A COMPARATIVE STUDY OF PATIENT PERCEIVED QUALITY OF LIFE PRE AND POST CORONARY ARTERY BYPASS GRAFT SURGERY

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ABSTRACT

Objective:

Traditionally, evaluation of outcome post cardiac surgery has focused on objective measures of cardiovascular status. The emphasis has shifted to examining an individual's quality of life (QoL). However a gap in Australian prospective research assessing QoL from a pre-operative period to the early stage of six weeks post-operatively exists. The aim of this study was to investigate recovery from coronary artery bypass graft surgery (CABGS) on the basis of patient perceived QoL and in particular, physical and mental health.

Design and setting:

Prospective longitudinal quasi-experimental study in a tertiary hospital in Melbourne, Australia.

Subjects:

Fifty four patients undergoing their first or second CABGS completed pre- and post-operative questionnaires.

Main outcome measures:

The Short Form 36 (SF-36) questionnaire was used to measure physical and mental QoL pre-and post CABGS and gives eight domain scores as well as a physical (PCS) and mental component summary score (MCS).

Results:

SF-36 scores following CABGS were significantly improved in three of the eight domains: physical functioning ($p<0.001$); general health perception ($p<0.001$); energy/vitality ($p<0.005$); and PCS ($p<0.001$). No statistical difference was found in patients' MCS pre- and post-operatively. Of importance, patients reported higher levels of pain at six weeks post-operatively compared to their pre-operative levels but scores were not significantly different.

Conclusions:

The SF-36 demonstrates improvements in physical QoL six weeks after CABGS compared to pre-operative results but no difference in mental QoL suggesting psychological adaptation. An increase in the pain score at six weeks suggests inadequate pain management in these patients.

INTRODUCTION

Coronary artery disease (CAD) is a significant cause of morbidity and mortality in Australia and around the world (Heart Foundation 2004). According to the Heart Foundation (2004), the health burden of cardiovascular disease exceeds that of any other disease and is the largest cause of death in Australia. The main symptoms associated with CAD are shortness of breath (dyspnoea) and chest pain (angina), which usually impacts negatively on an individual's physical functioning and activities of daily living (ADLs) and thus their QoL. Alleviation of these symptoms is the main reason individuals seek medical treatment.

Symptom severity has historically been categorised as the functional status of an individual with cardiac disease. The most recognised grading systems include; the Canadian Cardiovascular Society (CCS) classification of angina pectoris (Campeau 1976) and the New York Heart Association (NYHA) classification of heart failure (Criteria Committee of the New York Heart Association 1964). Although these classifications give clinicians an indication of the severity of an individual's symptoms, they do not inform us of their impact on the individual's QoL in terms of ADLs. There is no known cure for CAD. However re-vascularisation therapies are commonly utilised and include percutaneous coronary interventions (PCI) such as angioplasty and coronary stenting, and surgical re-vascularisation such as CABGS. Approximately 16,000 CABGS operations are performed annually in Australia (Heart Foundation 2004).

Research on CABGS has provided important data on outcomes, indicating that surgical intervention is effective in relieving the symptoms of CAD. Traditionally, evaluation of outcome post cardiac surgery has focused on medical outcomes such as complication, morbidity and mortality rates (Myles et al 2001). Although these measures are important in assessing the success of an operation, exclusively they cannot be regarded as an adequate estimate of outcome.

The Center for Disease Control and Prevention (2000) suggests that due to medical advances having led to improved treatment of disease and a delay in mortality, measuring health outcomes with interventions needs to not only focus on how many lives have been saved, but also on how an individual's life has been improved in terms of quality. A fitting explanation of QoL is the QoL theory which states that individual's subjective evaluation of the degree to which their needs, goals and wishes in valued areas of life, such as health, have been fulfilled, will equate to their life satisfaction (Frisch 2000).

In a study by Lindsay et al (2000) the researchers demonstrated that an individual's expectation of treatment is likely to have an influence on health outcomes with a majority of participants relating CABGS with an improved QoL. Gortner (1994) went on to find that the unexpected occurrence of continued symptoms post-operatively was shown to have a negative effect on an individual's perceptions of QoL following CABGS. Further research by Mallick et al (2005) has confirmed that those with depression and depressive symptoms report a negative or poorer QoL post CABGS even though their symptoms have been alleviated (Mallick et al 2005).

Considering the physical, social and emotional consequences of CAD which impact on QoL, measures have become increasingly recognised as complementary determinants of broader health status and have therefore gained importance in multidisciplinary clinical research (Donald 2003). A popular measure of subjective QoL for use in individuals with cardiovascular disease is the SF-36 questionnaire, which has been reported as valid and reliable in evaluating the impact of symptoms following CABGS (Ware 2003). Research investigating QoL in CABGS patients using the SF-36 has shown that for the majority of patients who undergo CABGS, most patients benefit from the procedure with an evident gain in QoL (Myles et al 2001; Skaggs and Yates 1999; Hunt et al 2000; Lindsay et al 2000). Of relevance to this study, Ross and Ostrow (2001) found that physical functioning and energy/vitality were significantly improved at six weeks post CABGS when compared to pre-operative levels.

METHODOLOGY

This prospective study was performed following review and approval by the Alfred Hospital Ethics Committee and the La Trobe University Human Ethics Committee. Data was collected face-to-face pre-operatively, intra-operatively and in the post-operative periods. All data was collected using the hospital cardiothoracic database. At the completion of data collection and analyses, data was kept in a locked filing cabinet for the follow-up study. Patient confidentiality was maintained throughout the study.

Questionnaire

The Australian version of the SF-36 was used (Australian Bureau of Statistics 1995). It is a self-administered 36 item questionnaire which measures eight domains of health. The scores for each domain range from 0 (the worst) to 100 (the best) possible health status. The scores can then be aggregated into two standardised summary scores measuring physical and mental health. (Jenkinson et al 1999). The mean score is 50 with 10 as the standard deviation. The SF-36's reliability and validity have been extensively reported. Ware (2003) found that the SF-36 was highly reliable; has high internal consistency; and high test-retest reliability. Similar results were also found in the Australian national survey (Australian Bureau of Statistics 1995).

Sample

A convenience sample of individuals undergoing CABGS or re-do CABGS was recruited over a 42 week period at a tertiary hospital in Melbourne, Australia. Potential participants were approached in the pre-admission clinic and consented for the study. The exclusion criteria included: those under the age of 18 years; those having concurrent surgery (valve replacement for example); those who were ventilated and intubated prior to operation; and those who had any communication disorder that could not be overcome with an interpreter. The data collection occurred between January and October 2004 and was completed pre-operatively in the pre-admission clinic and then six weeks post-operatively in the out-patients clinic.

Data analysis

Data analysis was performed using SPSS version 11.5®. Descriptive statistics were used for pre, peri and post-operative data. Paired t-tests were used to compare pre-operative and post-operative SF-36 scores.

FINDINGS

Eighty seven participants were recruited however information was obtained from only 81 participants pre-operatively. A percentage of the 81 patients did not

undergo CABGS or had concurrent surgical procedures such as valve replacement. These patients were then excluded from the study which reduced the sample size to 54. Patient demographic data from this sample is summarised in table 1.

Table 1:

Pre-operative characteristics of the sample

Variables	Frequency (n=62)	Percentage of sample (%)
Age	66.4 years (SD10.23)	
Gender		
Male	54	87.1
Female	8	12.9
Risk Factors		
Hypercholesterolaemia	56	90.0
Hypertension	58	93.5
Diabetes		
Type One	21	34.0
Type Two	3	4.8
Smoking Status		
Current smoker	15	24.2
Ex smoker	26	42.0
Cardiac history		
Acute myocardial infarction	26	42.0
Previous CABGS	4	6.5
Previous PTCA	12	20.0
Previous Stents	11	18.0

A majority (28.3%) of participants were found to have a Class III rating for the CCS, which means they had a marked limitation of ordinary physical activity and experienced angina with mild exertion; whereas a majority (35%) of participants had a Class II rating for the NYHA, which means they had slight limitation of physical activity. They were comfortable at rest, but ordinary activity resulted in fatigue or dyspnoea. Two patients (2.3%) died post-operatively in hospital due to cardiac causes. Both were undergoing re-operation.

The results from the SF-36 questionnaire for each of the eight domains are presented in table 2. Three measures were statistically significantly ($p<0.001$) from pre-operative to six weeks post-operative. These domains were physical functioning, energy/vitality, and general health perception. Scores in the remaining domains had improved from the pre-operative scores but were not statistically significant. The exception was in the domain of pain as this score decreased post-operatively, although it was not significant ($p=0.170$).

Table 2:

Mean pre and post-operative SF-36 scores for the eight domains (n=54).

SF-36 Domain	Pre-operative mean score (SD)	Post-operative mean score (SD)	Level of significance
Physical functioning	48.5 (25.8)	62.5 (21.7)	<0.001
Role limitation (due to physical problems)	47.1 (7.3)	54.6 (23.2)	0.600
Role limitation (due to emotional problems)	50.0 (44.2)	54.7 (43.9)	0.613
Social functioning	66.0 (28.1)	70.4 (28.6)	0.394
Mental health	82.9 (21.1)	83.7 (20.3)	0.798
Energy/vitality	53.3 (27.6)	64.3 (21.3)	0.004
Bodily pain	60.9 (25.9)	54.1 (25.0)	0.170
General health perception	58.0 (18.8)	69.5 (17.0)	<0.001

The component summary scores post-operatively for physical health showed significant improvement from the pre-operative score ($p<0.001$). The MCS score post-operatively was not statistically significant from the pre-operative level ($p=0.902$) (see table 3).

Table 3:

Mean PCS and MCS scores pre-operatively and six weeks post-operatively (n=54)

Component Summary Score	Pre-operative Mean Score (SD)	Post-operative Mean Score (SD)	T test	Level of significance
PCS	26.1 (8.0)	33.5 (10.2)	-4.6	<0.001
MCS	53.4 (12.7)	53.7 (10.1)	-0.124	0.902

LIMITATIONS

Several limitations should be considered when interpreting the findings of this study. The attrition rate was a problem due to the cardiothoracic unit significantly decreasing the number of surgical cases being undertaken at the time of this study and patients undergoing concomitant surgery for valvular disease. This impacted on the number of participants available for follow up in the allotted time. The stress experienced by participants during the pre-operative assessment when the initial data was collected is another potential limitation. One further problem with this non-randomised study is whether the observed differences in QoL scores from pre to post surgery may be due to other major life events rather than effects of re-vascularisation alone.

DISCUSSION

In this study, the male to female ratio was consistent with the demographic characteristics of cardiovascular disease predominantly affecting men, with CABGS being done three times more frequently in males than in females (Australian Institute of Health and Welfare 2003). The mean age of 66.4 years is considered young for those undergoing CABGS as procedure rates peak in Australia at ages 70-74 (Australian Institute of Health and Welfare 2003). This is a strong predicator for improvements of QoL, as Hunt et al (2000) found younger patients report greater improvements in QoL since they are more likely to return to a more active life post-operatively. A majority of participants reported having a Class III CCS rating and a Class II NYHA rating pre-operatively, suggesting they had a significantly decreased functional ability. Finally, the mortality rates are also representative of those undergoing CABGS. The findings from the demographic data demonstrate that the sample from this study is representative of the Australian population with heart disease (Australian Bureau of Statistics 1995).

When the pre-operative SF-36 scores from this sample are compared to Australian population data for those without heart disease and for those with heart disease, it reveals that for all domains except general health perception, mental health and the MCS scores are all well below the norms, suggesting that the QoL for this sample is below an optimal level (Australian Bureau of Statistics 1995). The fact that the domains of mental health and MCS scores are comparative to population norms suggests that the participants in this sample have psychologically adjusted to their illness. This is in line with previous studies (Singer et al 1999; Pit et al 1996).

In contrast, and not unexpected for individuals with symptomatic CAD awaiting CABGS, the identification of particularly poor health status pre-operatively through the PCS score may be an important factor in the overall assessment of operative risk. As Rumsfeld et al (1999) found inferences can be made as to how an individual's QoL will be affected post-operatively, as individuals with lower levels of health as determined by the SF-36 prior to CABGS are less likely to gain improvement in health following CABGS with up to 20% of patients not showing an improvement in QoL. The pre-operative PCS was also found to be predictor of mortality six months post CABGS.

When the post-operative SF-36 scores from this sample are compared to Australian population data for those with no heart disease, scores for all domains except energy/vitality, mental health and the MCS continued to be lower than the norms, suggesting that QoL at six weeks post CABGS continues to be sub-optimal.

When the mean SF-36 scores at pre-operative to post-operative periods in this sample are compared, significant improvements in three of the SF-36 domain scores: physical functioning; general health perception; and energy/vitality; as well as in the PCS are seen. This suggests that an individual's physical health improves when measured six weeks post CABGS. It would be expected that SF-36 scores would continue to improve with further recovery. Findings from this study are consistent with other results (Myles et al 2001; Ross and Ostrow 2001). These studies demonstrated that at six weeks post CABGS, individuals still have a sub-optimal QoL. For example at one month post-operatively there is minimal improvements in QoL due to the challenge of managing post-operative symptoms, dealing with health problems that arise after discharge, adapting to lifestyle changes, and getting back to normal routines and role functions (Skaggs and Yates 1999).

For bodily pain, post-operative scores were lower than those recorded at pre-operative assessment in accordance with other studies (Ross and Ostrow 2001). An increase in the pain score at six weeks post-operatively is most likely an implication of surgery in that the healing and associated pain experienced in the sternotomy wound is still present.

The nursing implications of this study are that the measurement of QoL is particularly important in that outcome assessment incorporates an assessment between surgical risks and potential benefits. Health professionals tend to underestimate many problems that individual's experience in relation to disabilities, disease and QoL. Nurses play an integral role in the optimisation of individual health outcomes. As each individual's self-perceived QoL is unique, through preparation and education prior to surgery the nurse can gain an increased knowledge of what the individual deems important allowing realistic goals, individualised care and education to be developed (Donald 2003). As a result this could accelerate the recovery process especially in the early post-operative period, as Lindsay et al (2000) found for a majority of individuals, the experience of the operation was a greater challenge than they had expected, the pain was more severe, they were weaker for longer and the recovery process was variable but long. Early preparation and education would also facilitate lifestyle changes and help individuals cope with the consequences of CABGS and furthermore improve their QoL.

An important finding from this study even though not statistically significant suggests that individuals are not discharged from hospital with the appropriate analgesia which means that their recovery is prolonged and QoL is impacted on. The implications are that post-operative pain could be better managed in this cohort. As Reimer-Kent (2003) suggests, inadequate pain management is a common problem post-operatively and it is an area of nursing practice that could be improved. As a consequence of these findings the Practice Review Committee made up of nurses from the cardiothoracic unit are in the process of developing pain management guidelines which will be used for all individuals undergoing a sternotomy, with the aim to introduce a consistent approach which is patient centered and can be undertaken in the community by the patient after discharge.

CONCLUSION

The goal of health care interventions today is to manage, alleviate or eradicate physical illness and ultimately improve a patient's QoL. Review of the literature revealed a gap in Australian research which this study attempted to fill: assessing QoL from a pre-operative period to the early stage of six weeks post-operatively. At six weeks post-operatively most patients are yet to experience significant improvements in their QoL. This study aimed to increase the body of knowledge regarding QoL outcomes for patients undergoing CABGS. Optimal care of patients requires consultation about perceived results of surgery and a change in practice to meet patient needs. In future, nurses can create a change in practice that makes a difference in QoL for patients undergoing CABGS if they improve the way in which patients are counseled so that they are supported before, during and after surgery.

RECOMMENDATION

A multidisciplinary approach is required to optimise patients' QoL post CABGS and to ensure they have adequate analgesia in the six week post-operatively. CAD is a chronic disease and the role of subjective QoL questionnaires needs to be investigated as a possible tool in monitoring patients' QoL, especially pre-and post CABGS.

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