cardiology workload.

We reviewed the Auckland/Northland primary PCI regional program from 2012 to assess patient numbers and management, and in particular to determine the DTRT of the cohort, and to consider areas where improvements may be made to improve patient management.

Methods

Data Collection

Patients with STEMI undergoing primary PCI were identified from a database of all patients undergoing coronary angiography at the Auckland City Hospital cardiac catheterisation laboratory. Their hospital records were reviewed to obtain demographic information, clinical history and cardiovascular risk factors. The database recorded the times of symptom onset, ECG changes, and the timing of invasive investigations and treatments received by patients. In addition, the peak troponin T level, the admission and discharge medications and in-hospital outcome data were available. DTRT was verified using admission and cardiac catheterisation laboratory records. The reperfusion time was defined as the time of the first coronary intervention, commonly thrombus aspiration or balloon inflation.

Hospitals

The Auckland/Northland Regional Cardiothoracic service is one of five Regional Cardiothoracic Centres in New Zealand [2,14]. The Auckland/Northland Region encompasses four of the 20 National DHBs [2] (Figs. 1 and 2). Auckland City Hospital is the district hospital for 441,000 people within the central Auckland DHB (Table 1) [14]. It is also the regional centre for cardiothoracic surgery and the national centre for heart and lung transplantation. The Auckland City Hospital cardiac catheterisation laboratory also provides coronary angiography and PCI for 156,000 people in the Northland DHB, which includes hospitals in the medium-sized town of Whangarei, along with smaller towns of Kaitaia, Dargaville, Kawakawa and Rawene. Within normal office hours (08:00 to 16:00 hrs, Monday to Friday), the Counties Manukau DHB (CMDHB) provides coronary angiography and PCI at Middlemore Hospital in South Auckland, for a 485,000 catchment population (Table 1, Fig. 2). The Waitamata DHB (WDHB), which encompasses North Shore (North Auckland) and Waitakere (West Auckland) Hospitals, provides the same daytime services at North Shore Hospital for a combined population of 529,000 people (Table 1, Fig. 2). The ‘out of hours’ service for primary PCI for Counties

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