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Field triage to primary percutaneous coronary intervention: Factors influencing health-related quality of life for patients aged ≥70 and <70 years with non-complicated ST-elevation myocardial infarction

Soon Yeng Soo Hoo, RN, MN, PhD student [a,b,*], Robyn Gallagher, RN, BA, MN, PhD [c], Doug Elliott, RN, BAppSc (Nurs), MAppSc (Nurs), PhD [b]

[a] Royal North Shore Hospital, Department of Cardiology, Sydney, Australia
[b] University of Technology Sydney, Faculty of Health, Sydney, Australia
[c] University of Sydney, Charles Perkins Centre, Sydney Nursing School, Sydney, Australia

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ABSTRACT

Objective: To examine clinical and health-related quality of life (HRQOL) outcomes and predictors of HRQOL for uncomplicated field triage ST-elevation myocardial infarction (STEMI) patients aged ≥70 years and <70 years after primary percutaneous coronary intervention (PPCI).
Background: Pre-hospital field triage for PPCI is associated with lower mortality but the impact of age and other factors on HRQOL remains unknown.
Methods: 77 field triage STEMI patients were assessed for HRQOL using the Short Form-12 (SF-12) and the Seattle Angina Questionnaire (SAQ) at 4 weeks and 6 months after PPCI.
Results: Regression analysis showed improvements in SF-12 domains and angina stability for older people. Age predicted lower physical function ($p = 0.001$) and better SAQ QOL at 6 months ($p = 0.003$).
Conclusion: Age, length of hospitalization, recurrent angina and hypertension were important predictors of HRQOL with PPCI. Assessment of HRQOL combined with increased support for physical and emotional recovery is needed to improve clinical care for field triage PPCI patients.

Introduction

Field (pre-hospital) triage of patients with ST-elevation myocardial infarction (STEMI) represents a fast-track pathway to percutaneous coronary intervention (PCI). With STEMI, primary PCI (PPCI) is the urgent intervention for coronary reperfusion by comparison to routine or elective PCI. A pre-hospital ECG is performed by ambulance paramedics at the scene, and transmitted to the Emergency Department (ED) of a regional major heart center. When an STEMI is confirmed, the patient is transported directly to the heart center for urgent PPCI. Unlike patients triaged through ED, who experience delays with routine assessment and admission processes, field triage directly to PPCI reduces myocardial ischemic time, resulting in better left ventricular function[1] and lower mortality.[2–7] For example, pre-hospital ECG STEMI diagnosis and field triage PPCI was associated with a 45-min reduction in revascularization delay ($p = 0.001$), and a two-thirds reduction for in-hospital mortality ($p = 0.019$)[3] including lower one month (5.4% vs 13.3%, $p = 0.006$) and one year mortality (6.6% vs 17.5%, $p = 0.019$).[8] While these effects on mortality are clear, influences on HRQOL for this patient cohort has not been investigated.

Rates of PCI in people over 70 years with STEMI have increased substantially in the United States with a 33.5% increase in PCI rates for those aged 65–79 years and 22% for ≥80 years between 2001 and 2010.[9] In Australia, PCI procedures increased with age until 75–84 years, but declined after 85 years.[10] Historically, older patients were excluded from PCI clinical trials[11] due to frailty, poor coronary vasculature and multiple comorbidities which predisposed them to increased major adverse cardiovascular events (MACE) such as strokes or death.

Despite these limitations, older individuals appear to benefit from PCI.[12,13] The Senior PAMI trial for example, demonstrated that STEMI patients aged ≥70 years treated with PCI had significantly

Abbreviations: ACS, acute coronary syndrome; ED, emergency department; HRQOL, Health-related quality of life; MACE, major adverse cardiovascular events; PCI, percutaneous coronary intervention; PPCI, primary percutaneous coronary intervention; STEMI, ST-elevation myocardial infarction.

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* Corresponding author. Department of Cardiology, Royal North Shore Hospital, St. Leonards, Sydney, NSW 2065, Australia. Tel.: +61 414061148.
E-mail address: soon.soohoo@health.nsw.gov.au (S.Y. Soo Hoo).

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reduced incidences of death, strokes and AMI.[14] Later studies comparing PCI with thrombolysis confirmed similar findings[15,16] for patients with cardiogenic shock[9] and other forms of acute coronary syndromes (ACS).[17] However, a recent large cohort study on STEMI patients aged ≥75 years reported higher co-morbidities of hypertension, chronic airway disease, previous angina including prior revascularization but patients had more PPCI-related MACE and that age was the strongest predictor of 90 day mortality after PPCI.[18]

Few studies have however examined health-related quality of life (HRQOL) in older people after PCI. HRQOL assessment is included in the American Heart Association's guidelines for PCI[19] to ensure all physical, mental, and social aspects of recovery are considered. However, with new technological advancements and increased emphasis on early coronary revascularization, research is still lacking on HRQOL for field triage cohorts particularly for older people despite age being a strong predictor of mortality and MACE after STEMI.[20,21] Results of a systematic review on octogenarians showed better physical functioning, angina status and quality of life improvements comparable to younger people and these outcomes were not age-dependent with PCI.[22] A more recent systematic review on HRQOL in PCI patients aged over 60 years also reported improved HRQOL, mainly from angina relief and better physical and mental function, with increasing age not demonstrating a predictive effect on HRQOL.[23] It is apparent therefore, that the most prevalent factors influencing HRQOL after PCI are likely to be age and angina symptoms, but it remains unclear if older people who have fast field triage PPCI experience similar HRQOL changes. Past studies have primarily reported improved mortality and better clinical outcomes associated with early reperfusion rather than evaluating the biopsychosocial aspects that HRQOL assessment confers in the setting of field triage PPCI. With projections for a global aging population[24] and increased risk of cardiovascular diseases, HRQOL assessment is crucial for strategic cardiac health care planning and improving clinical care for older people with acute coronary occlusion.

To date, there are no published studies examining HRQOL in field triage patients nor the independent effect of age in this population for potential comparison with other PCI cohorts during recovery. Similarly, the impact of socio-demographic and other potential covariates on health status and clinical outcomes of field triage PPCI patients aged ≥70 years after an STEMI event also remain relatively unknown.

The objectives for conducting this study were to:

1. Compare socio-demographic and clinical characteristics between field triage STEMI patients aged ≥70 and <70 years.
2. Differentiate HRQOL outcomes at 4 weeks and 6 months after PPCI.
3. Determine any independent predictors of HRQOL after PPCI such as age and clinical factors including hypertension, recurrent angina, smoking status and length of hospital stay which impact on HRQOL outcomes.

Methods

Design, setting and sample

This study is a component of a larger study which examined multiple outcomes following PPCI including HRQOL, qualitative and clinical data. The current study included only the field triage cohort, which comprised 31.3% of all patients recruited and examined a contemporary issue that had not been previously reported. A prospective repeated measures cohort study design was developed to address the study objectives. All consecutive STEMI patients admitted by field triage and treated exclusively with PPCI between April 2010 and November 2011 were recruited from the PCI registry of a large university-affiliated public teaching hospital and a private hospital in Sydney, Australia. These hospitals provide 24-h cardiac catheterization services in collaboration with a state-wide ambulance program for pre-hospital field triage of STEMI patients.

Sample inclusion/exclusion criteria

The inclusion criteria for the field triage cohort were: 1) STEMI diagnosis characterized by dynamic ST-segment elevation on field triage ECG or new left bundle branch block 2) persistent chest pain and symptoms of myocardial ischemia 3) no initial thrombolysis 4) Serum Troponin T > 14 ng/L or Troponin I > 0.14 ng/mL 5) able to provide informed consent in English and 6) has telephone for contact for follow-up. Exclusion criteria included a diagnosis of 1) dementia, 2) deafness, or 3) intensive care admission >5 days. The study was approved by the Human Research Ethics Committees of the two hospitals and all participants provided informed consent prior to data collection.

HRQOL measurement

Health-related quality of life was measured using the Medical Outcomes Short Form (SF-12) for general health and the Seattle Angina Questionnaire (SAQ) for cardiac-specific health. The SF-12 measures eight health domains: physical function, physical role limitations, emotional role limitations, vitality, social function bodily pain, general health and mental health.[25] Patients rated their responses on a Likert scale from 3 to 6 and scores were transformed from the lowest 0 (worst health state) to the highest 100 (best health state). The SF-12 has two summary components; the physical component summary (PCS) and mental component summary (MCS) and all domains and summary scores can be compared with population-standardized norms.[26] The instrument has been validated internationally for cardiovascular populations,[27,28] epidemiological studies[29] and for Australian population health surveys,[30,31] and also in smaller studies on HRQOL in cardiac patients, often combined with the SAQ[32] and is highly correlated and comparable with other HRQOL instruments.[33] In this study, all domains showed high internal consistency (Cronbach's alpha 0.79–0.95) for the SF-12 at both measurement points.

The SAQ is a 19-item questionnaire for patients with coronary artery disease and measures domains of physical limitations, angina stability, angina frequency, treatment satisfaction, and quality of life.[34] Responses are measured on a 5 or 6 point Likert scale, with scores summed and transformed from 0 (worst health) to 100 (best health). SAQ scores for each domain are calculated creating a percentage of the total possible score – an adjusted score. Higher scores represent better function, fewer symptoms and higher HRQOL. As a disease-specific tool, the SAQ is sensitive and detects small changes in cardiac status not adequately captured by a general instrument[35] hence its addition in this study. The SAQ has been demonstrated as valid in determining the impact of angina relief after PCI.[36–41] A difference in scores of 5–10 points is considered a minimal clinically important difference (MCID) representing a significant change in HRQOL status.[36,42,43] In the current study internal consistency reliability for the SAQ was moderate (Cronbach alpha coefficients were 0.58 and 0.79 at 4 weeks and 6 months). Both instruments are brief and suitable for telephone interviews[44] with feasibility for our study initially confirmed by a pilot test.