

**HEALTH-RELATED QUALITY OF LIFE OUTCOMES
FOLLOWING PRIMARY PERCUTANEOUS
CORONARY INTERVENTION FOR ST-ELEVATION
MYOCARDIAL INFARCTION
(HOOP-PCI STUDY)**

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Doctor of Philosophy (Nursing)**

**This thesis is presented in fulfilment of the Degree of
Doctor of Philosophy**

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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STATEMENT OF CONTRIBUTIONS TO JOINTLY AUTHORED WORKS IN THE THESIS

The results of studies contained in this thesis have been published in peer-reviewed journal as four discreet manuscripts from Chapters three to six inclusive. For each study, as the first author (50% contribution), I have been responsible for creating and finalising the research questions, conducting the analysis and writing and completing the manuscripts. I have received enormous support, guidance and supervision with all aspects of manuscript drafting and revisions (25% contribution each) by Professors Robyn Gallagher and Doug Elliott. I accept responsibility for the results reported in the publications and the accuracy of the research in this thesis.

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3. Soo Hoo S, Gallagher R, Elliott, D. (2016), 'Field triage for non-complicated ST-elevation myocardial infarction: Factors influencing health-related quality of life after primary percutaneous coronary intervention for patients aged ≥ 70 and < 70 years', *Heart & Lung*, vol., 45 no 1, pp.56-63. **(Impact factor 1.29)**
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1. S. Soo Hoo, Gallagher, R. & Elliott, D. (2012), 'Health-related quality of life of older people after percutaneous coronary intervention', *Heart, Lung and Circulation*, vol. 21, suppl 2, pp. 285.
2. Soo Hoo S, Gallagher R, Elliott, D. (2014), 'Cardiac rehabilitation participation and health-related quality of life following percutaneous coronary intervention for ST-elevation myocardial infarction: An age comparison', *Journal of the Hong Kong College of Cardiology*, vol. 22 (Suppl 1), A21.

CONFERENCE PRESENTATIONS RELATED TO THIS THESIS

1. Soo Hoo S, Gallagher R, Elliott, D. (2008) Outcomes of older people undergoing percutaneous coronary intervention (PCI) in acute myocardial infarction: A review of the literature. The Beat Goes On Conference, 28th November 2008, Northern Sydney and Central Coast Health, Sydney. Australia
2. Soo Hoo S, Gallagher R, Elliott, D. (2012) Health-related quality of life of older people after percutaneous coronary intervention. Cardiac Society of Australia and New Zealand (CSANZ) 17th August 2012, 60th Annual Scientific Meeting, Brisbane, Australia.
3. Soo Hoo S, Gallagher R, Elliott, D. (2013) Health-related quality of life of older people after primary percutaneous coronary intervention (PCI) for ST-elevation myocardial infarction: A comparison by age and health status outcomes. Northern Sydney Local Health District Nursing and Midwifery Research & Innovative Practice Conference, 30th May 2013, Sydney. Australia.
4. Soo Hoo S, Gallagher R, Elliott, D. (2013) Health-related quality of life and post-discharge support following primary percutaneous coronary intervention: A comparison by age. Australian Cardiac Rehabilitation Conference (ACRA) 13th August 2013, Melbourne. Australia.
5. Soo Hoo S, Gallagher R, Elliott, D. (2013) Health-related quality of life and post-discharge support following primary percutaneous coronary intervention: A comparison by age. Australian Cardiac Rehabilitation Conference (ACRA), Sydney. Australia.
6. Soo Hoo S, Gallagher R, Elliott, D. (2014) Cardiac rehabilitation participation and health-related quality of life following percutaneous coronary intervention for ST-elevation myocardial infarction. 5th Asian Preventive Cardiology and Cardiac Rehabilitation Conference, November, 2014, Hong Kong.

7. Soo Hoo S, (2016), Health-related quality of life after primary percutaneous coronary intervention for ST-Elevation myocardial infarction: An age comparison study. International invited speaker for 12th Nursing and Healthcare Congress, 3-5th October, Vancouver, Canada. Confirmed and abstract publication pending.

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LIST OF ABBREVIATIONS

ACS	Acute coronary syndrome (umbrella term encompassing STEMI, NSTEMI, NSTEMI, NSTEMI and angina)
AMI	Acute myocardial infarction
BMI	Body mass index
CABG	Coronary Artery Bypass Graft
CAL	Chronic Airway Limitation
CASP	Critical Appraisal Skills Program
CHD	Coronary heart disease
CKMB	Creatine Kinase-MB
CR	Cardiac rehabilitation
CVD	Cardiovascular disease
ECG	Electrocardiogram
ED	Emergency department
HRQOL	Health-related quality of life
LOS	Length of stay
MACE	Major adverse cardiovascular events
MCID	Minimal clinically important difference
NSTEMI	Non-ST elevation myocardial infarction
SAQ	Seattle Angina Questionnaire
SF-12	Medical Outcomes Short Form 12
STEMI	ST-elevation myocardial infarction
PCI	Percutaneous coronary intervention (umbrella term which includes PTCA and or coronary artery stenting)
PPCI	Primary percutaneous coronary intervention

PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTCA	Percutaneous transluminal coronary angioplasty
PVD	Peripheral Vascular Disease
QOL	Quality of life
RCT	Randomised controlled trial
WHO	World Health Organisation

THESIS ABSTRACT

Background

Health-related quality of life (HRQOL) is an important measure of patient outcome following primary percutaneous coronary intervention (PPCI) for an ST-Elevation myocardial infarction (STEMI). The assessment of HRQOL quantifies patient perceptions of the impact of an acute, unanticipated cardiac event on their survival and normal function. Despite international recognition and recommendations supporting HRQOL as a vital measure of cardiovascular health status, HRQOL remains under-reported and not routinely implemented in PPCI care. Field triage patients who are fast-tracked to PPCI have less ischaemic time delays than routine Emergency Department (ED) admissions but their HRQOL and cardiac rehabilitation (CR) attendance patterns have not been investigated.

Aims

This study aims to examine HRQOL outcomes of STEMI patients and to identify the key factors that influence recovery and CR attendance at 4 weeks and 6 months after PPCI.

Method

Clinical and HRQOL data was collected and compared for age categories, divided at 60 and 70 years separately; the cut-off age of 70 years used for this thesis. The cut-off for older age at 60 years was used for the systematic review based on the global standard set by the World Health Organisation (World Health Organization, 2002). The age cut-off was changed to 70 years for the

thesis study as it is more representative of older people in developed countries such as Australia. The timing of follow-up at 4 weeks and 6 months was chosen based on published evidence that improvements in HRQOL post-PPCI reached a plateau at 6 months, after which, no significant differences occurred. A prospective cohort study was conducted with repeated measures for all consecutive STEMI patients (n=246) comprised of 194 males and 52 females. All were treated by PPCI after ED or Field Triage admissions in two metropolitan hospitals, the Royal North Shore and North Shore Private Hospitals. Additional analyses included HRQOL in the subgroup of Field Triage patients and determination of CR participation at 4 weeks and 6 months.

Results

Age, length of hospitalisation, gender, partnership status and number of stents deployed were independent predictors of HRQOL after STEMI and PPCI. Participants aged ≥ 70 years achieved better cardiac-related HRQOL and mental health from angina relief despite physical limitations. Older age, longer hospitalization, hypertension and recurrent angina were associated with poorer HRQOL for field triage patients. Despite a high referral rate (96%, n=233), CR attendance was sub-optimal (36-54%, n=89-132). A total of 221 patients attended CR; men and patients who received post-discharge support were more likely to attend.

Recommendations

There is a need to integrate HRQOL measurement into PPCI care to ensure post-discharge support is directed at those who need it most. Older people and women were identified in this research as having lower HRQOL and attendance

at CR. Important factors that negatively impact on HRQOL such as recurrent angina and longer hospitalization need to be considered in cardiovascular health-care delivery and risk management of acute STEMI cohorts.

Conclusion

The HRQOL for all ages improves from 4 weeks to 6 months after PPCI including field triage patients. Older age, longer hospitalization and female gender are common predictors of poorer HRQOL and lower CR attendance, constituting areas requiring future research focus.