The impact of type of acute myocardial infarction on cardiac patient self-efficacy after hospitalisation

Abstract

Background: Self-efficacy is an important psychological construct associated with patient adherence with healthy lifestyle choices. Few studies have focused on impacts of type of Acute Myocardial Infarction (AMI): Non-ST-Elevation Myocardial Infarction (NSTEMI) and ST-Elevation Myocardial Infarction (STEMI) and its different treatment modalities of AMI on changes in cardiac self-efficacy after hospitalisation. **Objective**: This study examines the changes in cardiac self-efficacy based on type of AMI and to investigate the impact of different treatment modalities on changes in cardiac self-efficacy among post-AMI patients during hospitalisation, and at three- and six-month follow-up subsequent to hospitalisation. **Methods**: A repeated measures design was used with a convenient sample of 210 patients diagnosed with first AMI. Patients completed the Cardiac Self-Efficacy Questionnaire at the three time points. The study was implemented in three major hospitals in xxxxx. Patients did not have access to cardiac rehabilitation. **Results**: There was a statistically significant impact of AMI type on changes in cardiac self-efficacy measured between T1 and T2, between T2 and T3 and subsequently between T1 and T3. Nevertheless, there was no statistically significant impact of treatment modalities of AMI on changes in cardiac self-efficacy measured at the three time points. **Conclusions:** Assessment of self-efficacy for post-AMI patients is recommended. Moreover, post-NSTEMI patients need more attention when implementing an intervention to enhance self-efficacy after hospitalisation. Health decision makers have to consider establishing cardiac rehabilitation to improve self-efficacy in xxxxx. Further research is needed to confirm the study

results and to investigate other contributing factors that could influence self-efficacy after hospitalisation.

Keywords: Cardiac self-efficacy, myocardial infarction, treatment modalities, cardiac rehabilitation.

Introduction

Cardiovascular disease (CVD) remains the leading cause of death globally, responsible for 17.9 million deaths annually [1]. CVDs are a group of disorders of the heart and blood vessels, and including Coronary Heart Disease (CHD), cerebrovascular disease, rheumatic heart disease, and numerous other conditions [1]. Four out of 5 CVD deaths are due to heart attacks and strokes, and a third of these deaths occur prematurely in people under 70 years of age [1]. In the US, CHD was responsible for 635,260 deaths in 2016, approximately every 40 seconds a myocardial infarction occurs in the country [2]. In xxxxx, CVD is responsible for 37% of total mortality [3].

Acute Myocardial Infarction (AMI) is acute myocardial injury with clinical evidence of acute myocardial ischemia and with detection of increase of cardiac troponin T values (cTnT) and/ or troponin I (cTnI) values with at least 1 value above the 99th percentile upper reference limit. According to European Society of Cardiology diagnosis of AMI is confirmed if it is associated with at least one of symptoms of myocardial ischemia, new ischemic Electrocardiographic (ECG) changes, presence of pathological Q waves, new loss of viable myocardium or new abnormal regional wall motion [4].

AMI is classified according to European Society of Cardiology ECG changes as Non-ST-Elevation Myocardial Infarction (NSTEMI) and ST-Elevation Myocardial Infarction (STEMI) [5].

In recent years, there has been significant progress in AMI management, development of specific revascularisation methods including thrombolytic therapy and invasive procedures, such as angioplasty and Primary Percutaneous Coronary Intervention (PPCI), depending on the type of AMI [5].

Patients post STEMI is treated by PPCI if presenting in 12 hours of symptoms and PPCI can be delivered in 120 minutes. Fibrinolysis therapy is recommended if presenting in 12 hours of symptoms and PCI not possible in 120 minutes [6]. Meanwhile, patients post NSTEMI are treated through assessing individual risk of future adverse cardiovascular events using an established risk scoring system that predicts 6-month mortality. For example, using the “GRACE” scoring risk management system, in people who have been diagnosed with NSTEMI or unstable angina is important for determining early management strategies. If the Patient post NSTEMI has low risk (predicted 6-month mortality ≤ 3%), a conservative management without angiography is considered. For intermediate or higher risk (predicted 6-month mortality > 3%) it is recommended to implement immediate angiography if clinical condition unstable, or angiography (with follow-on PCI if indicated) within 72 hours [5,6].

Previous studies have shown that PPCI is a more effective treatment compared to thrombolytic therapy, as it reduces the re-myocardial infarction, risk of bleeding and mortality and improves maintenance of coronary artery patency [5,7]. Despite improvements in the treatment modalities for post-AMI patients and more advanced diagnostics and imaging technology, up to 12.4% of patients with AMI die within 30 days of the event [8]. Recently, a new survey reported data showing that 33% of AMI cases were categorised as STEMI, and 67% were categorised as NSTEMI [9]. Patients diagnosed with NSTEMI had a higher rate of in-hospital mortality (13%) than those with STEMI (9.6%). In addition, patients with NSTEMI had higher mortality (67%)

than patients with STEMI (53%) at eight-year follow-up [10]. These findings highlight the importance of secondary prevention along with treatment for patients with AMI in order to avoid further AMI, its complications, and other manifestations of vascular disease.

There is clear evidence that secondary prevention practices decrease both mortality and morbidity among patients diagnosed with AMI [11]. Secondary prevention along with treatment reduced the 30-day mortality of AMI to great effect, from 20% in 1995 to 12.4% in 2014 [8]. Many previous studies have showed that secondary prevention strategies have a beneficial impact on the patient, encouraging a healthy lifestyle and decreasing AMI risk factors after treatment[12,13].

Self-efficacy is a psychological construct that has a substantial role in improving patient outcomes and self-management skills of post-AMI patients[14]. In addition, self-efficacy is one of the most important mechanisms for the promotion of secondary prevention among post-AMI patients [15]. Self-efficacy is defined as individuals’ confidence about their own capabilities to manage actions [16].According to Bandura [16] patients with higher self-efficacy, have better self-management skills, and vice-versa. Furthermore, low cardiac self-efficacy is associated with worse baseline cardiac function and with increased risk of hospitalisation among patients with CVD [17].

There are many differences in the provided treatment modalities to post-STEMI and post-NSTEMI patients[18], in addition to different clinical figures and experiences between them [18,19]. However, there are no previous studies showed whether these differences could affect changes in self-efficacy for post-AMI patients following hospitalisation. Indeed, there is a dearth of literature regarding factors influencing changes in self-efficacy after hospitalisation among such patients, who ought to be assessed in terms of self-efficacy level during hospitalisation. Continuing the trend of assessment to include post-hospital care can serve as a guide for nurses to tailor their health interventions to enhance patient self-efficacy level, easing the transition to outpatient care and empowering patients to effectively improve their adherence to recommended treatment regimens.

METHODOLOGY

Objectives

This study has two objectives. They are:

1) To examine the changes in cardiac self-efficacy based on type of AMI among post-AMI patients during hospitalisation, and at three- and six-month follow-up subsequent to hospitalisation.

2) To investigate the impact of different treatment modalities on changes in cardiac self-efficacy among post-AMI patients during hospitalisation, and at three- and six-month follow-up subsequent to hospitalisation.

Design

A descriptive study with repeated measures design was used. Cardiac Self-Efficacy Questionnaire (CSEQ) measured self-efficacy during hospitalisation (T1), and at three (T2) and six (T3) months after hospitalisation.

Setting

The multicentre study was conducted in Xxxxx xxxxx Hospital (xxxxx), a governmental hospital, and a private hospital, all of which are located in xxxxx, the capital city of Xxxxx and its most populous region. These three hospitals are considered a referral hospitals and are equipped with advanced medical technology devices. XXXXX is a tertiary and teaching hospitals in the country, and it is affiliated with the flagship national university (the University of Xxxxx). The xxxxx hospital is affiliated with the xxxxxx of xxxxx, which provides most healthcare services for most of the xxxxx population. The private hospital is one of the major hospitals of the private healthcare sector in Xxxxx. Therefore, patients with CHD who need advanced cardiac revascularisation, such as Coronary Artery Bypass Graft (CABG) or PCI, are referred to these hospitals from all other public hospitals in Xxxxx, based on prior agreement with Ministry of Health (governmental hospitals) and other involved governmental institutions in Xxxxx. There is no structured education or rehabilitation provided for patients during their hospital stay or after discharge.

Sampling and Participants

The target population were patients admitted to CCU with a confirmed AMI, who were treated with either PPCI, PCI, or thrombolytic therapy. Inclusion criteria were: 1) all patients admitted to the CCU with a confirmed first time diagnosis of AMI, using standard ESC criteria[5]; 2) being aged over 18 years old, and 3) able to read, comprehend, and write in xxxxx. Exclusion criteria were: 1) hemodynamically unstable patients, 2) mental illness patients and 3) post-AMI patients treated with CABG (bacause they have a adifferent treatment regimen, hospitalisation period, and discharge care plan).

In this study, patients were categorized based on type of AMI into two groups: STEMI vs. NSTEMI. In addition, they were classified based on their received treatment modalities into three groups: patients treated with primary PCI, patients treated with THROMB and with PCI, and patients treated with medications other than thrombolytic therapy.

Data collection procedure

Potential patients were identified from hospital CCU by the research team and were screened for eligibility. Once eligibility was confirmed, and if patients' health conditions were hemodynamically stable, they were transferred to the medical unit where post-PCI patients in a stable health condition are routinely transferred. The eligible patients were met in the medical unit and were introduced to the researchers and the nature of the study, and were invited to participate; those who wished to take part were asked to give their written informed consent 24 to 48 hours after transfer from the CCU, and when they were haemodynamically stable. The Socio-Demographic and Clinical Data Questionnaire and CSEQ were given to patients whilst they were in-patients of the medical unit (T1), and were followed by mobile and then the researcher met them personally during their follow-up appointments in the outpatient cardiac clinics to collect the data at three (T2) and six months (T3) after hospitalisation.

The study assessed 326 patients for eligibility. A total 255 patients with AMI were identified as potential and eligible patients at T1, therefore, the study included 255 patients. During the data collection procedure, 19 patients withdrew after T1 and 10 after T2 for personal reasons; 7 patients changed their telephone number so the researchers unable to contact them; and 9 died during the data collection period. The remaining 210 patients completed all measurements time points (Figure 1). The data collection procedure began in March 2019 and ended in October 2019, lasting approximately seven months.

Insert Figure 1 here

Measures

Socio-Demographic and Clinical Data

The Socio-Demographic and Clinical Data Questionnaire was developed by the research team, covering socio-demographic factors such as age, gender, marital status, educational level, and occupation status. In addition, clinical data including type of AMI and type of treatment modalities were obtained from patients' medical files (with appropriate ethical permission under their written informed consent). Sullivan, LaCroix, Russo, & Katon,

Cardiac Self-Efficacy Questionnaire

Cardiac self-efficacy was measured by the self-administered CSEQ developed by Sullivan, LaCroix, Russo, & Katon, [20] . CSEQ is a valid and reliable questionnaire, with a Cronbach's alpha of 0.90 for control symptoms and 0.87 for maintenance function[20] Sullivan et al. It comprises16 questions under three subscales: control symptoms (8 questions), maintain function (5 questions) and healthy lifestyle (3 questions). The CSEQ score ranged from 0 to 64. The lowest score indicates low self-efficacy level and highest score indicates to high self-efficacy level. The CSEQ is disease–specific asking patients to rate how confident they are in self-efficacy behaviours concerning heart disease on a five-point Likert scale (0 = not at all, 1=somewhat confident, 2=moderately confident, 3=very confident, 4=completely confident). The xxxxx CSEQ (A-CSEQ) score ranged from 0 to 64, and the midpoint is 32. The lowest score indicates low self-efficacy level and highest score indicates to high self-efficacy level. A-CSEQ is a valid and reliable tool. The Cronbach's alpha of the A-CSEQ was found to be 0.90 indicating a very good level of internal consistency among patients with CHD [21].

Ethical consideration

All Ethics and Research Committees or Institutional Review Board approval was obtained at all facilities. All patients gave written consent before participating in the study. All data were anonymous, confidential and password-protected computers accessible only to the research team.

Data analysis

The collected data were statistically analysed using SPSS version 22 for Windows (SPSS, Inc., Chicago, IL, USA), while descriptive statistics were used to present the patients' socio-demographic characteristics. Repeated measure analysis of variance (ANOVA) was used to examine the impact of each type of AMI and different treatment modalities on changes in cardiac self-efficacy between T1 and T2, T2 and T3 and between T1 and T3. In addition, correlation in self-efficacy were examined based on socio-demographic characteristics, Pearson correlation was used with continuous variables such as age. Differences in self-efficacy were examined by repeated measure ANOVA, with categorical variables such as education and employment, and independent t-test was used with dichotomous variables, such as gender. The differences were considered statistically significant if the p value was < 0.05.

Findings

Socio-demographic characteristics and clinical details

As shown in Table 1, the mean age of the 210 patients was 61.7 ± 8.3 (n = 210), ranging from 40 to 82 years, and 60.5% were male (Table 1). Analysis of the patients' clinical details shows the two groups of post-AMI patients: 61% (n = 128) STEMI; and 39% (n = 82) NSTEMI. The three groups based on the three treatment modalities comprise: 37.1% (n = 78) treated with primary PCI; 28.6% (n = 60) with THROMB and with PCI; and 34.3% (n = 72) with medications other than thrombolytic therapy. There were no significant differences in cardiac self-efficacy based on socio-demographic variables at the studied time points (T1, T2, and T3).

Insert Table 1 here

Cardiac self-efficacy level at T1, T2, and T3

The findings showed that cardiac self-efficacy levels for the all post-AMI patients (n = 210) at the studied time points were: 20.69 (SD±7.9) (T1); 34.18 (SD±9.1) (T2); and 46.8 (SD±8.9) (T3). The cardiac self-efficacy level at T1 was below the midpoint (20.69 (SD±7.9)) (the midpoint of the cardiac self-efficacy level is 32). The repeated measure ANOVA test showed that a significant increasing in cardiac self-efficacy through the three measurements time: During their follow-up appointments in the outpatient cardiac clinics, at three and six months after hospitalisation, F (2, 208) = 555.846, p = 0.001, as shown in Table 2.

Insert Table 2 here

The impact of type of AMI on changes in cardiac self-efficacy among patients post AMI after hospitalisation

The descriptive data showed the two types of AMI, STEMI and NSTEMI, according to cardiac self-efficacy, as shown in Table 3. Repeated measure ANOVA test was used to examine the impact of types of AMI on changes in cardiac self-efficacy between T1, T2, and T3. Post-STEMI patients have a higher cardiac self-efficacy level than post-NSTEMI patients at the time points: (22.4 (7.4) vs. 17.7 (7.7) (T1); (35.4 (9.4) vs. 31.6 (8.3)) (T2); and (47.7 (8.2) vs. 46.80 (8.7)) (T3).

The data analysis revealed a statistically significant impact of type of AMI on changes in cardiac self-efficacy between T1 and T2, between T2 and T3, and between T1 and T3, as determined by: repeated measure ANOVA test in cardiac self-efficacy $F(2, 416) = 6.109$, $p = .001$; control symptoms subscale $F(2, 411.403) = 4.170$, $p = .016$; maintain function $F(2, 415.083) = 7.432$, $p = .001$; and healthy lifestyle subscale F (2, 402, 651) = 3.393, $p = .021$, as shown in Table 3.

<u>Insert Table 3 here</u>

The impact of treatment modalities of AMI on changes in cardiac self-efficacy among patients post AMI after hospitalisation

Further analysis was implemented to examine the impact of different three types of AMI treatment modalities on changes in cardiac self-efficacy between T1, T2, and T3. The three treatment modalities of AMI (STEMI treated by PPCI, THROMB with with PCI, and medications other than thrombolytic therapy) showed at a similar cardiac self-efficacy level at T1 (20.6 (6.7) vs. 18.2 (6.8) vs. 22.5 (9.3)), rising progressively at T2 (34.9 (9.7) vs. 33.6 (8.6) vs. 33.1 (9.2)), and at T3 (48.4 (9.6) vs. 47.1 (7.5) vs. 46.8 (8.7)).

Repeated measure ANOVA test revealed that there were no statistically significant impacts of the three types of AMI treatment modalities on changes in cardiac self-efficacy between T1, T2, and T3 in terms of cardiac self-efficacy $F(2, 409.384) = 2.081$, $p = .127$; control symptoms $F(2, 410.433) = 1.041$, $p = .355$; maintain function $F(2, 414) = 1.969$, $p = .142$; and healthy lifestyle $F(2, 401.486) = 3.393$, $p = .116$, as shown in Table 4.

<u>Insert Table 4 here</u>

Discussion

This study aimed to examine the impact of type of AMI (STEMI vs. NSTEMI) and the three treatment modalities of AMI (STEMI treated by PPCI vs. THROMB and with PCI vs. medications other than thrombolytic therapy) on changes in cardiac self-efficacy among post-AMI patients during hospitalisation and at three- and six-month follow-up subsequent to hospitalisation. The results of this study show that cardiac self-efficacy significantly increased during the first six months following hospitalisation and the type of AMI has impacts on changes in cardiac self-efficacy during this period. Specifically, STEMI patients had higher cardiac self-efficacy than their NSTEMI counterparts across all three studied time points. However, the treatment modalities of AMI did not seem to have an impact on cardiac self-efficacy across the three time points of measurements.

Cardiac self-efficacy is a basic essential to maintain self-management skills for post-AMI patient[22] and nurses must promote self-efficacy levels among such service users [23]. Intuitively, as per self-efficacy theory individuals are more likely to become involved in activities for which they have a high self-efficacy level and less likely to become involved in those for which they have a low self-efficacy level[16]. Therefore, in the current study, post-STEMI patients showed a higher self-efficacy and may have a better adherence with treatment regimen and healthy lifestyle choices.

Improved self-efficacy level is very important to cardiac rehabilitation outcomes [24]. Indeed, behavioural change interventions, theory-driven interventions, and cardiac rehabilitation demonstrably improve self-efficacy level among patients with CHD [25,26], particularly, from two to six months after cardiac rehabilitation [14], which is consistent with the current study, noting the contextual culture and absence of cardiac rehabilitation for the patients in the study setting. In addition, a previous study showed there was no significant changes in cardiac self-efficacy during the early recovery period among patients post AMI in Xxxxx [27]. However, the trend of self-efficacy levels in the literature was the highest at the beginning of the cardiac rehabilitation, then declined by six months following cardiac rehabilitation, and levelled off over the next 18 months[24].

The results of this study revealed that AMI type affects changes in cardiac self-efficacy. Improved cardiac self-efficacy was greater among post-STEMI patients than among post-NSTEMI ones, but this may be attributable to differences in the perceived seriousness of NSTEMI among patients. This is due to the complexity of clinical decision-making regarding patients with NSTEMI clinical phenotype, including their older age, greater burden of comorbidities, and higher likelihood of a previous AMI than STEMI patients [28].

The current study findings are congruent with those of [29] , who found that health outcomes were worse among STEMI patients within the first 90 days after hospital discharge, but from 90 days to two years STEMI patients have a lower frequency of post-discharge mortality and composite cardiovascular and cerebrovascular outcomes. Moreover, a survey by Nuti et al. [30] found that, in comparison to STEMI patients, NSTEMI patients have more past medical history of CHD, myocardial infarction, PCI, CABG, heart failure, and co-morbidities (including hypertension, diabetes, dyslipidaemia, stroke, and chronic lung disease). Also, it should be noted that post-NSTEMI patients are systematically missed in clinical analyses through less diagnostic testing.

It is important to mention here that the results of this study may be influenced by the xxxxx cultural context, including poor secondary prevention strategy, unstructured education programmes, and the absence of cardiac rehabilitation. However, this study is important because it focused on the larger proportion of patents post-AMI patents who were not involved in cardiac rehabilitation, which represents about two-thirds of all post-AMI patients worldwide [31]. On the other hand, we highly recommend increased referrals and participation of post-AMI patients in cardiac rehabilitation, because strong evidence demonstrates that cardiac rehabilitation can reduce cardiovascular mortality [32,33] and hospitalisation and lead to improvements in quality of life [32,34].

There are no previous studies of the same nature with which to compare the results of the current inquiry, and further investigations are needed to understand the reasons behind the difference of cardiac self-efficacy among patients with STEMI and NSTEMI, and the non-significant impacts of different treatment modalities on changes in cardiac self-efficacy. One recent study showed that treatment modalities of AMI have influences on physical activity, particularly in terms of step count and stepping time among post-AMI patients [35]. This study's results also indicate that NSTEMI patients exhibited lower levels of cardiac self-efficacy compared with STEMI patients, suggesting that the former need more attention to enhance their cardiac self-efficacy after hospitalisation. This is particularly important as patients with NSTEMI have higher long-term mortality compared to patients with STEMI [36].

This study's strengths include collecting the data from multicenter settings, which aids in generalization, especially for the Xxxxx population, as Xxxxx is the most populous city and the locus of referrals from other healthcare settings all over the country. In addition, no previous studies of the same nature were found to compare the impact of types of AMI and treatment modalities of AMI on changes in cardiac self-efficacy among patients with their first AMI six months after hospitalisation. However, the study has limitations such as absence of cardiac rehabilitation and poor secondary prevention provided to patients with AMI, which might influence study results. Furthermore, the study is inhibited by the short period of data collection after hospitalisation, and excluding the contributing factors that could influence study results, such as comorbidities and other psychological factors, such as depression and anxiety.

Implications for practice

Self-efficacy is an important construct to improve self-management skills, enhance patient adherence to healthy lifestyle choices, and maintain treatment regimens post-hospital discharge. The current study revealed that the type of AMI affects changes in self-efficacy after hospitalisation, but different AMI treatment modalities did not significantly affect changes in self-efficacy. Health decision makers need to give more attention to patients diagnosed with NSTEMI post-hospitalisation in order to improve their self-management skills and reduce adverse events in future. Further researches with different methods, such as qualitative studies, could improve understanding of such results relative to different cultural contexts.

Conclusion

These findings provide a theoretical basis to develop interventions for enhancing cardiac self-efficacy of post-NSTEMI patients. Thus, health decision makers need to consider the type of AMI when developing an intervention to enhance cardiac self-efficacy following hospital discharge based on the study findings. Nurses have to give more attention to post-NSTEMI patients in order to improve their self-management and reduce adverse outcomes after hospitalisation due to their particular needs (exhibiting patient-centred care). Further researches are warranted, including qualitative studies to explain the impacts of type of AMI and its treatment modalities, and confounding factors that affect changes in self-efficacy among post-AMI patients after hospitalisation.

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