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Factors influencing health-related quality of life after primary percutaneous coronary intervention for ST-elevation myocardial infarction

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ABSTRACT

Aims: This study compared health-related quality of life (HRQOL) between patients aged ≥70 and <70 years at 4 weeks and 6 months after primary percutaneous coronary intervention (PPCI) and examined predictors of HRQOL.
Background: HRQOL is an important patient outcome following PPCI for ST elevation myocardial infarction (STEMI) including pre-hospital field triage.
Methods: A comparative cohort design was conducted on STEMI patients undergoing PPCI. HRQOL was measured using the Medical Outcomes Short Form-12 (SF-12) and the Seattle Angina Questionnaire (SAQ) at 4 weeks and 6 months post-PPCI.
Results: HRQOL improved significantly from 4 weeks to 6 months in all aspects measured except anginal frequency and mental health. Patients aged ≥70 years had poorer physical HRQOL (SF-12) and physical limitations (SAQ), but better mental HRQOL (SF-12), angina frequency and QOL (SAQ) at both time points. Age, length of hospital stay, gender, partnership status and number of stents deployed are independent predictors of HRQOL improvement over time.
Conclusion: People ≥70 years reported better cardiac-specific quality of life, primarily from angina relief and improved mental function, despite worse physical limitations. HRQOL assessment is an important gauge of health status after PPCI for STEMI.

1. Introduction

Health-related quality of life (HRQOL) assessment for patients undergoing cardiac treatments is recommended by key organizations including the American Heart Association (Rumsfeld et al., 2013). One of these treatments, primary percutaneous coronary intervention (PPCI) is the optimal first-line reperfusion treatment for ST-elevation myocardial infarction (STEMI) which is a serious form of the acute coronary syndromes with high mortality and long-term morbidity. Primary percutaneous coronary intervention is initiated preferably within 60 minutes from the first medical contact and utilizes pre-hospital ambulance field triage to bypass emergency department (ED) delays (Steg et al., 2012). Although PPCI is known to improve outcomes for STEMI, the impact on HRQOL is not as well described. Furthermore, older people aged ≥70 years form a high proportion of patients undergoing this procedure, yet few studies focus on the potential differences in HRQOL that occur with age. It is projected that by 2025 approximately 1.2 billion people globally will be aged over 60 years, the age defined as "older" (World Health Organisation, 2002) with increased risk of cardiovascular disease and coronary occlusion. Primary percutaneous coronary intervention affects multiple dimensions of a person's life including physical, mental and social health as they develop across the life-span.

Researchers have investigated percutaneous coronary intervention (PCI), which includes elective procedures but limited studies explored health status outcomes for older STEMI patients. Older STEMI patients with acute symptoms may also derive the most clinical benefit from PPCI with fast field triage because of higher baseline risks and increased frailty. Indeed, changes to HRQOL in this population are known to impact on long-term recovery, physical function and mortality (Gharacholou et al., 2012b; Panasewicz et al., 2013).

Older people have more co-morbidities and constitute a higher risk cohort for PPCI as reflected by more major adverse cardiovascular

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events (MACE) including death in comparison to younger people (Bauer et al., 2011; Claessen et al., 2010). Clinical trials such as the Apex-AMI (Gharacholou et al., 2011) reported age as the strongest predictor of 90 day mortality in STEMI patients >75 years after PPCI, but HRQOL was not investigated. When HRQOL was investigated in older people there was often better HRQOL outcome (Graham, Norris, Galbraith, Knudtson, & Ghali, 2006; Li et al., 2012; Seto et al., 2000), mainly from angina relief (Agarwal, Schechter, & Zaman, 2009; Gunal et al., 2008). A recent systematic review reported improved angina status and physical functioning in octogenarians after PCI, equivalent to younger peoples' outcomes in the first 6 months (Johnman, Mackay, Oldroyd, & Pell, 2013). Some studies have also indicated age as a predictor of quality of life gains following PCI (Li et al., 2012; Pocock, Henderson, Clayton, Lyman, & Chamberlain, 2000; Spertus, Salisbury, Jones, Conaway, & Thompson, 2004). However, there is a lack of consistency in outcomes and results of another recent systematic review (Soo Hoo, Gallagher, & Elliott, 2014) did not find that age was a predictor of HRQOL after PCI.

An appropriate model of care for these complex groups examines the broader concepts of HRQOL and the theoretical framework guiding this study is the linear relationship model because it clearly includes health and physical symptoms. In this model Wilson and Cleary provided a conceptual model that links both the biophysiological and psychosocial concepts of health as causal variables which impact on global HRQOL (Wilson & Cleary, 1995). There are five health concepts in the model including physiological factors, symptoms, functional health, general health perceptions and overall quality of life interacting on a continuum. In addition, there are mediating variables such as individual and environmental characteristics which impact on these causal relationships. The model has been tested and widely used to examine the relationships among clinical, physiological outcomes and subjective psychosocial outcomes in patients with heart failure and cardiovascular diseases (Masterson Creber, Allison, & Riegel, 2013; Pettersen, Kvan, Rollag, Stavem, & Reikvam, 2008). Key concepts in this model that apply to our study on HRQOL after PCI include symptom status, which is particularly relevant because patients would expect relief from angina and that these symptoms would then likely influence their capacity to function both physically and mentally. Other nonmedical influences such as age are also considered to be influential and important in the current study. Previous studies on PPCI have inadequately examined this continuum of health complexities affecting HRQOL and this study's results will expand on the existing knowledge pool for STEMI/PPCI patients. Clarity is needed in whether there are differences and changes in HRQOL for older patients compared across time in order to improve care and recovery support.

Therefore this study aims to determine if:

i). Health related quality of life differs between people ≥70 years and <70 years old at 4 weeks and 6 months after PPCI,
ii). age has an independent effect on HRQOL, and
iii). to identify predictors of HRQOL.

2. Methods

2.1. Setting and sample

Consecutive STEMI patients treated with PPCI were recruited between April 2010 and November 2011 from the PCI Registry of a tertiary-level, university affiliated public hospital and from a metropolitan private hospital. In these institutions, approximately 1070 PCI cases were performed annually for a population of 1.2 million. These hospitals have ambulance pre-hospital field triage for acute STEMI, with PPCI as first-line emergency treatment utilizing 24-hour cardiac catheterization services.

2.1.1. Sample inclusion criteria

Patients were considered eligible if they: 1) had STEMI confirmed by serum cardiac enzyme rise of Troponin I >0.14 ng/mL or Troponin T >14 ng/L and dynamic ST elevation on presenting ECG > 0.1 mV in 2 or more contiguous precordial leads or at least 2 adjacent limb leads (Antman et al., 2007), 2) received PPCI (defined as urgent primary coronary reperfusion by using balloon inflation or stenting) following prehospital field triage or ED admission, 3) were able to write, read and comprehend English sufficient for consent and 4) were available for telephone contact after hospital discharge. Patients were excluded if they: 1) were diagnosed with dementia or any other severe neurocognitive disorder, 2) had severe hearing impairment which would prohibit telephone interviews, 3) required prolonged recovery with intensive care stay exceeding 5 days, or had cardiac arrest and or cardiogenic shock requiring intubation or inotropes, or 4) received thrombolysis as initial treatment.

Sample size was calculated for the multivariate regression analysis indicating that 258 participants with alpha level 0.05 and 11 predictors (age, admission pathway, marital status, smoking status, number of stents, hyperlipidemia, previous acute myocardial infarction (AMI), length of hospital stay, ejection fraction, hypertension and gender) was required for a small effect size on HRQOL and a power of 0.8 at 4 weeks (Soper, 2010). A small effect for HRQOL was determined to be a minimal clinically important difference (MCID) of >5 points on the SAQ, based on previous similar studies (Ho et al., 2008; Spertus et al., 1995). The anticipated dropout rate at 4 weeks was 5%; therefore 270 participants were required to be recruited.

Ethics approval was obtained from the Human Research Ethics Committees of both study sites and the university. All ethical considerations were met, including informed and voluntary participant consent, privacy and confidentiality.

2.2. HRQOL measurement

Health-related quality of life is a state of health perceived and reported by the patient as impacting on their functioning and therefore, it reflects the patient's physical, social and emotional health (Pedersen, Martens, Denollet, & Appels, 2007). It was measured using the Medical Outcomes Short Form (SF-12) and the Seattle Angina Questionnaire (SAQ) at 4 weeks and 6 months after PPCI. Both instruments are well-established, valid and reliable, commonly used in cardiac populations and are suitable for telephone administration (Summerhill & Taylor, 1992).

2.2.1. SF-12

The SF-12, a brief version of the SF-36 questionnaire measures eight general health domains: physical function, physical role limitations, emotional role limitations, vitality, social function bodily pain, general health and mental health (Ware & Kosinski, 2001). Responses are rated on a 3 to 6 point Likert scale and scores are transformed from a range of 0 to 100 (highest function). Two summary measures, the physical component summary (PCS) and mental component summary (MCS) have population-standardized norms for reference (mean of 50; 10 SD) (Ware, Kosinski, Turner-Bowker, & Gandek, 2009).

The SF-12 has been validated in coronary disease patients (Muller-Nordhorn, Roll, & Willich, 2004) with high construct validity reported in international clinical and epidemiological settings (Gandek, 1998) including Australian population health surveys (Sanderson & Andrews, 2002) and for cardiovascular populations (Lim & Fisher, 1999). This instrument has high reliability for heart disease and stroke patients (Lim & Fisher, 1999) and the MCS was tested on older adults in community living (Resnick & Parker, 2001). The coefficient in this study for all eight domains demonstrated good internal consistency and reliability with Cronbach's alpha between 0.79 and 0.95 at both time points.

2.2.2. SAQ

The SAQ measures five dimensions of health specific to coronary artery disease; physical limitations, angina stability, angina frequency, treatment satisfaction and impact on quality of life (Spertus et al., 1995). Responses are rated on a 5 or 6 point Likert scale, with transformation