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Immigrant status and disparities in health care delivery in patients with myocardial infarction

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ABSTRACT

Background: We investigated the differences in socioeconomic status and quality health care between Singapore-born citizens and immigrants presenting with ST-segment elevation myocardial infarction (STEMI).

Methods: In a prospective study, patients admitted with STEMI were recruited for a questionnaire survey. The recruited patients were categorized based on their immigration status into Singapore-born citizens (SBC), foreign-born citizens (FBC), permanent residents (PR) and non-residents (NR).

Results: Among the 374 recruited patients, 286 (76.5%) patients were categorized as SBC, and the remaining 88 (23.5%) as immigrants. Further breakdown of the immigrants revealed that 33 were FBC (median duration of living in Singapore, 53 years), 22 were PR (18 years), and 33 were NR (11 years). Significant differences in socioeconomic status among SBC, FBC, PR and NR were detected. NR were in the lowest, while PR in the highest, socioeconomic class based on occupation ($p = 0.003$), education level ($p < 0.001$), and average monthly household income ($p = 0.020$). There were no disparities in the proportion of patients treated with primary PCI (SBC 88%, FBC 82%, PR 91%, NR 79%, $p = 0.555$). Median door-to-balloon times were similar among the four groups (56, 52, 60, 56 min, $p = 0.614$). Compared with SBC, PR was associated with longer symptom-to-balloon times (median difference 54.1 min; 95% CI 9.0 to 99.2).

Conclusion: There were major differences in the socioeconomic status among SBC, FBC, PR and NR who presented with STEMI. Although there were no major disparities in access to high quality health care to these patients with different immigration status, symptom-to-balloon time differed substantially among the different migrant classes.

1. Introduction

ST-segment elevation myocardial infarction (STEMI) is the leading cause of mortality and morbidity worldwide. Early presentation for timely primary percutaneous coronary intervention and the initiation of evidence-based medical therapy are key health care performance metrics endorsed by both the American and European guidelines for management of STEMI [1,2]. In Asia, the availability of the aforementioned high quality health care varies widely among different countries, and the socioeconomic status of patients is an important factor determining their accessibility. Since immigrants' socioeconomic status often differ from that of local citizens, it is conceivable that disparities in accessibility to high quality health care are particularly obvious in countries with a high immigration rate.

Disparities in medical care among population in different strata of society have been recognized as an imminent health care issue in western countries [3,4]. For example, in the 2007 National Healthcare Disparities Report [5], disparities in the optimal treatment of heart failure between the white and non-white population in the U.S. still exist. Yet, disparities in the treatment of STEMI, the leading cause of mortality and morbidity, remain unevaluated. Compared with local-born citizens, immigrants usually have lower rates of health insurance coverage, use less health care, and receive a lower quality of health care [6].

Singapore is an Asian country with a large number of immigrants. Foreigners constituted 29% of Singapore's total labor force in 2000, making this the highest proportion of foreign workers in Asia [7]. In this study, we sought to investigate the differences in socioeconomic status between Singapore-born citizens and immigrants presenting with STEMI in Singapore. We further studied whether there were

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disparities in accessibility to high quality health care, and if patients' psychosocial condition after discharge was associated with their immigration status.

2. Materials and methods

2.1. Study design and population

This was a prospective study conducted at a university-affiliated hospital in Singapore. Singapore (total population in 2010, 5.1 million) is a multiethnic country located in Southeast Asia [8]. Based on the immigration status, 3.2 million (62.7%) were Singapore citizens (including Singapore- and foreign-born), 0.5 million (9.8%) were Singapore permanent residents, and 1.3 million (25.5%) were non-residents. Our institution is a 991-bed acute general hospital located in the western region of Singapore. For patients presenting with STEMI to our institution, primary percutaneous coronary intervention has been the default reperfusion strategy since 2002. Median door-to-balloon time in 2007 at our institution was 72 min [9].

Patients presenting to our hospital with a diagnosis of STEMI within 12 h after symptom onset were eligible for participation in this questionnaire survey. The exclusion criteria of this study were evolved STEMI (presenting more than 12 h after symptom onset), clinically unstable condition hindering the conduct of the questionnaire survey, language barrier, and inability or refusal to give written informed consent (application for verbal consent was declined by the local ethics committee). Enrolled patients underwent a two-stage questionnaire survey. Face-to-face interviews were conducted by a research assistant. If the participant did not understand a question or needed further explanation on a particular issue, this would be clarified with the research assistant. This research has conformed to the principles embodied in the Declaration of Helsinki. This study was approved by the local ethics committee (Reference: DSRB Domain C/08/218). All recruited patients gave written informed consent.

Recruited patients were approached by a dedicated research assistant to complete the first part of the questionnaire survey between day 2 and 5 after being admitted to the hospital. The following demographic and clinical information were collected: race, sex, age, immigrant status indicated by place of birth and citizenship, marital status, educational level, employment status, occupational type, household income, and residential type. The second stage of the questionnaire survey took place at the first clinic visit, between 1 and 2 months after the patients were discharged from the hospital. The size of patients' social network, satisfaction with social support received and level of perceived stress after STEMI were assessed by the same research assistant. Specifically, patients were asked about the number of people in their informal social network they could rely on for informational, emotional, financial and practical support, whether they have sought each type of social support from different groups of people within their informal social network, and their satisfaction level (1 for "very dissatisfied" to 6 for "very satisfied") with each type of social support received. To measure the patients' psychological stress after STEMI, an adapted version of Perceived Stress Scale (PSS)-10, originally developed by Cohen and Williams, was used [10]. The frequency of experiencing stress on each of the 9 items was measured using a 5-point Likert scale (1 for "never" to 5 for "very often").

2.2. Categorization based on immigration status

The recruited patients were divided into four groups based on their immigration status upon admission to hospital: (1) Singapore-born citizens (*SBC*): patients who had been born in Singapore and were citizens of Singapore; (2) foreign-born citizens (*FBC*): patients who had been born outside Singapore and had taken up Singapore citizenship prior to being admitted to the hospital; (3) permanent residents (*PR*): patients who were permanent residents of Singapore. Majority of these patients had been born outside Singapore and subsequently moved to this country. Rarely, this could also be Singapore-born offsprings of non-Singapore citizens (unlike in the U.S., Singapore-born offsprings of non-Singapore citizens are not citizens by default). (4) Non-residents (*NR*): patients who were staying temporarily in Singapore and had been born outside Singapore.

2.3. Study endpoints

The primary study endpoints were socioeconomic status and accessibility to high quality health care for the management of STEMI among the four study groups (*SBC*, *FBC*, *PR* and *NR*). Socioeconomic status was indexed by education level, occupation and average monthly household income. Quality level of health care was measured by the percentage of patients treated with primary percutaneous coronary intervention, median symptom-to-balloon time, median door-to-balloon time and prescription of evidence-based medical therapy.

2.4. Statistical analysis

Differences in the socio-demographic and clinical characteristics of the four study groups were compared using the χ^2 test for categorical variables. For continuous variables, the analysis of variance was used to compare differences in mean if the data was normally distributed. Otherwise, the Kruskal–Wallis test was implemented and the medians compared. Quantile regression was used in the multivariable analysis evaluating the effect of immigration status on symptom-to-balloon time and door-to-balloon time when accounting for the effect of potential confounders. In the assessment of the effect of immigration status on evidenced-based medications, logistic regression was applied. All statistical analyses were carried out using STATA 11, assuming a two-sided test with a 5% level of significance.

3. Results

From August 2008 to July 2010, a total of 649 patients were admitted to our hospital with a diagnosis of STEMI, and 626 (96.5%) were screened for eligibility to participate in this study. After excluding 252 patients, mainly for delayed presentation and clinical instability, 374 patients were recruited into this study (Fig. 1). All 374 patients completed the questionnaire survey during the index admission (Part 1) and a subsequent clinic visit (Part 2). Based on their immigration

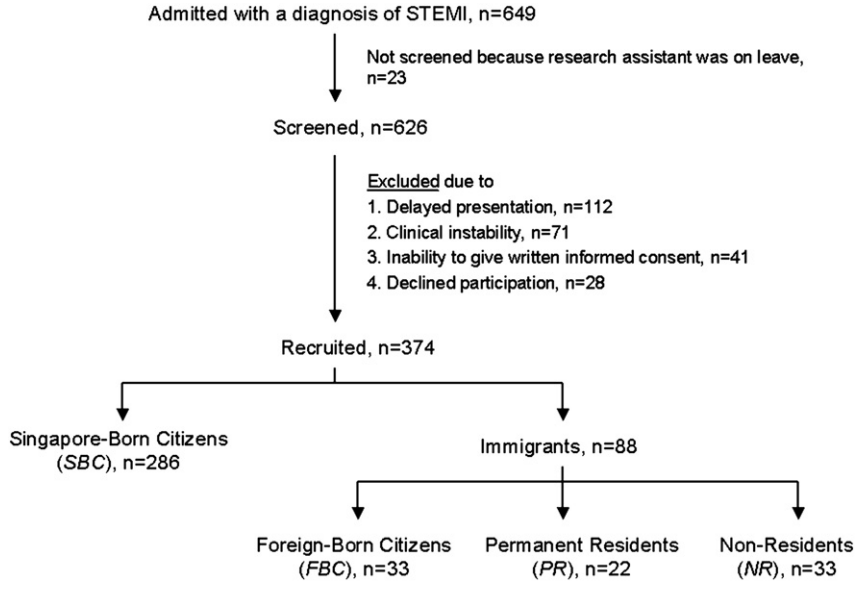

Fig. 1. Study Profile.